K.S. Rangasamy College of Technology
(Autonomous)

CURRICULUM AND SYLLABI

FOR

B.E. Civil Engineering
(For the batch admitted in 2023 – 2024)

R2022

Accredited by NAAC A++, Approved by AICTE,
Affiliated to Anna University, Chennai.

KSR Kalvi Nagar, Tiruchengode – 637 215.
Namakkal District, Tamil Nadu, India.

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Department of Civil Engineering

VISION OF THE DEPARTMENT

To empower the graduates to excel as a competent professional in the areas of design and development of safe, healthy, sustainable and eco-friendly infrastructure for overall development of the society.

MISSION OF THE DEPARTMENT

- To provide quality education through interdisciplinary research and innovative practices for the Betterment of human society in teaching and learning.
- To develop creative solutions for a wide range of challenges in civil engineering by adopting modern tools and techniques.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Our graduates are professionally competent in their chosen career and use appropriate techniques and modern engineering tools in executing projects.

PEO2: Our graduates apply mathematical, scientific and engineering principles to solve complex problems in civil engineering through lifelong learning.

PEO3: Our graduates work in multidisciplinary projects with professional and ethical responsibilities.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to

PO1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: **Design / development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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PROGRAMME SPECIFIC OUTCOMES (PSOs)

Engineering Graduates will be able to:

PSO1: The graduates will have the ability to plan, analyse, design, execute cost effective project related to civil engineering structures with conservation and protection of natural resource for sustainable growth.

PSO2: The graduates will have the ability to take up employment, new start-ups, entrepreneurship, research and development, chartered engineering professional to serve the society with honesty and integrity.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) WITH PROGRAMME OUTCOMES (POs)

The B.E. Civil Engineering Programme outcomes leading to the achievement of the objectives are summarized in the following Table.

Programme Educational Objectives	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO 1	3	1	3	2	2	1	1	1	2	2	3	1
PEO 2	3	3	3	2	2	1	1	1	2	2	3	1
PEO 3	3	2	3	2	2	1	1	1	3	2	3	1

Contributions: 1- low, 2- medium, 3- high

Year	Sem.	Course Name	PO											
			1	2	3	4	5	6	7	8	9	10	11	12
I	I	Professional English - I	-	-	-	-	-	-	-	2	3	3	2	3
		Matrices and Calculus	3	3	3	2	2	-	-	-	-	-	-	2
		Physics for Civil Engineering	3	3	3	3	2	3	2	2	2	2	2	3
		Chemistry for Civil Engineering	3	3	3	3	1	3	3	3	3	2	3	3
		Basic Electrical and Electronics Engineering	2	3	1	2	-	-	3	2	-	-	2	3
		Heritage of Tamils (தமிழர் மரபு)	-	-	-	-	-	-	3	3	-	2	-	3
		Physics and Chemistry Laboratory	3	3	3	3	3	2	3	2	2	2	2	3
		Basic Electrical and Electronics Engineering Laboratory	3	3	3	3	2	2	2	2	2	2	3	3
	II	Professional English - II	-	-	-	-	-	-	-	2	3	3	2	3
		Integrals, Partial Differential Equations and Laplace Transform	3	3	3	3	3	-	-	-	-	-	-	2
		C Programming	3	3	3	-	3	-	-	-	2	2	2	2
		Engineering Drawing for Civil Engineers	3	1	1	1	2	-	-	-	2	-	-	2
		Applied Mechanics	3	2	2	3	3	2	3	3	3	3	3	3
		Environmental Studies and Climate Change	3	3	3	3	3	3	3	3	3	2	2	3
		Tamils and Technology (தமிழரும் தொழில்நுட்பமும்)	-	-	-	-	-	-	3	3	-	2	-	3

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		C Programming Laboratory	3	3	3	-	3	-	-	-	3	3	2	2
		Fabrication and Research Engineering Laboratory	3	3	3	2	3	3	2	3	3	1	1	3
		Career Skill Development - I	-	-	-	-	-	-	-	2	3	3	2	3
II	III	Statistics and Numerical Methods	3	3	3	3	3	-	-	-	-	-	-	2
		Strength of Materials	2	2	3	2	2	1	2	2	3	2	2	1
		Fluid Mechanics and Hydraulics Machinery	3	3	-	2	-	3	-	-	3	3	-	2
		Surveying	3	3	3	2	2	2	2	2	3	3	2	3
		Construction Materials and Practices	3	2	2	2	3	2	3	2	2	2	2	3
		Engineering Geology	3	2	2	2	3	2	2	2	2	2	2	3
		Fluid Mechanics and Hydraulics Engineering Laboratory	3	2	2	2	-	2	-	-	2	-	-	-
		Surveying Laboratory	3	2	3	3	-	3	-	-	2	-	-	-
		Career Skill Development- II	-	-	-	-	-	-	-	2	3	3	2	3
II	IV	Structural Analysis I	2	2	1	2	3	3	2	1	1	-	1	2
		Soil Mechanics	3	2	2	3	3	2	3	3	3	3	3	3
		Water Supply and Wastewater Engineering	3	3	2	-	1	3	3	3	1	2	1	3
		Concrete Technology	3	3	3	3	2	3	3	2	2	2	2	2
		Universal Human Values (UHV)*	-	-	-	-	-	3	3	3	3	1	1	3
		Building Planning and Drawing Laboratory	1	-	2	3	-	2	3	3	3	3	3	3
		Materials Testing Laboratory	3	2	2	3	2	2	2	2	3	2	2	2
		Career Skill Development - III	3	3	3	3	-	2	-	-	-	2	3	3
III	V	Structural Analysis II	3	3	3	3	2	3	3	3	3	2	3	3
		Foundation Engineering	3	3	3	3	2	3	3	3	3	2	3	3
		Basic Reinforced Concrete Design	3	3	3	3	2	3	3	3	3	2	3	3
		Repair and Rehabilitation of Structures	3	2	2	2	1	3	-	1	2	2	-	1
		Energy Science and Engineering	3	2	2	3	2	3	-	1	-	-	1	1
		Smart Cities	3	3	3	3	3	3	-	1	-	-	1	1
		Traffic Engineering and Management	3	3	1	-	1	-	1	-	-	-	-	-
		Construction Techniques and Equipment	3	2	2	2	2	2	2	2	2	2	2	3

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

		Water Quality and Management	3	2	3	-	-	2	-	2	-	-	-	3
		Architecture and Town Planning	2	1	-	1	-	2	2	1	-	-	2	-
		Start-ups and Entrepreneurship	3	3	3	3	3	2	2	1	-	1	3	3
		Geotechnical Engineering Laboratory	3	2	3	2	2	3	3	3	3	2	3	3
		Environmental Engineering Laboratory	3	3	2	3	1	3	3	2	-	2	-	2
		Design Thinking and Innovation Laboratory	3	3	3	3	-	-	-	1	1	1	-	1
		Career Skill Development - IV	-	-	-	-	-	-	-	2	3	3	2	3
		Internship	3	3	3	3	3	2	2	2	3	3	3	3
III	VI	Advanced Reinforced Concrete Design	1	2	3	-	-	-	-	3	-	-	3	-
		Design of Steel Structures	3	3	3	2	2	3	3	3	3	2	3	3
		Highway, Railway and Airport Engineering	3	2	3	2	3	1	1	3	2	1	-	3
		Hydrology and Water Resources Engineering	3	2	1	2	-	1	2	-	-	1	-	-
		Dynamics and Earthquake Engineering	3	2	3	1	1	2	-	1	-	-	-	3
		Air Pollution Management	3	2	1	1	-	2	3	-	-	1	1	3
		Bridge Engineering	2	2	1	1	2	1	1	1	1	1	2	-
		Transportation Planning	3	3	3	3	3	3	3	2	2	2	3	3
		Building Services	3	-	-	-	-	-	-	-	2	2	-	1
		Water Resources Systems Engineering	3	3	3	2	2	3	3	3	3	2	3	3
		Climatic Changes and Adaptation Measures	3	2	3	2	-	3	3	-	-	-	-	-
		NCC\NSS\NSO\YRC\ RRC\Yoga\Fine Arts	3	2	1	1	1	1	1	1	1	1	-	-
		Concrete and Highway Laboratory	3	2	3	3	2	2	2	2	3	2	2	2
		Computer Aided Analysis and Design Laboratory	3	3	3	3	3	2	1	1	3	3	3	1
		Design Thinking and Product Development Laboratory	3	3	3	3	-	-	-	1	1	1	-	1
		Comprehensive Test	3	3	2	2	-	-	-	-	1	2	2	3
		Internship	3	3	3	3	3	2	2	2	3	3	3	3
IV	VII	Engineering Economics and Financial Accounting	2	2	1	3	-	1	2	-	-	-	3	2
		Prestressed Concrete	3	3	2	3	2	2	1	1	-	-	-	1
		Construction Planning and Management	3	2	2	3	-	2	3	-	-	1	1	3
		Smart Materials and Smart Structures	3	2	2	3	2	2	-	1	-	-	1	1

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		Solid and Hazardous Waste management	3	-	-	-	-	3	-	-	-	2	-	-
		Ground Improvement Techniques	3	2	-	2	-	-	-	-	2	2	-	1
		Urban Planning and Development	1	1	1	1	1	1	1	1	1	1	1	1
		Quality Control and Assurance	3	-	-	2	3	-	2	3	-	2	3	2
		Groundwater Engineering	3	3	3	2	-	-	2	-	-	1	1	2
		Prefabricated Structures	2	2	3	2	1	-	-	-	2	2	-	-
		Industrial Waste Management	3	3	2	2	1	2	-	1	2	2	-	1
		Reinforced Earth and Geotextiles	3	2	3	-	-	-	-	-	1	1	-	1
		Intelligent Transport Systems	3	2	2	2	1	2	-	-	2	2	-	1
		Project Management	3	1	-	1	1	-	-	1	2	-	3	1
		Integrated Water Resources Management	3	3	3	2	-	3	3	-	-	1	-	1
		Application of Remote Sensing and GIS in Engineering	3	3	3	3	3	3	3	3	2	2	3	3
		Disaster Management	3	3	2	2	2	2	2	2	3	2	2	2
		Research Skill Development	1	1	1	1	1	1	1	3	3	3	-	3
		NCC\NSS\NSO\YRC\RRC\Yoga\Fine Arts	3	2	1	1	1	1	1	1	1	1	-	-
		Estimation and Quantity Surveying Laboratory	2	2	2	2	1	1	1	1	-	-	-	-
		Project Work - I	3	2	3	-	-	3	-	3	3	-	-	2
		Internship	3	3	3	3	3	2	2	2	3	3	3	3
	VIII	Tall Structures	3	3	2	1	1	-	-	-	2	-	-	-
		Advanced Environmental Engineering	3	2	1	3	1	2	-	1	-	-	1	1
		Machine Foundation	3	2	3	1	1	2	-	1	-	-	-	3
		Pavement Analysis and Design	3	2	2	1	1	2	-	1	2	2	-	1
		Safety in Construction	3	2	2	2	1	2	-	1	2	2	-	1
		Watershed Conservation and Management	3	2	1	2	2	1	-	-	2	2	-	1
		Project Work - II	3	2	3	-	-	3	-	3	3	-	-	2
		Internship	3	3	3	3	3	2	2	2	3	3	3	3

K.S. RANGASAMY COLLEGE OF TECHNOLOGY

Credit Distribution for B.E. (Civil) Programme – 2023 – 2024 Batch

SUMMARY

S.No.	Category	Credits Per Semester								Total Credits	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	2	2	-	-	-	-	3	-	**07**	**04.32**
2.	BS	12	4	4	-	-	-	-	-	**20**	**12.35**
3.	ES	5	11	-	-	-	-	-	-	**16**	**09.88**
4.	PC	-	4	18	18	19	18	6	-	**85**	**52.47**
5.	PE	-	-	-	-	3	3	6	3	**15**	**09.25**
6.	OE	-	-	-	3	-	3	3	-	**09**	**05.56**
7.	CG	-	1*	1*	1*	1*	-	2	8	**10**	**06.17**
8.	MC	-	-		3*	3*	-	-	-	**09***	-
9.	AC	-	-	-	-	-	-	0	0	0	0
Total		**19**	**21**	**24**	**21**	**22**	**24**	**20**	**11**	**162**	**100**

HS – HUMANITIES AND SOCIAL SCIENCES
BS – BASIC SCIENCES
ES – ENGINEERING SCIENCES
PC – PROFESSIONAL CORE
PE – PROFESSIONAL ELECTIVES
OE – OPEN ELECTIVES
CG – CAREER GUIDANCE COURSES
MC – MANDATORY COURSES
AC – AUDIT COURSES

Open Electives are courses offered by different departments that do not have any prerequisites and could be of interest to students of any branch

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY,TIRUCHENGODE -637215
(An Autonomous Institution affiliated to Anna University)

HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 EN 001	Professional English - I	HS	2	1	1	0	2	Basic Knowledge in English
2.	60 EN 002	Professional English - II	HS	2	1	1	0	2	Professional English - I
3.	60 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3	-NIL-
4.	60 AB 00*	NCC/NSS/NSO/YRC/RRC/Fine Arts*	HS	-	-	-	-	3*	-NIL-

BASIC SCIENCE (BS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 MA 001	Matrices and Calculus	BS	5	3	1	0	4	Basic Knowledge in Mathematics
2.	60 PH 002	Physics for Civil Engineering	BS	3	3	0	0	3	Basic Knowledge in Physics
3.	60 CH 002	Chemistry for Civil Engineering	BS	3	3	0	0	3	Basic Knowledge in Chemistry
4.	60 CP 0P1	Physics and Chemistry Laboratory	BS	4	0	0	4	2	As above
5.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	5	3	1	0	4	Basic Knowledge in Mathematics
6.	60 MA 007	Statistics and Numerical Methods	BS	5	3	1	0	4	Basic Knowledge in Mathematics

ENGINEERING SCIENCES (ES)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE 101	Engineering Drawing for Civil Engineers	ES	6	2	0	4	4	Knowledge in Drawings
2.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2	Knowledge in Basic Engg.
3.	60 CS 001	C Programming	ES	3	3	0	0	3	Basic Knowledge in Computer
4.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3	Knowledge in Basic Engg.
5.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2	C Programming
6.	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	ES	4	0	0	4	2	Basic Electrical and Electronics Engineering

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PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-reqiosite
1.	61 CE 201	Applied Mechanics	PC	5	3	1	0	4	Physics for Civil Engineering
2.	61 CE 301	Strength of Materials	PC	5	3	1	0	4	Applied Mechanics
3.	60 CE 302	Fluid Mechanics and Hydraulics Machinery	PC	5	3	1	0	4	Basic Knowledge in Fluids
4.	60 CE 303	Surveying	PC	3	3	0	0	3	Knowledge in Measurements
5.	60 CE 304	Construction Materials and Practices	PC	3	3	0	0	3	Knowledge in Basic Materials
6.	60 CE 305	Engineering Geology	PC	2	2	0	0	2	Knowledge in Basic Geology
7.	60 CE 3P1	Fluid Mechanics and Hydraulics Engineering Laboratory	PC	4	0	0	4	2	Fluid Mechanics and Hydraulics Machinery
8.	60 CE 3P2	Surveying Laboratory	PC	4	0	0	4	2	Surveying
9.	60 CE 401	Structural Analysis I	PC	5	3	1	0	4	Strength of Materials
10.	60 CE 402	Soil Mechanics	PC	5	3	1	0	4	Engineering Geology
11.	60 CE 403	Water Supply and Wastewater Engineering	PC	3	3	0	0	3	Environmental Studies and Climate Change
12.	60 CE 404	Concrete Technology	PC	3	3	0	0	3	Construction Materials
13.	60 CE 4P1	Building Planning and Drawing Laboratory	PC	4	0	0	4	2	Computer Aided Drafting Laboratory
14.	60 CE 4P2	Materials Testing Laboratory	PC	4	0	0	4	2	Strength of Materials
15.	60 CE 501	Structural Analysis II	PC	5	3	1	0	4	Structural Analysis I
16.	60 CE 502	Foundation Engineering	PC	5	3	1	0	4	Soil Mechanics
17.	60 CE 503	Basic Reinforced Concrete Design	PC	5	3	1	0	4	Strength of Materials
18.	60 CE 5P1	Geotechnical Engineering Laboratory	PC	3	0	0	3	1.5	Soil Mechanics, Foundation Engineering
19.	60 CE 5P2	Environmental Engineering Laboratory	PC	3	0	0	3	1.5	Water Supply and Wastewater Engineering
20.	60 CE 5P3	Design Thinking and Innovation Laboratory	PC	2	0	0	2	1	-
21.	60 CE 601	Advanced Reinforced Concrete Design	PC	5	3	1	0	4	Basic Reinforced Concrete Design
22.	60 CE 602	Design of Steel Structures	PC	5	3	1	0	4	Strength of Materials
23.	60 CE 603	Highway, Railway and Airport Engineering	PC	3	3	0	0	3	Surveying
24.	60 CE 604	Hydrology and Water Resources Engineering	PC	3	3	0	0	3	Environmental Studies and Climate Change
25.	60 CE 6P1	Concrete and Highway Laboratory	PC	3	0	0	3	1.5	Concrete Technology

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26.	60 CE 6P2	Computer Aided Analysis and Design Laboratory	PC	3	0	0	3	1.5	Engineering Drawing for Civil Engineers
27.	60 CE 6P3	Design Thinking and Product Development Laboratory	PC	2	0	0	2	1	Design Thinking and Innovation
28.	60 CE 701	Prestressed Concrete	PC	5	3	1	0	4	Concrete Technology
29.	60 CE 702	Construction Planning and Management	PC	3	3	0	0	3	Construction Materials and Practices
30.	60 CE 7P1	Estimation and Quantity Surveying Laboratory	PC	3	0	0	2	2	Building Planning and Drawing Laboratory

PROFESSIONAL ELECTIVES (PE)

SEMESTER V, PROFESSIONAL ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE E11	Repair and Rehabilitation of Structures	PE	3	3	0	0	3	Concrete Technology
2.	60 C EE12	Energy Science and Engineering	PE	3	3	0	0	3	Basic Electrical and Electronics Engineering
3.	60 CE E13	Smart Cities	PE	3	3	0	0	3	Construction Materials and Practices
4.	60 CE E14	Traffic Engineering and Management	PE	3	3	0	0	3	Highway, Railway and Airport Engineering
5.	60 CE E15	Construction Techniques and Equipment	PE	3	3	0	0	3	Construction Materials and Practices
6.	60 CE E16	Water Quality and Management	PE	3	3	0	0	3	Water Supply and Wastewater Engineering
7.	60 CE E17	Architecture and Town Planning	PE	3	3	0	0	3	Nil

SEMESTER VI, PROFESSIONAL ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE E21	Dynamics and Earthquake Engineering	PE	3	3	0	0	3	Geology, Soil Mechanics
2.	60 CE E22	Air Pollution Management	PE	3	3	0	0	3	Environmental Studies and Climate Change
3.	60 CE E23	Bridge Engineering	PE	3	3	0	0	3	Basic Reinforced Concrete Design
4.	60 CE E24	Transportation Planning	PE	3	3	0	0	3	Highway, Railway and Airport Engineering
5.	60 CE E25	Building Services	PE	3	3	0	0	3	Basic Electrical and Electronics Engineering
6.	60 CE E26	Water Resources Systems Engineering	PE	3	3	0	0	3	Hydrology and Water Resources Engineering
7.	60 CE E27	Climatic Changes and Adaptation Measures	PE	3	3	0	0	3	Environmental science and engineering

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

SEMESTER VII, PROFESSIONAL ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE E31	Smart Materials and Smart Structures	PE	3	2	0	2	3	Construction Materials and Practices
2.	60 C EE32	Solid and Hazardous Waste management	PE	3	2	0	2	3	Water Supply and Wastewater Engineering
3.	60 CE E33	Ground Improvement Techniques	PE	3	2	0	2	3	Foundation Engineering
4.	60 CE E34	Urban Planning and Development	PE	3	2	0	2	3	Construction Materials and Practices
5.	60 CE E35	Quality Control and Assurance	PE	3	2	0	2	3	Materials Testing Laboratory
6.	60 CE E36	Groundwater Engineering	PE	3	2	0	2	3	Hydrology and Water Resources Engineering

SEMESTER VII, PROFESSIONAL ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE E41	Prefabricated Structures	PE	3	3	0	0	3	Prestressed Concrete
2.	60 CE E42	Industrial Waste Management	PE	3	3	0	0	3	Water Supply and Wastewater Engineering
3.	60 CE E43	Reinforced Earth and Geotextiles	PE	3	3	0	0	3	Soil Mechanics, Foundation Engineering
4.	60 CE E44	Intelligent Transport Systems	PE	3	3	0	0	3	Highway, Railway and Airport Engineering
5.	60 CE E45	Project Management	PE	3	3	0	0	3	Construction Planning and Management
6.	60 CE E46	Integrated Water Resources Management	PE	3	3	0	0	3	Hydrology and Water Resources Engineering
7.	60 CE E47	Application of Remote Sensing and GIS in Engineering	PE	3	3	0	0	3	Geology
8.	60 CE E48	Disaster Management	PE	3	3	0	0	3	Repair and Rehabilitation of Structures

SEMESTER VIII, PROFESSIONAL ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE E51	Tall Structures	PE	3	3	0	0	3	Advanced Reinforced Concrete Design
2.	60 CE E52	Advanced Environmental Engineering	PE	3	3	0	0	3	Water Supply and Wastewater Engineering
3.	60 CE E53	Machine Foundation	PE	3	3	0	0	3	Foundation Engineering

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

4.	60 CE E54	Pavement Analysis and Design	PE	3	3	0	0	3	Highway, Railway and Airport Engineering
5.	60 CE E55	Safety in Construction	PE	3	3	0	0	3	Construction Planning and Management
6.	60 CE E56	Watershed Conservation and Management	PE	3	3	0	0	3	Hydrology and Water Resources Engineering

MANDATORY COURSES (MC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0	Nil
2.	60 MY 002	Universal Human Values	MC	3	2	1	0	3	Nil
3.	60 MY 003	Start-ups & Entrepreneurship	MC	2	2	0	0	2*	Nil

SEMESTER VII & SEMESTER VIII, AUDIT COURSES (AC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 AC 001	Research Skill Development	AC	1	1	0	0	0	Nil

OPEN ELECTIVES I / II / III / IV (OE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE L01	Waste Management Techniques	OE	3	3	0	0	3	Nil
2.	60 CE L02	Climatic Changes and Adaptation Measures	OE	3	3	0	0	3	Nil
3.	60 CE L03	Application of Remote Sensing and GIS in Engineering	OE	3	3	0	0	3	Nil
4.	60 CE L04	Road Safety and Planning	OE	3	3	0	0	3	Nil
5.	60 CE L05	Environment and Ecology	OE	3	3	0	0	3	Nil
6.	60 CE L06	Architectural Engineering	OE	3	3	0	0	3	Nil
7.	60 CE L07	Green Buildings	OE	3	3	0	0	3	Nil
8.	60 CE L08	Sustainable Infrastructure	OE	3	3	0	0	3	Nil
9.	60 CE L09	Fundamentals of Civil Engineering	OE	3	3	0	0	3	Nil
10.	60 CE L10	Disaster Management	OE	3	3	0	0	3	Nil

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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

INTEGRATED COURSES

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE E31	Smart Materials and Smart Structures	PE	3	2	0	2	3	Construction Materials and Practices
2.	60 C EE32	Solid and Hazardous Waste management	PE	3	2	0	2	3	Water Supply and Wastewater Engineering
3.	60 CE E33	Ground Improvement Techniques	PE	3	2	0	2	3	Foundation Engineering
4.	60 CE E34	Traffic Engineering and Management	PE	3	2	0	2	3	Highway, Railway and Airport Engineering
5.	60 CE E35	Quality Control and Assurance	PE	3	2	0	2	3	Materials Testing Laboratory
6.	60 CE E36	Groundwater Engineering	PE	3	2	0	2	3	Hydrology and Water Resources Engineering

CAREER GUIDANCE COURSES (CG)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CG 0P1	Career Skill Development - I	CGC	2	2	0	0	1*	Nil
2.	60 CG 0P2	Career Skill Development - II	CGC	2	0	0	2	1*	Nil
3.	60 CG 0P3	Career Skill Development - III	CGC	2	0	0	2	1*	Nil
4.	60 CG 0P4	Career Skill Development - IV	CGC	2	0	0	2	1*	Nil
5.	60 CG 0P5	Comprehension Test	CGC	2	0	0	2	0	Nil
6.	60 CE 7P2	Project Work - I	CGC	4	0	0	4	2	Nil
7.	60 CE 8P1	Project Work - II	CGC	16	0	0	16	8	Nil
8.	60 CG 0P6	Internship	CGC		-	-	-	1/2/3*	Nil

GENERAL ELECTIVE (GE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 AB 001	National Cadet Corps (Air Wing)	HS	5	2	0	2	3	-NIL-
2.	60 AB 002	National Cadet Corps (Army Wing)	HS	5	2	0	2	3	-NIL-

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY,TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)
COURSES OF STUDY
(For the candidates admitted from 2023-2024 onwards)

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1		Induction Programme	-	-	-	-	-	**0**
THEORY								
2.	60 EN 001	Professional English I	HS	3	1	0	2	2
3.	60 MA 001	Matrices and Calculus	BS	5	3	1	0	4
4.	60 PH 002	Physics for Civil Engineering	BS	3	3	0	0	3
5.	60 CH 002	Chemistry for Civil Engineering	BS	3	3	0	0	3
6.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
7.	60 GE 001	Heritage of Tamils (தமிழர் மரபு)	GE	1	1	0	0	1[&]
PRACTICALS								
8.	60 CP 0P1	Physics and Chemistry Laboratory	BS	4	0	0	4	2
9.	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	ES	4	0	0	4	2
Total				**26**	**14**	**1**	**10**	**19**

I to VII semester
NCC[%] - Course can be waived with 3 credits in VII semester or offered as extra credits
NSS/NSO/YRC/RRC/Fine Arts[%] - 3 credits is not accounted for CGPA
Career Skill Development[*] - Extra 1 credit is offered and not accounted for CGPA.
I to VIII semester
Internship 3 additional credits not accounted for CGPA is offered based on the Internship duration
Heritage of Tamils[&] - additional 1 credit is offered and not account for CGPA.

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 EN 002	Professional English II	HS	3	1	0	2	2
2.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	5	3	1	0	4
3.	60 CS 001	C Programming	ES	3	3	0	0	3
4.	60 CE 101	Engineering Drawing for Civil Engineers	ES	6	2	0	4	4
5.	61 CE 201	Applied Mechanics	PC	5	3	1	0	4
6.	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0
7.	60 GE 002	Tamils and Technology (தமிழரும் தொழில் நுட்பமும்)	GE	1	1	0	0	1[&]
PRACTICALS								
8.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2
9.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2
10.	60 CG 0P1	Career Skill Development - I	CG	2	0	0	2	1[*]
Total				**35**	**15**	**2**	**16**	**21**

- Tamils and Technology[&] Extral1 credit is offered and not account for CGPA.

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 MA 007	Statistics and Numerical Methods	BS	5	3	1	0	4
2.	61 CE 301	Strength of Materials	PC	5	3	1	0	4
3.	60 CE 302	Fluid Mechanics and Hydraulics Machinery	PC	5	3	1	0	4
4.	60 CE 303	Surveying	PC	3	3	0	0	3
5.	60 CE 304	Construction Materials and Practices	PC	3	3	0	0	3
6.	60 CE 305	Engineering Geology	PC	2	2	0	0	2
PRACTICALS								
7.	60 CE 3P1	Fluid Mechanics and Hydraulics Engineering Laboratory	PC	4	0	0	4	2
8.	60 CE 3P2	Surveying Laboratory	PC	4	0	0	4	2
9.	60 CG 0P2	Career Skill Development - II	CG	2	0	0	2	1*
10.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
				33	**18**	**3**	**10**	**24**

SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CE 401	Structural Analysis I	PC	5	3	1	0	4
2.	60 CE 402	Soil Mechanics	PC	5	3	1	0	4
3.	60 CE 403	Water Supply and Wastewater Engineering	PC	3	3	0	0	3
4.	60 CE 404	Concrete Technology	PC	3	3	0	0	3
5.	60 CE L*	Open Elective – I	OE	3	3	0	0	3
6.	60 MY 002	Universal Human Value (UHV)	MC	3	3	0	0	3#
PRACTICALS								
7.	60 CE 4P1	Building Planning and Drawing Laboratory	PC	4	0	0	4	2
8.	60 CE 4P2	Materials Testing Laboratory	PC	4	0	0	4	2
9.	60 CG 0P3	Career Skill Development - III	**CG**	2	0	0	2	1*
10.	60 CG 0P6	Internship	CG		-	-	-	1/2/3*
				32	**18**	**2**	**10**	**21**

- UHV# - additional 3 credit is offered and not accounted for CGPA

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CE 501	Structural Analysis II	PC	4	3	1	0	4
2.	60 CE 502	Foundation Engineering	PC	4	3	1	0	4
3.	60 CE 503	Basic Reinforced Concrete Design	PC	4	3	1	0	4
4.	60 CE E*	Professional Elective I	PE	3	3	0	0	3
5.	60 CE L**	Open Elective – II	OE	3	3	0	0	3
6.	60 MY 003	Start-ups and Entrepreneurship	MC	2	2	0	0	2*
PRACTICALS								
7.	60 CE 5P1	Geotechnical Engineering Laboratory	PC	3	0	0	3	1.5
8.	60 CE 5P2	Environmental Engineering Laboratory	PC	3	0	0	3	1.5
9.	60 CE 5P3	Design Thinking and Innovation Laboratory	PC	2	0	0	2	1
10.	60 CG 0P4	Career Skill Development - IV	**CG**	2	0	0	2	1*
11.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
				33	**17**	**3**	**10**	**22**

SEMESTER VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CE 601	Advanced Reinforced Concrete Design	PC	5	3	1	0	4
2.	60 CE 602	Design of Steel Structures	PC	5	3	1	0	4
3.	60 CE 603	Highway, Railway and Airport Engineering	PC	3	3	0	0	3
4.	60 CE 604	Hydrology and Water Resources Engineering	PC	3	3	0	0	3
5.	60 CE E*	Professional Elective II	PE	3	3	0	0	3
6.	60 CE L**	Open Elective – III	OE	3	3	0	0	3
7.	60 AB 00*	NCC\NSS\NSO\YRC\RRC\Yoga\Fine Arts	HS	4	2	0	2	3%
PRACTICALS								
8.	60 CE 6P1	Concrete and Highway Laboratory	PC	3	0	0	3	1.5
9.	60 CE 6P2	Computer Aided Analysis and Design Laboratory	PC	3	0	0	3	1.5
10.	60 CE 6P3	Design Thinking and Product Development Laboratory	PC	2	0	0	2	1
11.	60 CG 0P5	Comprehension Test	CG	2	0	0	2	1*
12.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
				36	**20**	**2**	**12**	**24**

Comprehension Test* - one additional credit is offered and not accounted for CGPA calculation

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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

SEMESTER VII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 HS 002	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
2.	60 CE 701	Prestressed Concrete	PC	5	3	1	0	4
3.	60 CE 702	Construction Planning and Management	PC	3	3	0	0	3
4.	60 CE E*	Professional Elective III	PE	3	2	0	2	3
5.	60 CE E*	Professional Elective IV	PE	3	3	0	0	3
6.	60 AC 001	Research Skill Development	AC	1	1	0	0	0
7.	60 AB 00*	NCC\NSS\NSO\YRC\RRC\Yoga\Fine Arts	HS	4	2	0	2	3%
PRACTICALS								
8.	60 CE 7P1	Estimation and Quantity Surveying Laboratory	PC	3	1	0	2	2
9.	60 CE 7P2	Project Work - I	CG	4	0	0	4	2
10.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
				25	**18**	**1**	**6**	**20**

NCC% - Course can be waived with 3 credits in VII semester or offered as extra 3 credits
NSS/NSO/YRC/RRC/Fine Arts% - 3 extra credits not accounted for CGPA

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CE E*	Professional Elective - V	PE	3	3	0	0	3
PRACTICALS								
2.	60 CE 8P1	Project Work - II	CG	16	0	0	16	8
3.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
				19	**3**	**0**	**16**	**11**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 162

Note: HS- Humanities and Social Sciences including Management Courses, BS- Basic Science Courses, ES- Engineering Science Courses, PC-Professional Core Courses, PE-Professional Elective Courses, GE- General Elective Courses, OE- Open Elective Courses, CG - Career Guidance Courses, MC- Mandatory Courses

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TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2023-2024 onwards)

FIRST SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment *	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 EN 001	Professional English - I	2	40	60	100	45	100
2	60 MA 001	Matrices and Calculus	2	40	60	100	45	100
3	60 PH 002	Physics for Civil Engineering	2	40	60	100	45	100
4	60 CH 002	Chemistry for Civil Engineering	2	40	60	100	45	100
5	60 EE 001	Basic Electrical and Electronics Engineering	2	40	60	100	45	100
6	60 GE 001	Heritage of Tamils (தமிழர் மரபு)	2	40	60	100	45	100
PRACTICAL								
7	60 CP 0P1	Physics and Chemistry Laboratory	3	60	40	100	45	100
8	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	3	60	40	100	45	100

***** CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test pape follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 EN 001	Professional English – I	Category	L	T	P	Credit
		HS	1	0	2	2

Objectives

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

Pre-requisites

- **Basic knowledge of reading and writing in English**

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and interpret complex academic texts	Understand
CO2	Recall the denotative and connotative meanings of technical texts	Remember
CO3	Interpret definitions, descriptions, narrations, and essays on various topics	Understand
CO4	Express fluently and accurately in formal and informal communicative contexts	Understand
CO5	Summarize their opinions effectively in both oral and written medium of communication	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	10	30
Understand	50	50	50	70
Apply	-	-	-	-
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	60	100

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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to All Branches

60 EN 001 - Professional English I

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	0	2	45	2	40	60	100

Introduction to Fundamentals of Communication* **Listening:** General information-specific details-conversation: introduction to classmates – audio / video (formal & informal). **Speaking:** Self Introduction; Introducing a friend; conversation - politeness strategies. **Reading:** Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. **Writing:** Writing letters – informal and formal – basics and format orientation **Language Focus:** Present Tenses; word formation (affixes); synonyms, antonyms and contranyms, and phrasal verbs; abbreviations & acronyms (as used in technical contexts).	[9]
Narration and Summation* **Listening:** Podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities. **Speaking:** Narrating personal experiences / events; Interviewing a celebrity; reporting / and summarizing of documentaries / podcasts/ interviews. **Reading:** Biographies, travelogues, newspaper reports, excerpts from literature, and travel & technical blogs. **Writing:** Paragraph writing, short report on an event (field trip etc.). **Language Focus**: Past tenses and prepositions; One-word substitution.	[9]
Description of a process / product* **Listening:** Listen to a product and process descriptions; advertisements about products or services **Speaking**: Picture description; giving instruction to use the product; presenting a product. **Reading**: Advertisements, gadget reviews and user manuals. **Writing:** Definitions; instructions; and product /process description. **Language Focus**: Imperatives; comparative adjectives; future tenses. Homonyms; and Homophones, discourse markers (connectives & sequence words)	[9]
Classification and Recommendations* **Listening:** TED Talks; scientific lectures; and educational videos. **Speaking**: Small Talk; Mini presentations **Reading**: Newspaper articles and Journal reports **Writing:** Note-making / Note-taking; recommendations; Transferring information from non-verbal (chart, graph etc, to verbal mode) **Language Focus**: Articles; Pronouns -Possessive & Relative pronouns; subject-verb agreement; collocations.	[9]
Expression* **Listening:** Debates/ discussions; different viewpoints on an issue; and panel discussions. **Speaking**: Group discussions, debates & role plays. **Reading**: Editorials; and opinion blogs. **Writing**: Essay Writing (Descriptive or narrative). **Language Focus**: Punctuation; Compound Nouns; simple, compound & complex sentences. Cause & effect expressions.	[9]
Total Hours:	**45**

Text Book(s):

1.	'English for Engineers & Technologists' Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, 'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book', Penguin Random House India, 2020

Reference(s):

1.	Paul Emmerson and Nick Hamilton, 'Five Minute Activities for Business English', Cambridge University Press, New York, 2005
2.	Arthur Brookes and Peter Grundy,' Beginning to Write: Writing Activities for Elementary and Intermediate Learners', Cambridge University Press, New York, 2003
3.	Michael McCarthy and Felicity O Dell, 'English Vocabulary in Use: Upper Intermediate', Cambridge University Press, N.York, 2012
4.	Lakshmi Narayanan, 'A Course Book on Technical English'Scitech Publications (India) Pvt. Ltd. 2020

*** SDG- 04- Quality Education**

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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Fundamentals of Communication**	
1.1	Listening for general information and Specific details	1
1.2	Self-introduction	1
1.3	Narrating personal experiences	1
1.4	Reading relevant to technical contexts and emails	1
1.5	Writing letters – informal	1
1.6	Writing letters - formal	1
1.7	Present Tenses	1
1.8	synonyms, antonyms and contranyms, and affixes	1
1.9	phrasal verbs; abbreviations & acronyms	1
2.0	**Narration and Summation**	
2.1	Listening to podcasts, documentaries and interviews with celebrities	1
2.2	Narrating personal experiences	1
2.3	Summarizing of documentaries	1
2.4	Reading travelogues, and excerpts from literature	1
2.5	Paragraph writing	1
2.6	Short report on an event (field trip etc.).	1
2.7	Past tenses	1
2.8	Prepositions	1
2.9	One-word substitution	1
3.0	**Description of a process / product**	
3.1	Listen to a product and process descriptions	1
3.2	Picture description	1
3.3	Giving instruction to use the product	1
3.4	Reading Advertisements, gadget reviews and user manuals	1
3.5	Writing Definitions and instructions	1
3.6	Future Tenses	1
3.7	Homonyms and Homophones	1
3.8	Imperatives	1
3.9	comparative adjectives, and discourse markers	1
4.0	**Classification and Recommendations**	
4.1	Listening to TED Talks and educational videos	1
4.2	Listening to scientific lectures	1
4.3	Small Talk and mini presentations	1
4.4	Reading newspaper articles and journal reports	1
4.5	Note-making / Note-taking	1
4.6	Recommendations	1
4.7	Transferring information from non-verbal	1
4.8	Articles and Pronouns	1
4.9	Subject-verb agreement and collocations	1
5.0	**Expression**	
5.1	Listening to debates and panel discussions	1
5.2	Group discussions	2
5.3	Role plays	1
5.4	Reading editorials and opinion blogs	1
5.5	Essay Writing (Descriptive or narrative)	1
5.6	Punctuation and cause & effect expressions.	1
5.7	Compound Nouns	1
5.8	Simple, compound & complex sentences	1

Course Designer(s)

1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 MA 001	Matrices and Calculus	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To familiarize the students with basic concepts in Cayley-Hamilton theorem and orthogonal transformation.
- To get exposed to the fundamentals of differential calculus in various methods.
- To acquire skills to understand the concepts involved in Jacobians and maxima and minima.
- To solve various linear differential equations and method of variation of parameters.
- To learn various techniques and methods in solving definite and indefinite integrals.

Pre-requisites

- NIL -

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply Cayley-Hamilton theorem and reduce the quadratic form into canonical form.	Apply
CO2	Apply differential calculus in solving various Engineering problems.	Apply
CO3	Analyze Jacobian methods and constrained maxima and minima of the functions.	Analyze
CO4	Apply various methods in solving the differential equations.	Apply
CO5	Evaluate definite and indefinite integrals using different techniques.	Evaluate

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	-	-	-	-	-	-	2	-	3
CO2	3	3	2	2	3	-	-	-	-	-	-	2	-	3
CO3	3	3	3	2	3	-	-	-	-	-	-	2	-	3
CO4	3	3	3	3	3	-	-	-	-	-	-	2	-	3
CO5	3	3	3	2	3	-	-	-	-	-	-	2	-	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	10	10
Understand	10	10	10	10
Apply	30	20	40	40
Analyse	0	20	20	20
Evaluate	10	0	20	20
Create	0	0	0	0
Total	60	60	100	100

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT, AI&DS,

60 MA 001 - Matrices and Calculus

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	40	60	100

Matrices Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors –Cayley-Hamilton theorem-Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by an Orthogonal transformation - Nature of quadratic form – Applications : Stretching of an elastic membrane.	[9]
Differentiation Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) – Successive Differentiation- Leibnitz's theorem- Applications: Maxima and Minima of functions of one variable.*	[9]
Functions of Several Variables Partial differentiation – Homogeneous functions and Euler's theorem – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange's Method of Undetermined Multipliers*	[9]
Differential Equations Linear differential equations of second and higher order with constant coefficients - R.H.S is of the form $e^{ax}, sin\,a\,x, cos\,a\,x, x^n, n > 0$ - Differential equations with variable coefficients: Cauchy's and Legendre's form of linear equations - Method of variation of parameters.	[9]
Integration Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centers of mass.	[9]
Total Hours: 45 + 15 (Tutorial)	**60**

Text Book(s):

1.	Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017.
2.	Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.

Reference(s):

1.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10thEdition, John Wiley and Sons (Asia) Limited,New Delhi, 2016.
2.	Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand& Company Ltd, New Delhi, 2017
3.	Bali N P and Manish Goyal," A text book of Engineering Mathematics",10thEdition, Laxmi Publications (P) Ltd, 2016.
4.	"Matrix Analysis with Applications" Dr Gupta S K and DrSanjeev Kumar and Prof. Somnath Roy "Matrix Solvers", NPTEL Online Video Courses.

*** SDG- 04- Quality Education**

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Matrices**	
1.1	Characteristic equation	1
1.2	Eigen values and Eigen vectors of a real matrix	1
1.3	Properties of Eigen values and Eigen vectors	1
1.4	Cayley-Hamilton theorem	1
1.5	Tutorial	2
1.6	Orthogonal transformation of a symmetric matrix to diagonal form	1
1.7	Reduction of quadratic form to canonical form by Orthogonal transformation	1
1.8	Nature of quadratic form	1
1.9	Stretching of an elastic membrane	1
1.10	Tutorial	2
2.0	**Differentiation**	
2.1	Representation of functions	1
2.2	Limit of a functionand Continuity	1
2.3	Differentiation rules (sum, product, quotient, chain rules)	2
2.4	Successive differentiation	1
2.5	Tutorial	2
2.6	Leibnitz's theorem	1
2.7	Maximaandminimaoffunctionsof onevariable	2
2.8	Tutorial	2
3.0	**Functions of Several Variables**	
3.1	Partial differentiation	1
3.2	Homogeneous functions and Euler's theorem	1
3.3	Jacobians	2
3.4	Tutorial	2
3.5	Taylor's series for functions of two variables	1
3.6	Maxima and minima of functions of two variables	1
3.7	Lagrange's Method of Undetermined Multipliers	2
3.8	Tutorial	2
4.0	**Differential Equations**	
4.1	Linear differential equations of second and higher order with constant co-efficient	1
4.2	R.H.S is of the form e^{ax}, $sin\, a\, x$, $cos\, a\, x$, $x^n, n > 0$	2
4.3	Tutorial	2
4.4	Differential equations with variable coefficients: Cauchy's form of linear equations	2
4.5	Differential equations with variable coefficients: Legendre's form of linear equations	2
4.6	Method of variation of parameters	1
4.7	Tutorial	2
5.0	**Integration**	
5.1	Definite and Indefinite integrals	1
5.2	Substitution rule	1
5.3	Techniques of Integration: Integration by parts	1
5.4	Integration of rational functions by partial fraction	1
5.5	Tutorial	2

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

5.6	Integration of irrational functions	1
5.7	Improper integrals	1
5.8	Hydrostatic force.	1
5.9	Pressure, moments and centres of mass.	1
5.10	Tutorial	2

Course Designer(s)

1. Dr.C.Chandran - cchandran@ksrct.ac.in
2. Mr. G.Mohan - mohan@ksrct.ac.in

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Matrix Operations - Addition, Multiplication, Transpose, Inverse and Rank.
3. Solution of system of linear equations.
4. Computation of Eigen values and Eigen vectors of a Matrix.
5. Finding ordinary and partial derivatives.
6. Solving first and second order ordinary differential equations.
7. Computing Maxima and Minima of a function of one variable.
8. Computing Maxima and Minima of a function of two variables.

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 PH 002	Physics for Civil Engineering	Category	L	T	P	Credit
		BS	3	0	0	3

Objectives

- To analyze the crystal structures of solids and to gain knowledge of properties of materials
- To enrich the understanding of properties of materials and their applications in engineering and technology
- To explain the principles of laser, types and demonstrate the applications of laser
- To introduce the concepts of acoustics, production of ultrasonic waves and lighting designs
- To study the advanced materials and nanotechnology for various engineering applications

Pre-requisites

- NIL -

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Realize the basics of crystallography and its importance for varied materials properties	Understand
CO2	Appraise the engineering problems like plastic deformation, slip and twinning by material testing methods	Understand
CO3	Utilize a strong foundational knowledge in lasers and its applications	Apply
CO4	Recognize the characteristics of sound and suggestions for buildings with good acoustics	Apply & Analyse
CO5	Infer the properties of advanced materials and nano materials for potential applications	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	-	-	-	-	-	-	-	-	2	-	-	2	-
CO5	3	-	-	-	-	-	-	-	-	2	-	-	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10		16
Understand	46	46		80
Apply	04	04		04
Analyse	0	0		0
Evaluate	0	0		0
Create	0	0		0
Total	60	60		100

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 PH 002- Physics for Civil Engineering								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

CRYSTAL STRUCTURE OF SOLIDS* Lattice - Unit cell – crystal systems and Bravais lattice - Miller indices - d spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Packing factor for HCP structure - Crystal growth techniques - solution (Slow solvent evaporation and slow cooling) - melt (Bridgman and Czochralski) - Imperfections in crystals	[9]
PROPERTIES OF MATTER* Stress - Strain - Hooke's law - Elastic Behavior of Material - Types of elastic moduli - Young's modulus - Bulk modulus - Rigidity modulus - Non-uniform bending - Uniform bending - Application - I- shaped girders. Torsional Pendulum - Couple per unit twist of a wire - Time period - Application - Determination of Rigidity Modulus.	[9]
LASER TECHNOLOGY* Theory of laser - characteristics - Einstein's coefficients - population inversion - Types of lasers -Gas lasers (CO_2), solid-state lasers (Nd: YAG), Semiconductor laser (Homojunction and Hetero junction)-Properties of laser beams-applications - Laser scanning technology in civil engineering – LIDAR	[8]
TECHNICAL ACOUSTICS AND LIGHTING DESIGNS* Acoustics of buildings – Reverberation- Weber Fechner law- Factors affecting acoustics of a building and remedies –. Ultrasonic waves - Properties - Application of ultrasonic testing to steel-concrete composite structures– Non destructive testing (NDT): Pulse echo system, through transmission, resonance system. LIGHTING DESIGNS: Visual field glare, colour- day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.	[10]
ADVANCED MATERIALS AND NANOTECHNOLOGY* Advanced Materials: Metallic glasses – preparation, properties and applications - Shape memory alloys (SMA) - characteristics, properties of NiTi alloy applications. Nanomaterials: Properties- Top- down process: Ball Milling method – Bottom-up process: Vapor phase deposition- Carbon Nano Tube (CNT): Properties, preparation by electric arc method, Applications of carbon nanotube: Mechanical reinforcement & Sensors.	[9]
Total Hours:	**45**

Text Book(s):	
1.	M. N. Avadhanulu, P. G. Kshirsagar, TVS Arun Murthy "A Text Book of Engineering Physics", S Chand Publications, New Delhi, 2022.
2.	H. K. Malik, A. K. Singh "Engineering Physics" McGraw Hill Education Private Limited, New Delhi.
3.	D. R. Joshi "Engineering Physics" McGraw Hill Education Private Limited, New Delhi. 2010
Reference(s):	
1.	S.O. Pillai "A Textbook Of Engineering Physics" New Age International (P) Limited, New Delhi, 2014
2.	B.B.Laud "Lasers and Non-Linear Optics "New Age International Publications, New Delhi,2015
3.	Palanisamy, P.K., "Physics of Materials", Scitech Publications, Chennai. 2012

*** SDG- 04- Quality Education**

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Crystal Structure of Solids**	
1.1	Lattice - Unit cell	1
1.2	Crystal systems and Bravais lattice	1
1.3	Miller indices - d spacing in cubiclattice	1
1.4	Calculation of number of atoms per unit cell - Atomic radius - Coordination number	1
1.5	Packing factor for HCP structure	1
1.6	Crystal growth techniques	1
1.7	Solution (Slow solvent evaporation and slow cooling)	1
1.8	Melt (Bridgman and Czochralski)	
1.9	Imperfections in crystals	
2.0	**Properties of Matter**	
2.1	Stress - Strain - Hooke's law	1
2.2	Elastic Behavior of Material	1
2.3	Types of elastic moduli - Young's modulus - Bulk modulus - Rigidity modulus	1
2.4	Non-uniform bending	1
2.5	Uniform bending	1
2.6	Application - I- shaped girders.	1
2.7	Torsional Pendulum - Couple per unit twist of a wire	1
2.8	Time period – Application	1
2.9	Determination of Rigidity Modulus.	1
3.0	**Laser Technology**	
3.1	Theory of laser	1
3.2	Characteristics - Einstein's coefficients	1
3.3	Population inversion - Types of lasers	1
3.4	Gas lasers (CO_2)	1
3.5	Solid-state lasers (Nd: YAG)	1
3.6	Semiconductor laser (Homojunction and Hetero junction)	1
3.7	Properties of laser beams-applications	1
3.8	Laser scanning technology in civil engineering – LIDAR	1
4.0	**Technical Acoustics and Lighting Designs**	
4.1	Acoustics of buildings – Reverberation- Weber Fechner law	1
4.2	Factors affecting acoustics of a building and remedies	1
4.3	Ultrasonic waves - Properties - Application of ultrasonic testing to steel-concrete composite structures	2
4.4	Nondestructive testing (NDT): Pulse echo system, through transmission, resonance system.	1
4.5	Lighting designs: Visual field glare, colour- day light calculations	1
4.6	Day light design of windows, measurement of day	1
4.7	Light and use of models and artificial skies	1
4.8	Principles of artificial lighting	1
4.9	Supplementary artificial lighting	1
5.0	**Advanced Materials and Nanotechnology**	
5.1	Metallic glasses – preparation, properties and applications	1
5.2	Shape memory alloys (SMA) – characteristics	1
5.3	Properties of NiTi alloy applications	1
5.4	Nanomaterials: Properties	1
5.5	Top- down process: Ball Milling method	1
5.6	Bottom-up process: Vapor phase deposition	2
5.7	Carbon Nano Tube (CNT): Properties, preparation by electric arc method	1
5.8	Applications of carbon nanotube: Mechanical reinforcement & Sensors.	1

Course Designer(s)

1. Dr. V. Vasudevan - vasudevanv@ksrct.ac.in
2. Mr. S. Vanchinathan - vanchinathan@ksrct.ac.in
3. Dr. P. Suthanthira Kumar - suthanthirakumar@ksrct.ac.in

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CH 002	Chemistry for Civil Engineering	Category	L	T	P	Credit
		BS	3	0	0	3

Objectives

- To help the learners to analyse the hardness of water and its removal
- To study an overview of types of corrosion and its control.
- To rationalize the plating techniques and alloys.
- To analyze the concepts, functions and classification of composites
- To recall the basics building material.

Pre-requisites

- **NIL -**

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the types of hardness of water and its removal.	Apply
CO2	Understand the concept of corrosion and its control	Understand
CO3	Identify the types of coatings, alloys, and their applications.	Apply
CO4	Grasp the important properties of construction materials.	Understand
CO5	Comprehend the definition and importance of composites.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	-	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	2
CO4	3	2	-	-	-	-	-	-	-	-	-	-	3	2
CO5	3	2	-	-	-	-	-	-	-	-	-	-	2	2

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	20	20	30	30
Understand	30	40	60	60
Apply	10	-	10	10
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CH 002- Chemistry For Civil Engineering

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Water Technology* Introduction – Commercial and Industrial Uses of Water - Hardness - Types – Estimation of Hardness by EDTA Method- Internal Conditioning (Colloidal, Phosphate, Calgon and Carbonate Conditioning Methods) – External Conditioning (Zeolite Process, Demineralization Process) - Desalination Methods (Reverse Osmosis and Electro Dialysis). Flash Evaporation.	[9]
Corrosion Chemistry** Electrochemical Corrosion, Corrosion due to Dissimilar Metal Cells (Galvanic Cells), Corrosion due to Differential Aeration – Factors Influencing Corrosion- Microbial Induced Concrete Corrosion and Bio Fouling -Corrosion Control: Cathodic Protection (Sacrificial Anodic Protection, Impressed Current Cathodic Protection).	[9]
Protective Coatings** **Protective Coatings:** Classification - Metallic Coating: Electroplating – Electroless Plating - Diffusion Coating. Paint: Types and Characteristics of Paints - Constituents - Drying Process. Varnishes: Characteristics - Constituents. Enamels and Lacquers (Natural Resins). **Alloys:** Properties of Alloys- Significance of Alloying, Functions and Effect of Alloying Elements - Ferrous Alloys – Nichrome and Stainless Steel – Heat Treatment of Steel, Non-Ferrous Alloys – Brass and Bronze.	[9]
Construction Materials*** **Classification of Construction Materials - Soil:** Constituent of Soil (Phase, Structure And Texture)-Physical and Chemical Properties Acid, Alkali and Saline Soils- **Clay:** Classification of Clay - Composition, Particle Shape, Size, Plasticity, CEC, Occurrences, Important Properties and Uses of China Clay, Bentonites. **Refractories:** Definition Classification Properties of Refractories Preparation, Properties and Uses of High Alumina Bricks, Magnesite and Zirconia Bricks. **Cement:** Manufacture of Portland Cement and Setting.	[9]
Modern Building Materials** **Composites**: Introduction: Definition & Need for Composites; Constitution: Matrix Materials (Polymer Matrix, Metal Matrix and Ceramic Matrix) and Reinforcement (Fiber, Particulates, Flakes and Whiskers). Properties and Applications of: Metal Matrix Composites (MMC), Ceramic Matrix Composites and Polymer Matrix Composites, Nano Composites: Properties - Applications. Hybrid Composites: Properties - Applications.	[9]
Total Hours:	**45**

Text Book(s):

1.	Palanna O.G, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 2017.
2.	Jain P.C. and Monica Jain, A Textbook of Engineering Chemistry, DhanpatRai publications, New Delhi, 16th edition, 2015.

Reference(s):

1.	Jain. P.C. and Monica Jain, "Engineering Chemistry", Dhanpatrai publishing co. New Delhi, 14th edition, 2015.
2.	Dara. S.S, "A Text Book of Engineering Chemistry", S Chand & co. Ltd., 2014.
3.	Roussak O.V. and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.
4.	Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2nd Edition, 2019.
5.	Shaw D.J., Introduction to Colloid and Surface Chemistry, Butterworth-heinemann publishers, 1992.

*** SDG 6 – Improve Clean Water and Sanitation**

****SDG 9– Industry Innovation and Infrastructure**

*****SDG 8 – Decent Work and Economic Growth**

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Water Technology**	
1.1	Introduction – Commercial and Industrial Uses of Water	1
1.2	Hardness - Types	1
1.3	Estimation of Hardness of by EDTA Method	1
1.4	Internal Conditioning (Colloidal, Phosphate, Calgon and Carbonate)	1
1.5	External Conditioning (Zoelite Process & Demineralization Process)	2
1.6	Desalination Methods (Reverse Osmosis and Electrodialysis)	2
1.7	Flash Evaporation	1
2.0	**Corrosion Chemistry**	
2.1	Electrochemical Corrosion	1
2.2	Corrosion due to Dissimilar Metal Cells (Galvanic Cells),	1
2.3	Corrosion due to Differential Aeration	1
2.4	Factors Influencing Corrosion	2
2.5	Microbial Induced Concrete Corrosion and Bio Fouling	2
2.6	Corrosion Control: Cathodic Protection (Sacrificial Anodic Protection, Impressed Current Cathodic Protection).	2
3.0	**Protective Coatings**	
3.1	**Protective Coatings:** Classification.	1
3.2	Metallic Coating: Electroplating – Electroless Plating- Diffusion Coating	1
3.3	Paint: Types and Characteristics of Paints.	1
3.4	Constituents - Drying Process.	1
3.5	Varnishes: Characteristics - Constituents. Enamels and Lacquers (Natural Resins).	1
3.6	**Alloys:** Properties of Alloys- Significance of Alloying.	1
3.7	Functions and Effect of Alloying Elements - Ferrous Alloys – Nichrome and Stainless Steel.	2
3.8	Heat Treatment of Steel, Non-Ferrous Alloys – Brass and Bronze.	1
4.0	**Construction Materials**	
4.1	**Classification Of Construction Materials - Soil:** Constituent of Soil (Phase, Structure and Texture)	1
4.2	Physical and Chemical Properties Acid, Alkali and Saline Soils	1
4.3	**Clay:** Classification of Clay - Composition, Particle Shape, Size, Plasticity, CEC, Occurrences.	1
4.4	Important Properties and Uses of China Clay, Bentonites.	1
4.5	**Refractories:** Definition Classification Properties of Refractories.	1
4.6	Preparation, Properties and Uses of High Alumina Bricks, Magnesite and Zirconia Bricks.	2
4.7	**Cement:** Manufacture of Portland Cement and Setting.	2
5.0	**Modern Building Materials**	
5.1	**Composites**: Introduction: Definition & Need for Composites;	1
5.2	Constitution: Matrix Materials (Polymer Matrix, Metal Matrix and Ceramic Matrix)	2
5.3	Reinforcement (Fiber, Particulates, Flakes and Whiskers).	1
5.4	Properties and Applications of Metal Matrix Composites (MMC)	1
5.5	Ceramic Matrix Composites and Polymer Matrix Composites	1
5.6	Nano Composites: Properties - Applications.	2
5.7	Hybrid Composites: Properties - Applications.	1

Course Designer(s)

1.Dr.T.A.Sukantha-sukantha@ksrct.ac.in
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3.Ms.D.Kirthiga - kiruthiga@ksrct.ac.in

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 EE 001	Basic Electrical and Electronics Engineering	Category	L	T	P	Credit
		ES	3	0	0	3

Objectives

- To familiarize the basic concept on electrical circuits and its various parameters
- To facilitate the various types of electrical machines and their uses
- To gain knowledge on Electrical safety
- To provide exposure on the functions of various semiconductor devices
- To familiarize the use of various measuring instruments

Pre-requisites

- NIL -

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the basic laws of electric circuits to calculate the unknown quantities.	Remember
CO2	Acquire knowledge on different electrical machines and select suitable machines for industrial applications.	Remember
CO3	Recognize the significance of various components of low voltage electrical installations and create awareness on electrical safety.	Understand
CO4	Realize the operation and characteristics of semiconductor devices.	Understand
CO5	Understand the operating principles of measuring instruments and choose suitable instrument for measuring the parameters.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	2	-	-	-	-	2	3	-	3	2
CO2	3	3	1	1	-	-	2	-	2	-	2	1	3	2
CO3	3	3	-	2	-	2	-	-	-	-	2	2	3	2
CO4	2	2	3	-	2	-	2	1	-	2	1	3	3	2
CO5	2	3	1	2	-	-	3	2	-	-	2	3	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	20	30	30
Understand	20	30	40	40
Apply	30	10	30	30
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0
Total	60	60	100	100

R4/ w.e.f. 01.06.2024
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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to CSE, IT, AIDS, AIML, MECH, MCT, BT, FT and CIVIL Branches								
60 EE 001 - Basic Electrical and Electronics Engineering								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Electrical Circuits DC Circuits: Circuit Components: Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws–Simple problems. Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform real power, reactive power and apparent power, power factor – Steady state analysis of RLC series circuits- Simple problems. Introduction to three phase AC circuits	[10]
Electrical Machines* Construction and Working principle - Separately and Self excited DC Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.	[10]
Electrical Installations* Domestic wiring, types of wires and cables, earthing,protective devices- switch fuse unit-Miniature Circuit Breaker-Moulded Case Circuit Breaker- Earth Leakage Circuit Breaker, Batteries and types, UPS,Safety precautions and First Aid.	[9]
Analog Electronics Introduction to Semiconductor Materials– PN Junction Diodes, Zener Diode – Characteristics and Applications – Bipolar Junction Transistor-Biasing and Configuration (NPN) - **Regulated power supply unit***, **switched mode power supply***	[8]
Measurements and Instrumentation Functional elements of an instrument, Standards and calibration, Operating Principle, types -Moving Coil and Moving Iron meters, Operating principles and Types of Wattmeter, Energy Meter, Instrument Transformers-**CT and PT, DSO***- Block diagram-**Data acquisition***	[8]
Total Hours:	**45**
Text Book(s):	

1.	Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2.	A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.
Reference(s):	
1.	Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2.	Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
3.	Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
4.	H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

***SDG 9 – Industry Innovation and Infrastructure**

R4/ w.e.f. 01.06.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Electrical Circuits**	
1.1	Circuit Components: Resistor, Inductor, Capacitor	1
1.2	Ohm's Law - Kirchhoff's Laws	1
1.3	Ohm's Law - Kirchhoff's Laws - Problems	2
1.4	Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform	2
1.5	Real power, reactive power and apparent power, power factor	1
1.6	Steady state analysis of RLC series circuits	1
1.7	RLC series circuits - Problems	1
1.8	Introduction to three phase system	1
2.0	**Electrical Machines**	
2.1	Construction and Working principle of DC Generator	1
2.2	Types and Applications of Separately and Self excited DC Generators	1
2.3	EMF equation of DC Generator	1
2.4	Working Principle of DC motors	1
2.5	Torque Equation	1
2.6	Types and Applications	1
2.7	Construction, Working principle and Applications of Transformer	1
2.8	Construction, Working principle and Applications of Three phase Alternator	1
2.9	Construction, Working principle and Applications of Synchronous motor	1
2.10	Construction, Working principle and Applications of Three Phase Induction Motor	1
3.0	**Electrical Installations**	
3.1	Domestic wiring, types of wires and cables	1
3.2	Earthing, protective devices	2
3.3	Switch fuse unit- Miniature Circuit Breaker	1
3.4	Molded Case Circuit Breaker- Earth Leakage Circuit Breaker	1
3.5	Batteries and types	2
3.6	UPS	1
3.7	Safety precautions and First Aid	1
4.0	**Analog Electronics**	
4.1	Introduction to Semiconductor Materials	1
4.2	Characteristics and Applications of PN Junction Diodes	1
4.3	Characteristics and Applications of Zener Diode	1
4.4	Bipolar Junction Transistor	1
4.5	Biasing & Configuration (NPN)	2
4.6	Regulated power supply unit	1
4.7	Switched mode power supply	1
5.0	**Measurements and Instrumentation**	
5.1	Functional elements of an instrument	1
5.2	Standards and calibration	1
5.3	Moving Coil meters - Operating Principle, types	1
5.4	Moving Iron meters - Operating Principle, types	1
5.5	Operating principles and Types of Wattmeter	1
5.6	Energy Meter	1
5.7	Instrument Transformers – CT& PT	1
5.8	DSO- Block diagram- Data acquisition	1

Course Designer(s)

1. Mr.S.Srinivasan - srinivasan@ksrct.ac.in
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5. Mr.T.Prabhu - prabhut@ksrct.ac.in

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

61 GE 001	தமிழர் மரபு (அனைத்து துறைகளும் பொதுவானது)	Category	L	T	P	Credit
		GE	1	0	0	1*

பாடத்தின் நோக்கங்கள்:

- தமிழ் மொழியின் இலக்கணச் செறிவைக் கற்றுணர்தல் ,வாழ்க்கைத் திறன்கள் **மற்றும்** நெறிமுறைகள் தெரிதல்.
- தமிழர் பண்பாட்டின் நுண்கலைகள் பற்றிய ஒரு மீள்பார்வை.
- தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்து அறிதல்
- தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்களை தெரிதல்.
- இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பை உணருதல்

முன்கூட்டிய துறை சார் அறிவு

- தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்

- பாடத்தை வெற்றிகரமாக கற்றுமுடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

CO1	தமிழ் மொழியின் செந்தண்மை மற்றும் இலக்கியம் குறித்தும் . வாழ்க்கைத் திறன்கள் **மற்றும்** நெறிமுறைகள் குறித்தும் தெரிதல்	நினைவு கூர்தல் புரிதல் செயல் படுத்துதல்
CO2	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்த தெளிவு.	நினைவு கூர்தல் புரிதல்
CO3	தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு.	நினைவு கூர்தல் புரிதல்
CO4	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	நினைவு கூர்தல் புரிதல்
CO5	இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்துவம் பற்றிய புரிதல்.	நினைவு கூர்தல் புரிதல்

Mapping with Programme Outcomes

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	2	-	3	2	-	-	1	-	-
CO2	-	-	-	-	-	1	1	1	-	-	-	3	-	-
CO3	-	-	-	-	-	2	-	3	3	2	-	2	-	-
CO4	2	-	-	-	-	1	1	2	1	2	-	1	-	-
CO5	-		-	-	-	-	-	3	2	2	-	2	-	-

3- Strong; 2-Medium; 1-Low

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)
	1	1	
Remember	20	20	40
Understand	20	20	40
Apply	20	20	20
Analysis	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Note: Those who studied Tamil as language subject in +2 should write the exams (Model & End Semester Exams) in Tamil Language only. Those who did not study Tamil as language subject in +2 and other state students can write the exams in English Language. It is mandatory.

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Passed in the BOS Meeting Held on 22.05.2024
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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology - Autonomous R2022								
(Common to all Branches)								
61 GE 001- Heritage of Tamils								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	0	0	15	1#	100	-	100

Language, Literature, Life Skills & Ethics* Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan-Life, Responsibility, Self-exploration, Attitude, Self-confidence, Goals, Relationships, Leadership, Gender equality	[3]
Heritage - Rock Art Paintings to Modern Art – Sculpture* Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making -Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.	[3]
Folk and Martial Arts* Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	[3]
Thinai Concept of Tamils* Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.	[3]
Contribution of Tamils to Indian National Movement and Indian Culture* Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.	[3]
Total Hours:	**15**

Text Book(s) cum Reference Book(s)

1.	முனைவர் கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed ,2022.
2.	முனைவர் இல. சுந்தரம், கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed 2021
3.	முனைவர் இரா.சிவானந்தம், மு.சேரன், கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed ,2020.
4.	முனைவர் இரா.சிவானந்தம் , முனைவர் ஜெ.பாஸ்கர், பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,1st Ed ,2022
5.	ஈரோடு கதிர், உயர்தல் உரிமை, சிக்ஸ் ப்ளஸ் ஒன் ட்ரெயினிங் அகாடமி,1st Ed, 2024
6.	Pillay K.K., Social Life of Tamils, TNTB & ESC and RMRL – (In print).
7.	Singaravel S., Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st, 2001.
8.	Subaramanian S.V., Dr.K.D. Thirunavukkarasu, Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd, 2010
9.	Valarmathi M., The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies,
10.	Sivanantham R., Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
11.	Pillay K.K., Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
12.	Sivanantham R., Dr.J.Baskar, Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
13	Balakrishnan R., Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed, 2022

***SDG 4 – Quality Education**

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology–AutonomousR2022								
61 GE 001- தமிழர் மரபு (அனைத்து துறைகளும் பொதுவானது)								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	0	0	15	1#	100	-	100

மொழி, இலக்கியம், வாழ்க்கைத் திறன்கள் மற்றும் நெறிமுறைகள்:* இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள் - தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு. வாழ்வியல், பொறுப்புணர்வு, சுய ஆய்வு, மனோபாவம், தன்னம்பிக்கை, இலக்குகள், உறவுகள், தலைமைப்பண்பு, பாலின சமநிலை.	[3]
மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை- சிற்பக் கலை. * நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.	[3]
நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுள்: * தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து சிலம்பாட்டம், வளரி, புளியாட்டம், தமிழர்களின் விளையாட்டுகள் .	[3]
தமிழர்களின் திணைக் கோட்பாடுகள்: * தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி .	[3]
இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: * இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு	[3]
Total Hours:	**15**

TextBook(s):

1.	முனைவர் கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed ,2022.
2.	முனைவர் இல. சுந்தரம், கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed,2021
3.	முனைவர் இரா.சிவானந்தம், மு.சேரன், கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed,2020.
4.	முனைவர் இரா.சிவானந்தம் , முனைவர் ஜெ.பாஸ்கர், பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,1st Ed ,2022
5.	ஈரோடு கதிர், உயர்தல் உரிமை, சிக்ஸ் ப்ளஸ் ஒன் ட்ரெயினிங் அகாடமி,1st Ed,2024
6.	Pillay K.K., Social Life of Tamils, TNTB & ESC and RMRL – (In print).

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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

7.	Singaravel S., Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st, 2001.
8.	Subaramanian S.V., Dr.K.D. Thirunavukkarasu, Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd, 2010
9.	Valarmathi M., The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies,
10.	Sivanantham R., Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
11.	Pillay K.K., Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
12.	Sivanantham R., Dr.J.Baskar, Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
13	Balakrishnan R., Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed, 2022

***SDG 4 – Quality Education**

 # For Heritage of Tamils, additional 1 credit is offered and not accounted for CGPA.

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Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CP 0P1	Physics and Chemistry Laboratory (Common to Civil, Mech, MCT)	Category	L	T	P	Credit
		BS	0	0	4	2

Objectives

- To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To demonstrate an ability to make physical measurements and understand the limits of precision in measurements
- To analyze the behavior and characteristics of various materials for its optimum utilization
- Test the knowledge of theoretical concepts and develop the experimental skills of the learners.
- To facilitate data interpretation and expose the learners to various industrial and environmental applications

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the concept of stress, strain and elastic limit for a given sample to find their properties	Apply
CO2	Recognize the concept of quantum Physics & magnetic properties by experimental verification	Apply
CO3	Infer the properties of light and fiber optic cable	Apply
CO4	Apply the concepts of chemistry and develop analytical skills for applications in engineering to determine the rate of corrosion	Apply
CO5	Analyze the pH, electrode potential, conductance sample solutions	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	2	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	2	-	-	-	2	-
CO3	3	-	-	-	-	-	-	-	2	-	-	-	2	-
CO4	3	-	-	-	-	-	-	-	2	-	-	-	3	3
CO5	3	-	-	-	-	-	-	-	2	-	-	-	2	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	10	-	10	-	10
Understand	30	30	30	-	30
Apply	40	40	40		40
Analyse	20	30	20		20
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	100	100	100	-	100

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Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CP 0P1– Physics and Chemistry Laboratory (CIVIL, MECH & MCT)								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	0	0	4	45	2	60	40	100

List of Experiments (Physics):

1. Determination of Young's modulus of a given material - Uniform bending
2. Determination of rigidity modulus of a wire - Torsional pendulum
3. Determination of Planck's constant
4. Magnetic field along the axis of current carrying coil – Stewart and Gee
5. (a) Laser- Determination of the wave length of the laser using grating
   (b) Optical fibre -Determination of Numerical Aperture and acceptance angle

*** SDG: 4- Quality Education**

List of Experiments (Chemistry):

1. Estimation of hardness of water sample by complexometric method.
2. Determination of Dissolved Oxygen in water sample by Winkler's method
3. Determination of corrosion by weight loss method
4. Estimation of HCl by pH meter.
5. Estimation of mixture of acids by conductivity meter.

Case studies/Activity report

1. Case study on Dissolved Oxygen in various water samples.
2. Activity report for determination of HCl using conductometric titration

***SDG 6: Improve Clean Water and Sanitation**
***SDG 9: Industry, Innovation, and Infrastructure**
***SDG 8: Decent Work and Economic Growth**

Lab Manual	
1.	"Engineering Physics Lab Manual", Department of Physics, KSRCT.
2.	"Chemistry Lab Manual Volume I & II", Department of Chemistry, KSRCT.

*** SDG: 4- Quality Education**

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Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory (Common to Civil, Mech, MCT and FT Branches)	Category	L	T	P	Credit
		BS	0	0	4	2

Objectives

- To acquire knowledge in conducting basic electrical laws
- To gain knowledge on three phase power measurement
- To train the students in conducting load tests on electrical machines
- To gain practical experience in characterizing electronic devices
- To gain practical experience in using measuring devices

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Practice experimental methods to verify the Ohm's and Kirchhoff's Laws.	Apply
CO2	Calculate the three-phase power measurement	Apply
CO3	Analyze experimentally the load characteristics of electrical machines.	Analyze
CO4	Analyze the characteristics of basic electronic devices.	Analyze
CO5	Calibrate the measuring devices	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	2	2	-	-	2	-	3	3	3	2
CO2	3	3	3	3	2	2	-	3	-	-	3	3	3	2
CO3	3	3	3	3	2	2	-	-	2	-	3	3	3	2
CO4	3	3	3	3	2	2	2	2	-	2	3	3	3	2
CO5	3	3	3	3	2	2	2	-	-	-	3	3	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	50	50	50	50
Analyse	50	50	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	100	100	100	100

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to Civil, Mech, MCT and FT Branches								
60 EE 0P1 - Basic Electrical and Electronics Engineering Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	0	0	4	45	2	60	40	100

List of Experiments:

1. Verification of Ohm's and Kirchhoff's Laws.
2. Measurement of Three Phase Power.
3. Load test on DC Shunt Motor.
4. Load test on Self Excited DC Generator.
5. Load test on Single phase Transformer.
6. Load test on Induction Motor.
7. Characteristics of PN and Zener Diodes.
8. Characteristics of BJT (CE).
9. Calibration of Single-Phase Energy Meter*
10. Mini Project*

Lab Manual	
1.	Manual prepared by the course designers

***SDG 9 – Industry Innovation and Infrastructure**

Course Designer(s)

1. Mr.S.Srinivasan - srinivasan@ksrct.ac.in
2. Ms.R.Radhamani - radhamani@ksrct.ac.in
3. Ms.S.Jaividhya - jaividhya@ksrct.ac.in
4. Dr.S.Gomathi - gomathi@ksrct.ac.in
5. Mr.T.Prabhu - prabhut@ksrct.ac.in

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2023-2024 onwards)

SECOND SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 EN 002	Professional English II	2	40	60	100	45	100
2	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	2	40	60	100	45	100
3	60 CS 001	C Programming	2	40	60	100	45	100
4	60 CE 101	Engineering Drawing for Civil Engineers	2	40	60	100	45	100
5	61 CE 201	Applied Mechanics	2	40	60	100	45	100
6	60 MY 001	Environmental Studies and Climate Change	2	100	-	100	-	100
7	60 GE 002	Tamils and Technology(தமிழரும் தொழில்நுட்பமும்)	2	100	-	100	-	100
PRACTICAL								
8	60 CS 0P1	C Programming Laboratory	3	60	40	100	45	100
9	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	3	60	40	100	45	100
11	60 CG 0P1	Career Skill Development - I	3	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 EN 002	Professional English II	Category	L	T	P	Credit
		HS	1	0	2	2

Objectives

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Pre-requisites

Basic knowledge of reading and writing in English and should have completed Professional English I.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	10	10
Understand	-	-	-	-
Apply	20	20	40	40
Analyse	30	30	50	50
Evaluate	-	-	-	-
Create	0	0	0	0
Total	60	60	100	100

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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to All Branches

60 EN 002 Professional English II

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	2	45	2	40	60	100

Making Comparisons* **Listening:** Evaluative Listening: Advertisements, Product Descriptions, - Audio / video; filling a graphic organiser (choosing a product or service by comparison) **Speaking:** Marketing a product, persuasive speech techniques. **Reading:** Reading advertisements, user manuals and brochures. **Writing:** Professional emails, Email etiquette - compare and contrast essay. **Language Focus:** mixed tenses, prepositional phrases, same words used in different contexts and discourse markers	**[10]**
Expressing Causal Relations in Speaking and Writing* **Listening:** Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects. **Speaking:** Describing and discussing the reasons of accidents or disasters based on news reports. **Reading:**longer technical texts– cause and effect essays, and letters / emails of complaint, **Writing:** Writing responses to complaints **Language Focus:** Active Passive Voice transformations, Infinitive and Gerunds – Word Formation (Noun-Verb-Adj-Adv), Adverbs.	**[10]**
Problem Solving* **Listening:** Listening to / watching movie scenes/ documentaries depicting a technical problem and suggesting solutions. **Speaking:** Group Discussion (based on case studies), - techniques and Strategies. **Reading:** Case Studies, excerpts from literary texts, news reports etc. **Writing:** Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay **Language Focus:** Error correction; If conditional sentences - Compound Words, Sentence Completion.	**[9]**
Reporting of Events and Research* **Listening:** Listening Comprehension based on new report and documentaries – **Speaking:** Interviewing, presenting oral reports, Mini presentations on select topics. **Reading:** Newspaper articles. **Writing:** Recommendations, Transcoding, Accident Report, Precis writing and Summarising **Language Focus:** Reported Speech – Modals - Conjunctions- use of Prepositions	**[8]**
The Ability to put Ideas or Information Coherently* **Listening:** Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance). **Speaking:** Participating in role plays, virtual interviews, making presentations with visual aids **Reading:** excerpts of interview with professionals **Writing:** Job / Internship application – Cover letter & Résumé **Language Focus:** Numerical Adjectives, question types: Wh/ Yes or No/ and Tags; Relative Clauses - Idioms.	**[8]**
Total Hours:	**45**

Text Book(s):

1.	'English for Engineers & Technologists' Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, 'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book', Penguin Random House India, 2020

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Reference(s):	
1.	Raman. Meenakshi, Sharma. Sangeeta, 'Professional English'. Oxford university press. New Delhi. 2019
2.	Arthur Brookes and Peter Grundy,' Beginning to Write: Writing Activities for Elementary and Intermediate Learners', Cambridge University Press, New York, 2003
3.	Prof. R.C. Sharma & Krishna Mohan, *'Business Correspondence and Report Writing'*, Tata McGraw Hill & Co. Ltd., New Delhi, 2001
4.	V.N. Arora and Laxmi Chandra, *'Improve Your Writing'*, Oxford University Press, New Delhi, 2001

*** SDG- 04- Quality Education**

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Making Comparisons**	
1.1	Evaluative Listening	1
1.2	Product Descriptions and filling a graphic organiser	1
1.3	Marketing a product by using persuasive techniques	2
1.4	Reading advertisements, user manuals and brochures	1
1.5	Writing professional emails	1
1.6	Compare and contrast essay	1
1.7	mixed tenses and prepositional phrases	1
1.8	Same words used in different contexts	1
2.0	**Expressing Causal Relations in Speaking and Writing**	
2.1	Listening to longer technical talks	1
2.2	Listening to process/event descriptions	1
2.3	Describing and discussing the reasons of accidents or disasters	1
2.4	Reading longer technical texts– cause and effect essays	1
2.5	Writing responses to complaints	1
2.6	Active Passive Voice transformations	2
2.7	Infinitive and Gerunds	1
2.8	Word Formation (Noun-Verb-Adj-Adv), Adverbs.	1
3.0	**Problem Solving**	
3.1	Listening to documentaries and suggesting solutions	1
3.2	Group Discussion (based on case studies)	2
3.3	Reading Case Studies, excerpts from literary texts and news reports	1
3.4	Letter to the Editor	1
3.5	Checklists	1
3.6	Problem solution and argumentative essays	1
3.7	Error correction and Sentence Completion	1
3.8	If conditional sentences	1
4.0	**Reporting of Events and Research**	
4.1	Listening Comprehension	1
4.2	Interviewing and presenting oral reports	1
4.3	Mini presentations on select topics	1
4.4	Reading newspaper articles	1
4.5	Recommendations	1

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

4.6	Transcoding	1
4.7	Precis writing and Summarising and Plagiarism	1
4.8	Reported Speech, Modals	1
4.9	Conjunctions	
5.0	**The Ability to put Ideas or Information Coherently**	
5.1	Listening to Formal job interviews	1
5.2	Role plays	2
5.3	Virtual interviews	1
5.4	Reading Company profiles	1
5.5	Writing Statement of Purpose (SoPs)	1
5.6	Writing Résumé	1
5.7	Numerical Adjectives and Relative Clauses - Idioms	1
5.8	question types: Wh/ Yes or No/ and Tags	1
	Total	45

Course Designer(s)

1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To provide exposure in handling the situations involving multiple integrals
- To familiarize the basic concepts in Vector calculus.
- To get exposed to the fundamentals ofanalytic functions.
- Todevelop the mathematical skills in solving partial differential equations.
- To facilitate the concepts in Laplace transform techniques.

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Evaluate double and triple integrals.	Evaluate
CO2	Analyze the basic concepts of vector calculus.	Analyze
CO3	Construct the analytic functions and evaluate complex integrals.	Apply
CO4	Compute the solution of partial differential equations using different methods.	Apply
CO5	Apply Laplace transform techniques for solving differential equations.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	3	-	-	-	-	-	-	2	3	2
CO2	3	3	2	2	3	-	-	-	-	-	-	2	3	2
CO3	3	3	3	2	2	-	-	-	-	-	-	2	3	2
CO4	3	3	3	3	2	-	-	-	-	-	-	2	3	2
CO5	3	3	2	3	3	-	-	-	-	-	-	2	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	10	10
Understand	-	10	10	10
Apply	20	40	40	40
Analyse	10	-	20	20
Evaluate	20	-	20	20
Create	-	-	-	-
Total	60	60	100	100

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT

60 MA 003 - Integrals , Partial Differential Equations and Laplace Transform

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

Multiple Integrals Double integration – Cartesian and polar co-ordinates – Change of order of integration – Area as double integral – Triple integration in Cartesian co-ordinates – Change of variables - Cartesian to polar co-ordinates and Cartesian to Cylindrical co-ordinates.	[9]
Vector Calculus* Introduction - Gradient of a scalar point function –Directional derivative – Angle of intersection of two surfaces – Divergence and curl (excluding vector identities) – Solenoidal and irrotational vectors – Application: Green's theorem in the plane – Gauss divergence theorem -Stokes' theorem (statement only) .	[9]
Analytic Functions and Integrals Analytic function – Necessary and Sufficient conditions (statement only)-Properties – Harmonic function – Construction of an analytic function – Cauchy's Integral theorem (statement only) – Cauchy's integral formula – Classification of singularities – Application: Cauchy's residue theorem.	[9]
Partial Differential Equations Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Non- Linear partial differential equations of first order – Lagrange's linear equations – Application: Homogeneous Linear partial differential equations with constant coefficients.	[9]
Laplace Transform Conditions for existence – Transforms of elementary functions – Basic properties - Derivatives and integrals of transforms - Initial and final value theorem – Transform of periodic functions. Inverse Laplace transform – Convolution theorem (excluding proof) – Application: Solution of second order ordinary differential equations with constant co-efficients.	[9]
Total Hours: 45 + 15 (Tutorial)	**60**

Text Book(s):

1.	Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017.
2.	Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.

Reference(s):

1.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.
2.	Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand & Company Ltd, New Delhi, 2017
3.	Bali N P and Manish Goyal, "A text book of Engineering Mathematics",10th Edition, Laxmi Publications (P) Ltd, 2016.
4.	Dr.P.N.Agrawal, Dr.D.N.Pandey ,"Integral Equations, Calculus of Variations and its Applications", NPTEL online video courses.

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R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1	**Multiple Integrals**	
1.1	Double integration	1
1.2	Cartesian and polar coordinates	1
1.3	Change of order of integration	1
1.4	Area as double integral	1
1.5	Tutorial	2
1.6	Triple integration in Cartesian coordinates	1
1.7	Change of variables	1
1.8	Cartesian to polar coordinates	1
1.9	Cartesian to Cylindrical coordinates	1
1.10	Tutorial	2
2.0	**Vector Calculus**	
2.1	Introduction: Gradient of a scalar point function	1
2.2	Directional derivative	1
2.3	Angle of intersection of two surfaces	1
2.4	Divergence and curl (excluding vector identities)	1
2.5	Tutorial	2
2.6	Solenoidal and irrotational vectors	1
2.7	Application: Green's theorem in the plane	1
2.8	Gauss divergence theorem	1
2.9	Stokes' theorem (statement only)	1
2.10	Tutorial	2
3.0	**Analytic Functions and Integrals**	
3.1	Analytic function	1
3.2	Necessary and Sufficient conditions (statement only)	1
3.3	Properties	1
3.4	Harmonic function	1
3.5	Tutorial	2
3.6	Construction of an analytic function	1
3.7	Cauchy's Integral theorem (statement only), Cauchy's integral formula	1
3.8	Classification of singularities	1
3.9	Applications : Cauchy's residue theorem.	1
3.10	Tutorial	2
4.0	**Partial Differential Equations**	
4.1	Formation of partial differential equations by eliminating arbitrary constants	1
4.2	Formation of partial differential equations by eliminating arbitrary functions	2
4.3	Tutorial	2
4.4	Non- linear partial differential equations of first order	2
4.5	Lagrange's linear equations	1
4.6	Application : Homogeneous Linear partial differential equations with constant coefficients.	2
4.7	Tutorial	2
5.0	**Laplace Transform**	
5.1	Conditions for existence	1
5.2	Transforms of elementary functions	1

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

5.3	Basic properties	1
5.4	Derivatives and integrals of transforms, Initial and final value theorem	1
5.5	Tutorial	1
5.6	Transform of periodic functions	2
5.7	Inverse Laplace transform	1
5.8	Convolution theorem (excluding proof)	1
5.9	Application:Solution of second order ordinary differential equation with constant co-efficient.	1
5.10	Tutorial	2

Course Designer(s)

1. Dr. C. Chandran cchandran@ksrct.ac.in
2. Dr. K. Prabakaran prabakaran@ksrct.ac.in

List of MATLAB Programmes:

1. Evaluating double and triple integrals.
2. Area as double integral.
3. Volume as triple integral.
4. Plotting and visualizing single variable functions.
5. Plotting and visualizing functions of two and three variables.
6. Evaluating Gradient, divergence and curl.
7. Evaluating Laplace & Inverse Laplace transforms.
8. Applying Laplace transform techniques to solve differential equations

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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CHAIRMAN
Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CS 001	C Programming	Category	L	T	P	Credit
		ES	3	0	0	3

Objectives

- To learn most fundamental element of the C language and to examine the execution of branching, looping statements,
- To examine the concepts of arrays, its characteristics and types and strings.
- To understand the concept of functions, pointers and the techniques of putting them to use
- To apply the knowledge of structures and unions to solve basic problems in C language
- To enhance the knowledge in file handling functions for storage and retrieval of data

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Construct the fundamental building blocks of structured Programming in C	Apply
CO2	Implement the different operations on arrays and strings	Apply
CO3	Develop simple real world applications utilizing functions, recursion and pointers.	Apply
CO4	Demonstrate the concepts of structures ,unions ,user defined data types and preprocessor	Apply
CO5	Interpret the file concepts using proper standard library functions for a given application	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3		3	-	-	-	2	2		2	-	-
CO2	3	3	3	-	3	-	-	-	2	2		2	-	-
CO3	3	3	3	-	3	-	-	-	2	2		2	-	-
CO4	3	3	3	-	3	-	-	-	2	2		2	-	-
CO5	3	3	3	-	3	-	-	-	2	2		2	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	20	20
Understand	10	10	20	20
Apply	40	40	60	60
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to All Branches

60 CS 001 – C Programming

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Basics of C, I/O, Branching and Loops Structure of a C Program – Data types – Keywords - Variables – Type Qualifiers - Constants – Operators–expressions and precedence- Console I/O– Unformatted and Formatted Console I/O - Conditional Branching and Loops-Writing and evaluation of conditionals and consequent branching	**[10]**
Arrays and Strings Arrays: One Dimensional Arrays - Two Dimensional Arrays – Matrix Manipulation - Character arrays – Strings: String Manipulation with and without String Handling Functions.	**[10]**
Functions and Pointers Functions: Scope of a Function – Library Functions and User defined functions - Function Prototypes – Call by value and Call by reference – Function Categorization- Arguments to main function—Recursion and application - Passing Arrays to Functions– Storage class Specifiers. Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions - Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers– Function and pointers - Dynamic memory allocation.	**[9]**
Structures, Unions, Enumerations, Typedef and Preprocessors Structures - Introduction to Structures and Initialization - Arrays of Structures- Arrays and Structures, Nested Structures - Passing Structures to Functions - Structure Pointers - Unions – Bit Fields - Enumerations - typedef –The preprocessor and commands.	**[8]**
File Handling File: Streams –Reading and Writing Characters - Reading and Writing Strings - File System functions – File Manipulation-Sequential access - Random Access Files – Command Line arguments.	**[8]**
Total Hours	**45**

1.	Herbert Schildt, “The Complete Reference C”, Fourth Edition, Tata McGraw Hill Edition, 2010.
2.	Byron Gottfried, “Programming with C”, Third Edition, McGraw Hill Education, 2014.

Reference(s):

1.	Raman. Meenakshi, Sharma. Sangeeta, ‘Professional English’. Oxford university press. New Delhi. 2019
2.	Arthur Brookes and Peter Grundy,’ Beginning to Write: Writing Activities for Elementary and Intermediate Learners’, Cambridge University Press, New York, 2003
3.	Prof. R.C. Sharma & Krishna Mohan, *‘Business Correspondence and Report Writing’*, Tata McGraw Hill & Co. Ltd., New Delhi, 2001
4.	Arora V.N. and Laxmi Chandra, *‘Improve Your Writing’*, Oxford University Press, New Delhi, 2001

*** SDG- 04- Quality Education**

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basics of C, I/O, Branching and Loops**	
1.1	Structure of a C Program, Keywords	1
1.2	Data types, Type Qualifiers	1
1.3	Variables and Constants	1
1.4	Operators–expressions and precedence	1
1.5	Console I/O– Unformatted and Formatted Console I/O	1
1.6	Conditional Branching	1
1.7	Iteration and loops	2
1.8	Writing and evaluation of conditionals and consequent branching	1
2.0	**Array sand Strings**	
2.1	One Dimensional Array	1
2.2	Two-Dimensional Array and MatrixManipulation	1
2.3	Character arrays and Strings Basics	1
2.4	String Manipulation without String Handling Functions	2
2.5	String Manipulation with String Handling Functions	2
3.0	**Functions and Pointers**	
3.1	Scope of a Function – Library Functions, User defined functions and Function Prototypes	1
3.2	Function Call by value and Function Call by reference,Function Categorization	2
3.3	Arguments to main function	1
3.4	Recursion and application	1
3.5	Passing Arrays to Functions	1
3.6	Storage class Specifiers	1
3.7	Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions	1
3.8	Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers	1
3.9	Function and pointers	1
3.10	Dynamic memory allocation	1
4.0	**Structures, Unions, Enumerations, Typedef and Preprocessors**	
4.1	Introduction to Structures and Initialization	1
4.2	Arrays and Structures, Arrays of Structures	1
4.3	Structures within Structures, Passing Structures to Functions	2
4.4	Structure Pointers	1
4.5	Unions and Bit Fields.	1
4.6	Enumerations - typedef	1
4.7	Preprocessor commands	2
5.0	**File Handling**	
5.1	File Streams –Reading and Writing Characters - Reading and Writing Strings	2
5.2	File System functions and File Manipulation	2
5.3	Sequential access	2
5.4	Random Access Files	2
5.5	Command Line arguments and files	1

Course Designer(s)

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R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE 101	Engineering Drawing for Civil Engineers	Category	L	T	P	Credit
		ES	3	0	0	3

Objectives

- To introduce the students to use drawing instruments and to draw cones, polygons, Engineering curves etc.
- To introduce the students to use scales and orthographic projections, projections of points & simple lines.
- To make the students draw the projections of the plane inclined to both the planes.
- To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
- To make the students to understand about Civil Engineering Components and its identification code.

Pre-requisites

Basic knowledge of Higher Secondary Mathematics, Binary Operations & Mathematic Logic.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Use the different drafting instruments to draw the drawings.	Apply
CO2	Draw the projections of regular points and line.	Apply
CO3	Draw the projections of solids.	Apply
CO4	Identifying the building drawing symbols and observations.	Understand
CO5	Draw details of part of a building.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3		2	1	3	-	-	-	1	-	-	2	-	-
CO2	3	1	1	1	2	-	-	-	2	-	-	2	-	-
CO3	3	1	1	1	2	-	-	-	2	-	-	2	-	-
CO4	2		1		3	-	-	-	2	-	-	2	-	-
CO5	2		1		3	-	-	-	2	-	-	2	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
knowledge	20	10	30	30
Understand	10	10	50	50
Apply	30	40	00	20
Analyse	-	-	20	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 101 - Engineering Drawing for Civil Engineers

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	2	0	4	60	4	40	60	100

Introduction to Engineering Drawing * Use of drawing instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning – Drawing sheet layouts - Title block – Line types – Scales: plain, diagonal and vernier scales.	[12]
Projection of lines and planes * Introduction to orthographic projections – Planes of projection – Projection of points and lines inclined to both planes – Projection of planes (Inclined to one plane and parallel to other – Inclined to both planes) - Conversions of pictorial views to orthographic views - Projections of simple solids: prism, cylinder and cone (Axis of solid inclined to both HP and VP).	[12]
Projection of solids * Sections of Solids: Prism, Cylinder, Cone – Auxiliary Views - Draw the sectional orthographic views of geometrical solids, objects from industry.	[12]
Introduction to engineering building drawing * Types of drawing with appropriate scale and directions – uses of key plan and index map, village map - sketch the conventional signs for materials like bricks, stone, concrete, wood, glass, earth, steel – water supply and sanitary fixtures like tap, wash basin, sink, W.C pan (Indian and European type), shower, flush tank.	[12]
Building components * Draw the plan and cross section of load bearing structure and framed structure - cross section of a load bearing wall and framed structure showing all the components below and above the ground level – drawings of parts of buildings such as staircase, chajjas, columns and piers – draw the elevation of various buildings.	[12]
Total Hours	**60**

1.	Bhatt N.D., “Engineering Drawing”, Charotar Publishing House Pvt. Ltd., 53rd Edition, Gujarat, 2014.
2.	Basant Agarwal and C.M.Agarwal., “Engineering Drawing”, McGraw Hill Education, 2013.

Reference(s):

1.	Shah M.B., Rana B.C., and V.K.Jadon., “Engineering Drawing”, Pearson Education, 2011.
2.	Natarajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2014.
3.	Max Raisor FIAE., “Engineering Graphics Principles with Geometric Dimensioning and Tolerancing”, SDC Publication, Chennai, 2017.
4.	Kirstie Plantenberg, “ Engineering Graphics Essentials”, SDC Publication, Chennai, 2016.

*** SDG- 04- Quality Education**

R4/ w.e.f. 01.06.2024
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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Engineering Drawing**	
1.1	Introduction to Engineering Drawing and Computer Graphics	1
1.2	Drawing tools: typrs and usage of drawing tools	2
1.3	Dimensioning	1
1.4	Symbols for shape identification	2
1.5	Drawing sheet: Size, layout and Title block	1
1.6	Drawing sheet: B.I.S. specifications and folding of drawing sheets	1
1.7	Line types and Lettering	1
2.0	**Projection of points and straight lines**	
2.1	Introduction to orthographic projections	1
2.2	Positions of a points	2
2.3	Projection of straight lines with respect to V.P and H.P	2
2.4	Projection of lines (Inclined to one plane and parallel to other)	2
2.5	Projection of lines (Inclined to both planes)	2
3.0	**Projection of plane and solids**	
3.1	Plane figures	1
3.2	Traces of Planes	2
3.3	Classifications of solids	2
3.4	Simple positions of solids (Front view)	2
3.5	Simple positions of solids (Top view)	2
4.0	**Introduction to building components**	
4.1	Types of buildings (Load besring and framed structure)	1
4.2	Sections of buildings (Supstructure and Super structure)	2
4.3	Sketch the conventional signs for materials - bricks, stone, concrete and wood	2
4.4	Sketch the conventional signs for materials - glass, earth and steel	2
4.5	Water supply and sanitary fixtures like tap, wash basin, sink, W.C pan (Indian and European type), shower, flush tank.	2
5.0	**Building drawing**	
5.1	Types of drawing with appropriate scale and directions	2
5.2	Key plan, Site plan, Index map and Village map	1
5.3	Cross section of a load bearing wall and framed structure showing all the components below and above the ground level	2
5.4	Draw the plan, cross section and elevation of buildings - load bearing structure.	2
5.5	Draw the plan, cross section and elevation of buildings - framed	2

Course Designer(s)

1. Dr.S.Gunasekar - gunasekar@ksrct.ac.in

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

61 CE 201	Applied Mechanics	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To understand static equilibrium of particles and rigid bodies in two dimensions.
- To comprehend the effect of friction on equilibrium.
- To Understand the properties of section that are needed for the design of structural elements
- To understand the laws of motion, the kinematics of motion and the interrelationship.
- To impart a knowledge about properties of sections, kinetics of particles..

Pre-requisites

Basic knowledge of Physics

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recall the fundamental knowledge on laws of mechanics and Computation of equilibrium of forces to know the different types of support and reactions	Remember
CO2	Explain the concepts of different types of static frictions and Analyse the truss member by different methods	Understand
CO3	Compute the centroid and second moment of area for various sections	Apply
CO4	Examine the different types of motion in dynamics of particles	Analyse
CO5	Compute the mass, force and acceleration using Newton's law and D'Alembert's principle	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	1	1	2	-	1	-	-	-	3	-	-
CO2	3	2	3	1	1	2	-	1	-	-	-	3	-	-
CO3	3	2	2	1	1	1	-	1	-	-	-	3	-	-
CO4	3	2	3	1	1	1	-	1	-	-	-	3	-	-
CO5	3	2	3	1	1	2	-	2	-	-	-	3	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	20	20
Understand	-	30	50	50
Apply	30	-	-	-
Analyse	20	20	30	30
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

61 CE 201- Applied Mechanics

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

Statics and Equilibrium of Rigid Bodies Introduction to statics- Parallelogram laws of forces – Concurrent Forces and Non concurrent forces- Parallel Forces – Laws of Forces- Lames Theorem, Newtons law of Motion -Varignon's Theorem –Traiangle law of forces- Equilibrium of particles – Free body diagram- Types of Supports and Reactions - Simple problems in reactions – Moments and Couples – Moment of Forces about a point and about an axis	[12]
Frictions and Application of Statics Friction – Frictional forces – Laws of coulomb's friction – Simple contact friction- Ladder friction – Belt friction – Rolling resistance – Trusses - Analysis of Truss – Method of joints and Method of Section.	[12]
Properties of Surfaces and Solids* Determination of Areas and Volumes- Pappus Guldinus Theorem – Radius of gyration - First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section – Second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia.	[12]
Dynamics of Particles – Kinematics* Displacement, Velocity and acceleration, their relationship – Relative motion – Plane Motion - Rectilinear motion -–Projectile motion	[12]
Dynamics of Particles - Kinetics* Newton's law – D' Alembert's Principle - Principles of Work Energy Equation of particles – Impulse and momentum – Impact of elastic bodies	[12]
Total Hours:	**60**

Text Book(s):	
1.	Dubey. N.H., "Engineering Mechanics - Statics and Dynamics", Tata Mc Graw Hill Private Ltd., New Delhi, 2013.
2.	Palanisamy, M.S. and Nagan, S., " Engineering Mechanics- Statics and Dynamics", Tata Mc Graw Hill Private Ltd., New Delhi, 2008.
Reference(s):	
1.	Bansal, R.K., "Engineering Mechanics", Laxmi Publications Private Ltd, New Delhi, 2017.
2.	Beer, F.P and Johnson Jr. E.R., "Vector Mechanics for Engineers - Statics and Dynamics", McGraw-Hill International Edition, 2009.
3.	Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000.
4.	Irving H. Shames., "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., 2003.

* **SDG 9: Industry, innovation and infrastructure**

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Statics and Equilibrium of Rigid Bodies**	
1.1	Introduction, Units and Dimensions, Laws of Mechanics	1
1.2	Parallelogram laws of forces	1
1.3	Resultant of concurrent and non-concurrent forces	1
1.4	Conditions of Static Equilibrium	1
1.5	Free body diagram, Types of supports and their reactions	1
1.6	Equilibrium of Rigid bodies in two dimensions	1
1.7	Application problems in reactions	1
1.8	Moment of a force –about an axi s	1
1.9	Moment of a force about the point	1
1.10	Tutorials	2
2.0	**Frictions and Application of Statics**	
2.1	Fundamentals of friction	1
2.2	Angle of repose and cone of friction	1
2.3	Frictional force, Laws of Coloumb friction, Simple contact friction	1
2.4	Ladder friction	1
2.5	Belt friction	1
2.6	Rolling resistance	1
2.7	Trusses and its methods of analysis	1
2.8	Simple Problems in Method of joints.	1
2.9	Simple Problems in Method of Section.	1
2.10	Tutorials	2
3.0	**Properties of Surfaces and Solids**	
3.1	Determination of Areas and Volumes-Centroid	1
3.2	Moment of Inertia of plane area (Rectangle, circle, triangle using Integration Method)	1
3.3	Moment of Inertia of plane area(T section, I section)	1
3.4	Moment of Inertia of plane area (Angle section)	1
3.5	Moment of Inertia of plane area(Hollow section)	1
3.6	Parallel axis theorem	1
3.7	perpendicular axis theorem	1
3.8	Polar moment of inertia	1
3.9	Mass moment of inertia of thin rectangular section.	1
3.10	Tutorial	2
4.0	**Dynamics of Particles – Kinematics**	
4.1	Kinematics: Displacement, Velocity and acceleration	1
4.2	Relative motion	1
4.3	Plane Motion	1
4.4	Rectilinear motion	2
4.5	Projectile motion	1
4.6	Simple Problems in Kinematics	1
4.7	Tutorial	2
5.0	**Dynamics of Particles - Kinetics**	
5.1	Kinetics	1
5.2	Newton's law	1
5.3	D' Alembert's Principle	1
5.4	Principles of Work Energy Equation of particles	1
5.5	Impulse and momentum	2
5.6	Impact of elastic bodies	1
5.7	**Tutorials**	2

Course Designer(s)

1. Dr.J.Abdul Bari - abdulbari@ksrct.ac.in

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 MY 001	Environmental Studies and Climate Change (Common to all Branches)	Category	L	T	P	Credit
		MC	2	0	0	0

Objectives

- To understand the importance of ecosystem and biodiversity.
- To analyze the impacts of pollution, control and legislation.
- To enlighten awareness and recognize the social responsibility in environmental issues.
- To enlighten the waste management

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the impacts of pollution on climate change	Understand
CO2	Enhance the awareness the methods of waste management.	Apply
CO3	Examine the value of sustainable future	Evaluate
CO4	Evaluate the clean and green development for environmental problem	Evaluate
CO5	Analyze the role of Geo-science in environmental management	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	1	3	2	3	-	-
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	3	2	2	3	-	-
CO3	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	2	2	2	3	-	-
CO4	**2**	**2**	**3**	**3**	**-**	**1**	**3**	**3**	2	2	1	2	-	-
CO5	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	3	2	2	3	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	20	20	-	-
Understand	20	20	-	-
Apply	10	10	-	-
Analyse	10	10	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	-	-

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 MY 001– Environmental Science and Climate Change

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	2	0	0	30	0	100	-	100

Pollution and its impact on climate change* Pollution: Sources and impacts of air pollution – greenhouse effect- global warming- climate change - ozone layer depletion - acid rain. Carbon Footprint - Climate change on various sectors – Agriculture, forestry and ecosystem – climate change mitigation and adaptation. Action plan on climate change. IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes. *Activity*: Study of carbon emission nearby place or industry	[6]
Integrated Waste Management* Waste - Types and classification. Principles of waste management (5R approach) - Swachh Bharat Abhiyan – Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste - risk management: Collection, segregation, treatment and disposal methods. Waste water treatment- ASP *Activity*: Analysis and design of waste management systems, prepare a model / project - wealth from waste.	[6]
Sustainable development practices** Sustainable development goals (SDGs) **–** Green computing- Carbon trading - Green building – Eco- friendly plastic – Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – Hydroelectric power. Water scarcity- Watershed management, ground water recharge and rainwater harvesting. *Activity*: Select a topic and analyze the value of sustainable development.	[6]
Environment andAgriculture*: Organic farming – bio-pesticides- composting, bio composting, vermi-composting, roof gardening and irrigation. Waste land reclamation. Climate resilient agriculture. Green auditing *Activity*: Prepare a green auditing report on energy, water etc	[6]
Geo-science in natural resource management Data base software in environment information, Digital image processing applications in forecasting. GPS, Remote Sensing and Geographical Information System (GIS), World wide web (www), Environmental information system (ENVIS). *Activity*: Prepare the report using IT tool	[6]
Total Hours:	30

Text Book(s):	
1.	Anubha Kaushik , C P Kaushik. Perspectives In Environmental Studies, New Age International publishers; Sixth edition (1 January 2018)
2.	
Reference(s):	
1.	G.Tyler Miller Environmental Science 14th Edition Cengage Publications, Delhi, 2013
2.	Gilbert M.Masters and Wendell P. Ela,"Environmental Engineering And Science", Phi Learning Private Limited, 3rd Edition,2015
3.	Erach Bharucha. Textbook of Environmental Studies for Undergraduate Courses, Universities Press, 2000
4.	

***SDG:3 – Climate Action**
****SDG:6 – Clean Water and Sanitation**
****SDG:7 – Affordable and Clean Energy**

R4/ w.e.f. 01.06.2024
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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Pollution and its impact on climate change**	
1.1	Pollution: Sources and impacts of air pollution – green house effect- Global warming- climate change - ozone layer depletion - acid rain	2
1.2	Climate change on various sectors: Agriculture, forestry and ecosystem. – climate change mitigation and adaptation	1
1.3	Action plan on climate change - IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes	1
2.0	**Integrated Waste Management**	
2.1	Waste - Types and classification. Principles of waste management (5R approach) - Swachh Bharat Abhiyan	1
2.2	Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste	1
2.3	Risk management: Collection, segregation, treatment and disposal methods.	1
2.4	Waste water treatment- ASP	1
3.0	**Sustainable development practices**	
3.1	Sustainable development goals (SDGs) **–** Green computing- Carbon trading - Green building – Eco- friendly plastic	1
3.2	Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – Hydroelectric power	2
3.3	Water scarcity- Watershed management, ground water recharge and rainwater harvesting	1
4.0	**Environment and Agriculture**	
4.1	Organic farming – bio-pesticides	1
4.2	Composting, bio composting, vermi-composting	1
4.3	Roof gardening and irrigation	1
4.4	Waste land reclamation. Climate resilient agriculture, Green auditing	1
5.0	**Geo-science in natural resource management**	
5.1	Data base software in environment information, Digital image processing applications in forecasting	2
5.2	GPS, Remote Sensing and Geographical Information System (GIS)	1
5.3	World wide web (www), Environmental information system (ENVIS)	1

Course Designer(s)

1. Dr.T.A.Sukantha – sukantha@ksrct.ac.in
2. Dr.B.Srividhya – srividhyab@ksrct.ac.in
3. Dr.K.Prabha – prabhak@ksrct.ac.in
4. Dr.S.Meenachi – meenachi@ksrct.ac.in
5. Mr.K.Tamilarasu – tamilarasu@ksrct.ac.in
6. Ms.D.Kirthiga – kiruthiga@ksrct.ac.in

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CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 GE 002	தமிழரும் தொழில்நுட்பமும் (அனைத்து துறைகளும் பொதுவானது)	Category	L	T	P	Credit
		GE	1	0	0	1*

பாடத்தின் நோக்கங்கள்:

- தமிழர்களின் சங்ககால நெசவு, பானை வனைதல் குறித்து அறிதல்.
- தமிழர்களின் கட்டிடத் தொழில் நுட்பம் குறித்து அறிதல்.
- தமிழர்களின் உற்பத்தி முறைகள் குறித்து அறிதல்.
- தமிழர்களின் சங்ககால வேளாண்மை, நீர்ப்பாசனம் குறித்து கற்றல்.
- நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிதல்.

முன்கூட்டிய துறை சார் அறிவு

- தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

CO1	சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானை வனைதல் தொழில்நுட்பம் குறித்த கற்றுணர்தல்.	நினைவு கூர்தல், புரிதல்
CO2	சங்ககாலத் தமிழர்களின் கட்டிட தொழில்நுட்பம் கட்டுமானப் பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்த அறிவு.	நினைவு கூர்தல், புரிதல்
CO3	சங்ககாலத் தமிழர்களின் உலோகத் தொழில் நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு.	நினைவு கூர்தல், புரிதல்
CO4	சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு.	நினைவு கூர்தல், புரிதல்
CO5	நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிந்துகொள்ளலும் மற்றும் பயன்படுத்துதலும்.	நினைவு கூர்தல், புரிதல், செயல்படுத்துதல்

Mapping with Programme Outcomes

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	3	3	3	2	-	3	-	-
CO2	3	-	-	-	-	-	2	3	2	2	-	3	-	-
CO3	3	-	-	-	-	-	3	3	3	2	-	3	-	-
CO4	3	-	-	-	-	2	3	3	2	2	-	3	-	-
CO5	3	-	-	-	3	-	-	3	-	3	-	3	-	-

3- Strong; 2-Medium; 1-Low

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)
	1	1	
Remember	20	20	40
Understand	20	20	40
Apply	20	20	20
Analysis	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Note: Those who studied Tamil as language subject in +2 should write the exams (Model & End Semester Exams) in Tamil Language only. Those who did not study Tamil as language subject in +2 and other state students can write the exams in English Language. It is mandatory.

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty Of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology– Autonomous R2022								
Common to all Branches								
60 GE 002- Tamils and Technology								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1#	100	-	100

Weaving and Ceramic Technology* Weaving Industry during Sangam Age – Ceramic Technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.	[3]
Design and Construction Technology* Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period - Type Study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal – Chetti Nadu Houses , Indo – Saracenic architecture at Madras during British Period.	[3]
Manufacturing Technology* Art of Ship Building – Metallurgical studies – Iron Industry – Iron smelting ,Steel -Copper and gold coins as source of history – Minting of Coins – Beads making – industries Stone beads – Glass beads – Terracotta beads – Shell beads/bone beats – Archeological evidences -Gem stone types described in Silappathikaram.	[3]
Agriculture and Irrigation Technology* Dam,Tank,Ponds,Sluice,Significance of Kumizhi Thoompu of Chola Period,Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea- Fisheries – Pearl – Conche diving -Ancient Knowledge of Ocean – Knowledge Specific Society.	[3]
Scientific Tamil and Tamil Computing* Development of Scientific Tamil – Tamil Computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy- Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	[3]
Total Hours	15

TextBook(s):

1.	முனைவர் கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed, 2022.
2.	முனைவர் இல. சுந்தரம், கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed, 2021
3.	முனைவர் இரா.சிவானந்தம், மு.சேரன், கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed 2020.
4.	முனைவர் இரா.சிவானந்தம் , முனைவர் ஜெ.பாஸ்கர், பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,1st Ed, 2022
5.	Dr.K.K.Pillay, Social Life of Tamils, TNTB & ESC and RMRL – (In print).
6.	Dr.S.Singaravel, Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st Ed, 2001.
7.	Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu, Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd, 2010
8.	Dr.M.Valarmathi, The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies,
9.	Dr.R.Sivanantham, Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
10.	Dr.K.K.Pillay, Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
11.	Dr.R.Sivanantham, Dr.J.Baskar, Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
12.	R.Balakrishnan, Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed 2022

***SDG 4 – Quality Education**

 # For Tamils and Technology, additional 1 credit is offered and not accounted for CGPA.

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology–AutonomousR2022								
60 GE 002- தமிழரும் தொழில்நுட்பமும் (அனைத்து துறைகளும் பொதுவானது)								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1#	40	60	100

நெசவு மற்றும் பானைத் தொழில்நுட்பம்* சங்க காலத்தில் நெசவுத் தொழில் -பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.	[3]
வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்* சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.	[3]
உற்பத்தித் தொழில் நுட்பம்* கப்பல் கட்டும் கலை - உலோகவியல் -இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.	[3]
வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்* அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.	[3]
அறிவியல் தமிழ் மற்றும் கணித்தமிழ்* அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.	[3]
Total Hours	15

Text Book(s):

1.	முனைவர் கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed, 2022.
2.	முனைவர் இல. சுந்தரம், கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed 2021
3.	முனைவர் இரா.சிவானந்தம், மு.சேரன், கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed 2020.
4.	முனைவர் இரா.சிவானந்தம் , முனைவர் ஜெ.பாஸ்கர், பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,1st Ed 2022
5.	Dr.K.K.Pillay, Social Life of Tamils, TNTB & ESC and RMRL – (In print).
6.	Dr.S.Singaravel, Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st Ed 2001.
7.	Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu, Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd Ed, 2010
8.	Dr.M.Valarmathi, The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies,
9.	Dr.R.Sivanantham, Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
10.	Dr.K.K.Pillay, Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
11.	Dr.R.Sivanantham, Dr.J.Baskar, Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
12.	R.Balakrishnan, Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed 2022

***SDG 4 – Quality Education**

 # For Tamils and Technology, additional 1 credit is offered and not accounted for CGPA.

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Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CS 0P1	C Programming Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To enable the students to apply the concepts of C to solve simple problems
- To use selection and iterative statements in C programs
- To apply the knowledge of library functions in C programming
- To implement the concepts of arrays, functions, structures and pointers in C
- To implement the file handling operations through C

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement computational problems using selection and iterative statements	Apply
CO2	Demonstrate C program to manage collection of related data.	Apply
CO3	Design and Implement different ways of passing arguments to functions, Recursion and implement pointers concepts.	Apply
CO4	Develop a C program to manage collection of different data using structures, Union, user-defined data types and preprocessor directives.	Apply
CO5	Demonstrate C program to store and retrieve data using file concepts.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	2	2	-	2	3	3
CO2	3	3	3	-	3	-	-	-	2	2	-	2	3	3
CO3	3	3	3	-	3	-	-	-	2	2	-	2	3	3
CO4	3	3	3	-	3	-	-	-	2	2	-	2	3	3
CO5	3	3	3	-	3	-	-	-	2	2	-	2	3	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	100	100	100	100
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	100	100	100	100

R4/ w.e.f. 01.06.2024
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K.S.Rangasamy College of Technology – Autonomous R2022							
B.E. Civil Engineering							
60 CS 0P1- C Programming Laboratory							
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
II	0	0	4	45	2	60	40	100

List of Experiments:

1. Implementation of Simple computational problems using various formulas*
2. Implementation of Problems involving Selection statements*
3. Implementation of Iterative problems e.g., sum of series*
4. Implementation of 1DArray manipulation*
5. Implementation of 2D Array manipulation*
6. Implementation of String operations*
7. Implementation o fSimple functions and different ways of passing arguments to functions and Recursive Functions*
8. Implementation of Pointers*
9. Implementation of structures and Union*
10. Implementation of Bit Fields, Typedef and Enumeration*
11. Implementation of Preprocessor directives*
12. Implementation of File operations*

*** SDG:4- Quality Education**

Course Designer(s)

1. Dr.P.Kaladevi - kaladevi@ksrct.ac.in

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60 ME 0P1	Fabrication and Reverse Engineering Laboratory	Category	L	T	P	Credit
		ES	0	0	4	2

Objectives

- To make the students gain practical knowledge to co-relate with the theoretical studies and to acquire skills on operating the hand tools and instruments.
- To provide hands on training on Fitting, Carpentry, Sheet metal, Welding and machine
- To offer real time activity on plumbing connections in domestic applications tools.
- To provide hands on training on house hold wiring and electronic circuits.
- To provide hands on activities on dismantling, assembling of the computer internal components and peripherals.

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Perform facing, plain turning and drilling.	Apply
CO2	Make a model of fitting, carpentry, sheet metal and welding joints.	Apply
CO3	Construct the water pipe line in plumbing shop.	Apply
CO4	Trouble shoots the electrical and electronic circuits and realizes the importance of earthing.	Apply
CO5	Identify and install computer internal components and peripherals	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1	2	1	3	1	3	2	3	1	2	3	2	2
CO2	3	3	3	1	3	2	1	2	3	3	1	3	2	2
CO3	3	3	3	1	3	2	2	2	3	3	2	3	2	2
CO4	3	3	3	2	3	3	2	3	3	1	1	3	2	2
CO5	3	3	3	3	3	2	2	2	3	2	2	3	2	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	50	50	50	50
Analyse	50	50	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	100	100	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 ME 0P1- Fabrication and Reverse Engineering Laboratory								
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	4	45	2	60	40	100

List of Experiments:

Machine Shop Exercises

1. Facing and Turning Operations
2. Drilling Operations

Fitting Exercises

3. Filling Operations
4. Filling and Cutting Operations on MS Plates for Square joint

Carpentry Exercises

5. Planning Operations
6. Joining of Wooden piece by Dovetail Joint

Sheet Metal Exercises

7. Making of Sheet Metal of Rectangular Tray
8. Making of Sheet Metal t of Cone Shape & Scoop

Welding Exercises

9. Arc Welding of MS Plates by Lap joint , Butt joint,&T-Joint

Plumbing Exercises

10. Assembly of GI pipes/PVC and Pipe Fitting
11. Cutting of Threads in GI pipes / PVC by thread Cutting Dies

Electrical Wiring Exercises

12. Wiring circuits for Filament lamps/CT using Single (One way) Switch
13. Wiring circuits for Filament lamps/CT using Stair Case (Two Way) Switch
14. Wiring Circuits for a Fluorescent lamp (Tube Light Circuit)

Electronics Exercises

15. Current limiting resistor calculation for light emitting diode (LED).
16. Forward bias & Reverse bias of a PN junction diode.

Computer Hardware Exercise

17. Identify computer peripherals and internal components.
18. Dismentle and assemble of desktop computer systems.

Lab Manual	
1.	Lab Manual prepared by Course Designer.

Course Designer(s)

1. Mr..S.Venkatesan – venkatesans@ksrct.ac.in

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Passed in the BOS Meeting Held on 22.05.2024
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TIRUCHENGODE - 637 215

60 CG 0P1	Career Skill Development- I	Category	L	T	P	Credit
		CGC	0	0	2	1*

Objectives

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

Pre-requisites

Basic knowledge of reading and writing in English.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Listen and comprehend complex academic texts	Understand
CO2	Read and infer the denotative and connotative meanings of technical texts	Analyze
CO3	Write definitions, descriptions, narrations, and essays on various topics	Apply
CO4	Speak fluently and accurately in formal and informal communicative contexts	Apply
CO5	Appraise the verbal ability skills in the career development and professional contexts	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	2	3	3	2	3	-	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	2
CO3	-	-	-	-	-	-	-	2	3	3	2	3	-	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	2
CO5	-	-	-	-	-	-	-	2	3	3	2	3	-	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	10	10	20	No End Semester Examination
Understand	10	10	20	
Apply	20	20	30	
Analyse	20	20	30	
Evaluate	0	0	0	
Create	0	0	0	
Total	60	60	100	

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K.S.Rangasamy College of Technology – Autonomous R2022								
Common to all Branches								
60 CG 0P1 - Career Skill Development- I								
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	2	30	1*	100	00	100

List of Experiments:

Listening*

Listening for general information-specific details - audio / video (formal & informal) - Listen to podcasts/ TED talks/ anecdotes / stories / event narration / documentaries and interviews with celebrities - Listen to a product and process descriptions, advertisements about products or services.

Speaking*

Self-Introduction; Introducing a friend; conversation - politeness strategies - Narrating personal experiences / events; Interviewing a celebrity; reporting / and summarizing of documentaries / podcasts/ interviews - Picture description; giving instruction to use the product; presenting a product - Small Talk; Mini presentations - Group discussions, debates & role plays.

Reading*

Loud reading vs Silent reading, Skimming & Scanning of passages, reading brochures (technical context), social media messages relevant to technical contexts and emails - Biographies, travelogues, newspaper reports and travel & technical blogs - Advertisements, gadget reviews and user manuals - Newspaper articles and Journal reports - Editorials; and opinion blogs

Writing*

Writing letters – informal and formal – basics and format orientation - paragraph texting, short report on an event (field trip etc.) - Definitions; instructions; and product /process description - Note-making / Note-taking; recommendations; transferring information from non-verbal (charts, graphs to verbal mode) - Essay texting

Verbal Ability I*

Reading Comprehension (MCQs) – Cloze Test - Sequencing of sentences – Summarizing and paraphrase – Error Detection – Spelling Test – Sentence Improvement - Preposition

Lab Manual

1.	'English for Engineers & Technologists' Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, 'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book', Penguin Random House India, 2020
3.	Michael McCarthy and Felicity O Dell, 'English Vocabulary in Use: Upper Intermediate', Cambridge University Press, N.York, 2012
4.	Lakshmi Narayanan, 'A Course Book on Technical English' Scitech Publications (India) Pvt. Ltd. 2020

*** SDG- 04- Quality Education**

Course Designer(s)

Dr.A.Palaniappan - palaniappan@ksrct.ac.in

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TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2023-2024 onwards)

THIRD SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 MA 007	Statistics and Numerical Methods	2	40	60	100	45	100
2	61 CE 301	Strength of Materials	2	40	60	100	45	100
3	60 CE 302	Fluid Mechanics and Hydraulics Machinery	2	40	60	100	45	100
4	60 CE 303	Surveying	2	40	60	100	45	100
5	60 CE 304	Construction Materials and Practices	2	40	60	100	45	100
6	60 CE 305	Engineering Geology	2	40	60	100	45	100
PRACTICAL								
8	60 CE 3P1	Fluid Mechanics and Hydraulics Engineering Laboratory	3	60	40	100	45	100
9	60 CE 3P2	Surveying Laboratory	3	60	40	100	45	100
10	60 CG 0P2	Career Skill Development II	3	100	-	100	-	100
11	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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60 MA 007	Statistics and Numerical Methods	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To provide an understanding of the statistical methods and distribution concept by which real life problems are analyzed.
- To learn basic concepts in descriptive statistics.
- To apply numerical techniques for solving system of linear equations.
- To understand and apply the concepts of interpolation and numerical integration.
- To solve initial value problems of ordinary differential equations numerically.

Pre-requisites

- **Basic knowledge of reading and writing in English**

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of probability and random variables.	Understand
CO2	Apply Student's t test, F test and Chi-square test for testing the statistical hypothesis.	Apply
CO3	Compute measures of central tendency, measures of dispersion and correlation coefficient.	Apply
CO4	Employ various iteration techniques for solving algebraic, transcendental and system of linear equations.	Apply
CO5	Apply different techniques to find the intermediate values and to evaluate single definite integrals.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	2	-	-	-	-	-	-	2	-	3
CO2	3	3	3	3	3	-	-	-	-	-	-	2	-	3
CO3	3	3	3	3	2	-	-	-	-	-	-	2	-	3
CO4	3	3	3	2	3	-	-	-	-	-	-	2	-	3
CO5	3	3	3	2	3	-	-	-	-	-	-	2	-	3
3 - Strong; 2 - Medium; 1 - Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	40	30	60
Analyse	0	10	10
Evaluate	0	0	0
Create	0	0	0
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to Mech, MCT and Civil

60 MA 007- Statistics and Numerical Methods

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Probability and Random Variables Axioms of probability - Conditional probability - Baye's theorem - Random variable - Expectation - Probability mass function - Probability density function - Moment generating function.	[9]
Standard Distributions and **Testing of Hypothesis*** Binomial distribution - Poisson distribution – Type I and Type II errors - Test of significance of small samples - Student's 't' test - Single mean - Difference of means - F-test - Chi-square test - Goodness of fit - Independence of attributes.	[9]
Empirical Statistics **Measures of central tendency***: Mean, Median, Mode - Measures of dispersion: Range - Quartile deviation - Standard deviation - Measures of skewness: Bowley's co-efficient of skewness - Pearson's co-efficient of skewness- Correlation.	[9]
Solutions of Equations and Eigen Value Problem Algebraic and Transcendental equations - Newton Raphson method – RegulaFalsi method -Gauss elimination method - Gauss Jordan method - Iterative methods: Gauss Jacobi method - Gauss Seidel method - Eigen value of a matrix by Power method.	[9]
Interpolation and Numerical Integration Lagrange's and Newton's divided difference interpolation (unequal intervals)** - Newton's forward and backward interpolation (equal intervals)** - Two point and three point Gaussian quadrature - Trapezoidal, Simpson's 1/3 and 3/8 rule (single integral).	[9]
Total Hours: 45 + 15 (Tutorial)	**60**

Text Book(s):	
1.	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2.	Kapoor V. K. and S.C.Gupta , "Fundamentals of Mathematical Statistics ", Sultan Chand & sons 12th Edition, New Delhi, 2020.
Reference(s):	
1.	Veerarajan,T., "Probability, Statistics and Random Processes (with Queueing Theory and Queueing Networks)", Tata McGraw-Hill 4th Edition, New Delhi, 2015.
2.	Johnson R.A and Gupta C.B., "Miller and Freund's Probability and statistics for Engineers'', 11th Edition, PearsonEducation,Asia,2011.
3.	Kandasamy P,Thilakavathy K.andGunavathyK., "NumericalMethods", 3rd Edition, S.Chand and Co., NewDelhi, 2003.
4.	

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****SDG:9 Industry, Innovation, and Infrastructure**

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Standard Distributions and Testing of Hypothesis**	
1.1	Binomial Distribution	1
1.2	Poisson Distribution	1
1.3	Exponential a n d Geometric Distributions	1
1.4	t test	1
1.5	Tutorial	2
1.6	F test	1
1.7	Chi- square test	1
1.8	Test for Independency	1
1.9	Goodness of fit.	1
1.10	Tutorial	2
2.0	**Basic Statistics**	
2.1	Mean, Median and Mode	1
2.2	Range, Quartile deviation	1
2.3	Standard deviation	1
2.4	Tutorial	2
2.5	Pearson's co-efficient of skewness	1
2.6	moments	1
2.7	kurtosis	1
2.8	correlation	1
2.9	Rank correlation	1
2.10	Tutorial	2
3.0	**Solution of Equation sand Eigen Value Problems**	
3.1	Newton Raphson method	1
3.2	Gauss elimination method	1
3.3	Gauss Jordan method	1
3.4	Gauss Jacobi	1
3.5	Tutorial	2
3.6	Gauss Seidel	1
3.7	Matrix inversion by Gauss Jordan method	1
3.8	Eigen values of a matrix by power method	1
3.9	Tutorial	2
4.0	**Interpolation and Numerical Integration**	
4.1	Lagrange's interpolations	1
4.2	Newton's divided difference interpolations	1
4.3	Tutorial	2
4.4	Newton's forward and backward difference interpolations	1
4.5	Two and three point Gaussian quadratures	1
4.6	Single integration using Trapezoidal andSimpson's1/3and3/8rules	1
4.7	Tutorial	2
5.0	**Numerical Solution of Ordinary Differential Equations**	
5.1	Taylor's series method	1
5.2	Euler's method	1
5.3	modified Euler's method	1
5.4	Tutorial	2
5.5	Fourth order Runge – Kutta method	1
5.6	Milne's method	1
5.7	Adam's method	1
5.8	Tutorial	2
	Total	60

List of MATLAB programmes:

1. **Calculate the standard parameters by using Binomial distribution.**
2. **Determine the Measures of central tendency.**
3. **Compute the measures of dispersion.**
4. **Solve the Equation by using Gauss Seidel method.**
5. **Numerical integration using Trapezoidal and Simpson's rules.**
6. **To solve Ordinary differential equations by Taylor's series method.**

Course Designer(s)

1. Dr.C.Chandran - cchandran@ksrct.ac.in

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61 CE 301	Strength of Materials	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To learn the fundamental concepts of Stress, Strain and deformation of solids.
- To know bending stress and shear stress distribution in various sections.
- To calculate the deflection of beams under the application of external forces.
- To evaluate the performance of columns.
- To assess the behaviour of shaft, Cylinders and springs.

Pre-requisites

Fundamentals of Mathematics, knowledge of strength of materials and its mechanics

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand various types of stresses and strains developed in the member.	Evaluate
CO2	Sketch the bending and shear stress distribution of a member.	Evaluate
CO3	Compute the deflection of beams by different methods and selection of method for determining slope or deflection.	Evaluate
CO4	Describe the failure modes for various types of columns.	Evaluate
CO5	Analyze the members subjected to torsion.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	2	2	1	2	2	3	2	2	1	2	-
CO2	-	-	3	-	2	1	-	-	3	-	2	1	2	-
CO3	2	2	3	2	2	1	2	2	3	2	2	1	2	-
CO4	-	-	3	-	2	1	-	-	3	-	2	1	2	-
CO5	1	1	3	2	3	1	1	1	3	2	3	1	2	-

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	20	20	40
Analyse	20	20	40
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

61 CE 301 - Strength of Materials

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Stress, Strain and Deformation of Solids* Introduction – Stress, Strain – Types – Elastic limit – Hooke's law – Stress Strain curves – Elastic constants – Relationship between Elastic constants. Simple and Compound bars – Principles of Superposition – Varying cross section – Thermal stress in composite bars - Principal stresses and principal planes	[9]
Stresses in Flexural Members* Beams – Types of beams - Statically determinate beams subjected to simple loading – Shear force and Bending Moment – Shear Force Diagram and Bending Moment Diagram –Point of contra flexure - Relationship between load, shear force and bending moment - Theory of simple bending – bending equation –Flexural rigidity- Bending stress distribution in symmetrical sections. Shear stress-Variation of shear stress in beam cross section – Shear stress distribution for symmetrical sections.	[9]
Deflection of Beams** Deflection: Methods - Integration method, Macaulay's method, Conjugate beam method, Area moment Method.	[9]
Compression Members** Column / strut : Types- modes of failure-Factor of safety- Euler's expression for crippling load for different end conditions - Rankine's Gordon formula-Combined and bending stress-Core section.	[9]
Torsion of shaft, Cylinders and Springs* Theory of simple torsion –torsion equation - Torsional rigidity - Polar modulus - Stresses in solid and hollow circular shafts – Power transmitted by a shaft. Springs: Types-Applications-Deflection.Thin and Thick Cylinder: Analysis – internal pressure – deformation – Introduction to compound cylinders.	[9]
Total Hours: 45 + 15(Tutorial)	**60**

Text Book(s):

1.	Bansal R K, "Text book of Strength of Materials", Laxmi Publications Pvt. Ltd, New Delhi, 2012.
2.	Rajput R K, "Strength of Materials", S.Chand & Company Ltd, New Delhi, 2015.

Reference(s):

1.	Beer F P and E R Johnston, "Mechanics of Materials", Tata McGraw Hill, New Delhi,2014
2.	Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2009.
3.	Ramamrutham S, "Strength of materials", Dhanpat Rai Publishing Company, New Delhi, 2014.
4.	Timoshenko S, "Strength of Materials", C B S Publishers & distributors, New Delhi, 2002

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Stress, Strain and Deformation of Solids**	
1.1	Introduction – Force on a particle, coplanar forces and resultant of several concurrent forces	1
1.2	Introduction to stress and strain,tensile, compressive and shear stress and strain	1
1.3	Hooke's law ,Young's Modulus, Rigidity Modulus, Bulk Modulus, Poisson's Ratio	1
1.4	Tutorial	2
1.5	External and internal forces, free body diagram and equilibrium of a rigid body	2
1.6	Various boundary conditions.	2
2.0	**Stresses in Flexural Members**	
2.1	Beams and its types Flexural rigidity	1
2.2	Shear force and Bending Moment Diagram in Beams	2
2.3	Point of Contraflexure - Relationship between load, SF and BMD	1
2.4	Theory of simple bending	1
2.5	Bending equation	1
2.6	Bending stress distribution in symmetrical sections. Shear stress	1
2.7	Variation of shear stress in beam cross section- Shear stress distribution for symmetrical sections.	1
2.8	Tutorial	1
3.0	**Deflection of Beams**	
3.1	Determination of slope and deflection of determinate beams by Integration method	2
3.2	Determination of slope and deflection of indeterminate beams by Integration method	2
3.3	Determination of slope and deflection of determinate beams by Macaulay's method	1
3.4	Determination of slope and deflection of indeterminate beams by Macaulay's method	1
3.5	Determination of slope and deflection of determinate beams by Conjugate beam method	1
3.6	Determination of slope and deflection of determinate beams by Area moment Method	1
3.7	Determination of slope and deflection of indeterminate beams by Area moment Method	1
3.8	Tutorial	2
4.0	**Compression Members**	
4.1	Introduction, Difference between column and struts	2
4.2	Types of columns	1
4.3	Modes of failure	1
4.4	Factor of safety	1
4.5	Euler's expression for crippling load for different end conditions	1
4.6	Tutorial	2
4.7	Determination of crippling load for different end condition using Rankine's Gordon formula	1
4.8	Combined and bending stress-Core section.	1
4.9	Tutorial	2
5.0	**Torsion of shaft, Cylinders and Springs**	
5.1	Power transmitted by shafts and design of shafts	2
5.2	Torsional rigidity & Polar modulus	1
5.3	Stresses in solid and hollow circular shafts	1
5.4	Tutorial	1
5.5	Deflection.Thin and Thick Cylinder	2
5.6	Analysis of internal pressure	1
5.7	Introduction to compound cylinders	1
5.8	Problems in Springs	1
5.9	Tutorial	1

Course Designer(s)

1. Dr.K.Vijaya Sundravel - vijayasundravel@ksrct.ac.in

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60 CE 302	Fluid Mechanics and Hydraulics Machinery	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To be able to study the importance of various properties and characteristics of fluids.
- To solve fluid statics and kinematic problems such as pressure measurement, particle paths and streamlines.
- To derive the equation of conservation of mass and its application.
- To use important concepts of boundary layers theory, continuity equation, Bernoulli's equation and turbulence, and apply the same to problems.
- To understand the various flow measuring devices pumps and turbines and analyse its performance.

Pre-requisites

- Applied Physics.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	State and explain various fluid properties.	Understand
CO2	Apply the knowledge of fluid statics for solving the problems in buoyancy and Pressure measurement.	Apply
CO3	Gain knowledge on fluid kinematics for solving the problems in Stream and Potential functions.	Understand
CO4	Solve problems in flow dimensional analysis and boundary layer.	Analyse
CO5	Analyze the performance of turbines and pumps.	Analyse

Mapping with Programme Outcomes

COs	POs												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	-	2	-	-	-	-	2	3	-	3	2	-
CO2	3	2	-	-	-	2	-	-	3	2	-	2	2	-
CO3	3	3	-	3	-	-	-	-	2	3	-	3	2	-
CO4	3	3	-	3	-	3	-	-	3	3	-	3	2	-
CO5	3	3	-	2	-	3	-	-	3	3	-	2	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	-	-	-
Understand	30	20	40
Apply	20	30	40
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60CE302 - Fluid Mechanics and Hydraulic Machinery

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Fluid Properties, Statics and Kinematics** Fluid Properties: Importance & applications of fluid mechanics. Solid vs Fluid - Units and Dimensions – Properties of fluids (Definition only)-Mass density – Specific weight – Specific volume – Specific gravity – Viscosity – Compressibility – Surface tension – Capillarity – Vapour pressure. Fluid Statics: Hydrostatic law - Pascal's law - Pressure measurement - Buoyancy and meta-centre. Fluid Kinematics: Path line – Stream line – Streak line – Stream and Potential functions – Flow nets.	[9]
Fluid Dynamics* Fluid Element and properties - Lagrangian vs Eulerian description – Governing equations: Mass balance (Continuity equation) – Newton's second law (momentum equation-statement only) – First law of thermodynamics (Energy equation-statement only). Non-viscous flows (Euler's equation) – Frictionless flows (Bernoulli's equation), Introduction to CFD.	[9]
Flow Through Pipes and Boundary Layer* Laminar and turbulent flows through pipe – Hagen-Poiseuille equation – Darcy-Weishbach equation – Major and Minor losses. Dimensional Analysis- Buckingham's π theorem- Discharge and velocity measurements-venture meter and pitot tube- Boundary layer concept- Displacement and momentum thickness.	[9]
Hydraulic Turbines** Force exerted on moving plate/ vanes- Definition and classifications- Pelton, Francis, Propeller and Kaplan turbine: Working principles- Velocity triangle – Work done – specific speed – Efficiencies – Performance curve for turbines.	[9]
Hydraulic Pumps ** Definition and classifications- Centrifugal and Reciprocating Pumps: Working principles- Indicator diagram – Specific speed – efficiency and performance curves - Cavitation in pumps.	[9]
Total Hours: 45 + 15(Tutorial)	**60**

Text Book(s):

1.	Bansal, R.K., "A text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi,2019
2.	Rajput, R.K., "A Text book of Fluid Mechanics and Hydraulic Machines", S. Chand Publishing Ltd., NewDelhi, 2015.

Reference(s):

1.	Modi, P.N. and Seth, S.M., "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House, New Delhi, 2015.
2.	Subramanian, K., "Fluid Mechanics and Hydraulic Machines – Problems and Solutions", Tata McGraw Hill Education, New Delhi, 2010.
3.	Giles, R.V., Evett, J.B. & Liu, C., "Fluid Mechanics and Hydraulics", Tata McGraw Hill, New Delhi, 2015.
4.	Khurmi R.S., "Fluid Mechanics & hydraulic Machines. (in S.I. units)" S CHAND & Company Limited, 2015.

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Fluid Properties, Statics and Kinematics**	
1.1	Fluid Properties: Importance & applications of fluid mechanics	1
1.2	Solid vs Fluid - Units and Dimensions	1
1.3	Properties of fluids (Definition only)-Mass density	1
1.4	Specific weight – Specific volume – Specific gravity – Viscosity	1
1.5	Compressibility – Surface tension – Capillarity – Vapour pressure.	1
1.6	Fluid Statics: Hydrostatic law - Pascal's law - Pressure measurement	1
1.7	Buoyancy and meta-centre	1
1.8	Fluid Kinematics: Path line – Stream line – Streak line – Stream	1
1.9	Potential functions – Flow nets.	1
2.0	**Fluid Dynamics**	
2.1	Fluid Element and properties	1
2.2	Lagrangian vs Eulerian description	1
2.3	Governing equations: Mass balance (Continuity equation)	1
2.4	Governing equations: Mass balance (Continuity equation)	1
2.5	Newton's second law (momentum equation- statement only)	1
2.6	First law of thermodynamics (Energy equation-statement only)	1
2.7	First law of thermodynamics (Energy equation-statement only)	1
2.8	Non-viscous flows (Euler's equation)	1
2.9	Frictionless flows (Bernoulli's equation), Introduction to CFD.	1
3.0	**Flow Through Pipes and Boundary Layer**	
3.1	Laminar and turbulent flows through pipe	1
3.2	Hagen-Poiseuille equation	1
3.3	Darcy-Weishbach equation	1
3.4	Major and Minor losses	1
3.5	Dimensional Analysis- Buckingham's π theorem	1
3.6	Discharge and velocity measurements-venture meter and pitot tube	1
3.7	Boundary layer concept	1
3.8	Displacement and momentum thickness	1
4.0	**Hydraulic Turbines**	
4.1	Force exerted on moving plate/ vanes	1
4.2	Definition and classifications	1
4.3	Pelton, Francis, Propeller	1
4.4	Pelton, Francis, Propeller	1
4.5	Kaplan turbine: Working principles- Velocity triangle	1
4.6	Work done – specific speed	1
4.7	Efficiencies	1
4.8	Performance curve for turbines	2
5.0	**Hydraulic Pumps**	
5.1	Definition and classifications	1
5.2	Centrifugal and Reciprocating Pumps	1
5.3	Working principles- Indicator diagram	2
5.4	Specific speed	1
5.5	Efficiency	1
5.6	Performance curves	1
5.7	Cavitation in pumps	2

Course Designer(s)

1. Dr.M.Velumani - velumani@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE 303	Surveying	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To be familiar with fundamental knowledge on surveying and survey instruments.
- To carry out levelling and calculate area and volume from contour map.
- To conduct Theodolite Surveying for complex surveying and setting out of curves.
- To introduce the concepts of Control Surveying and Survey adjustments
- To know various modern instruments used in surveying.

Pre-requisites

Basic knowledge of properties learnt in Physical Science and Mathematical courses.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate the rudiments of various surveying and its principles.	Remember
CO2	Acquire knowledge on applications of levelling and contouring.	Understand
CO3	Imparts concepts of Theodolite Surveying for complex surveying operations like tachometry, Trigonometry and Setting out of Curves.	Understand
CO4	Construct the procedure for establishing horizontal and vertical control while surveying and practice to obtain probable value.	Apply
CO5	Imparts the knowledge on modern surveying instruments	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	2	2	2	2	3	3	2	3	2	-
CO2	3	3	3	2	2	2	2	2	3	3	2	3	2	-
CO3	3	3	3	3	3	2	2	3	3	3	2	3	2	-
CO4	3	3	3	3	3	2	2	3	3	3	3	3	2	-
CO5	2	2	2	3	3	2	2	3	3	3	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	10	10	20
Apply	20	20	30
Analyse	10	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 303 – Surveying

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Fundamentals of Conventional Surveying* Definition – Classifications – Basic principles – Chaining - Equipment and Accessories – Ranging Methods of ranging - Compass – Types - Basic Principles- Bearing – Local attraction – Traversing - Plane table surveying – Accessories - Merits and demerits – Methods – Traversing.	[9]
Levelling and Countouring* Levelling - Principles of Levelling - Datum – Bench Marks - Levels and staves - Temporary and Permanent Adjustments- Methods of Levelling- Booking - Reduction - Curvature and refraction correction - Contour - Characteristics of contours - Methods of contouring - Uses of contour – Calculation of areas and volumes.	[9]
Theodolite,Tacheometry and Curve Surveying* Theodolite: Description - Temporary and permanent adjustments - Horizontal and vertical angle measurements — Heights and distances – Tacheometric surveying – Stadia Tacheometry – Tangential Tacheometry – Trigonometric levelling – Single Plane method – Double Plane method – Curves – Types - Components and setting out of Simple circular curves.	[9]
Control Surveying and Adjustment* Horizontal and vertical control - Methods - Triangulation- Baseline - Satellite stations - single and reciprocal observations - traversing – Gale's table - Errors Sources - precautions and corrections - classification of errors - true and most probable values - weighed observations - principle of least squares - normal equation.	[9]
Modern Surveying* Total Station: Accessories - Digital Theodolite, EDM, Electronic field book – Advantages – – Working principle – Observables – Errors - Field procedure and applications. GPS: Advantages – System components – Segments - Signal structure – Selective availability and anti-spoofing receiver components and antenna – Planning and data acquisition – Data processing – Errors in GPS – Field procedure and applications.	[9]
Total Hours:	45

Text Book(s):

1.	Punmia B. C., Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, Sixteenth Edition, 2016.
2.	Duggal.S.K., "Surveying Volume I", Tata McGraw Hill Education Private Limited, Third Edition, 2011

Reference(s):

1.	Subramanian R., Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2.	Basak N.N., "Surveying and Levelling" Tata McGraw Hill Education Private Limited, Second Edition, 2011.
3.	Venkatramaiah C., Textbook of Surveying, Universities Press, Second Edition, 2011.
4.	Kanetkar.T.P and Kulkarni.S.V, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2014

*** SDG- 04- Quality Education**

****SDG:9 Industry, Innovation, and Infrastructure**

R4/ w.e.f. 01.06.2024
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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Fundamentals of Conventional Surveying**	
1.1	Definition – Classifications	1
1.2	Basic principles – Chaining	1
1.3	Equipment and Accessories	1
1.4	Methods of ranging	1
1.5	Compass – Types - Basic Principles	1
1.6	Bearing – Local attraction	1
1.7	Traversing	1
1.8	Plane table surveying – Accessories - Merits and demerits	1
1.9	Methods – Traversing	1
2.0	**Levelling and Contouring**	
2.1	Levelling - Principles of Levelling – Datum - Bench Marks	1
2.2	Levels and staves - Temporary and Permanent Adjustments	1
2.3	Methods of Levelling	1
2.4	Booking – Reduction	1
2.5	Curvature and refraction correction	1
2.6	Contour - Characteristics of contours	1
2.7	Methods of contouring - Uses of contour	1
2.8	Calculation of areas	1
2.9	Calculation of volumes	1
3.0	**Theodolite, Tacheometry and Curve Surveying**	
3.1	Theodolite: Description - Temporary and permanent adjustments	1
3.2	Horizontal and vertical angle measurements	1
3.3	Heights and distances – Tacheometric surveying	1
3.4	Stadia Tacheometry	1
3.5	Tangential Tacheometry	1
3.6	Trigonometric levelling – Single Plane and Double Plane method	1
3.7	Curves – Types – Components	1
3.8	Setting out of Simple circular curves	2
4.0	**Control Surveying and Adjustment**	
4.1	Horizontal and vertical control – Methods	1
4.2	Triangulation - Baseline - Satellite stations	1
4.3	Single and reciprocal observations	1
4.4	Traversing – Gale's table	1
4.5	Errors Sources - precautions and corrections	1
4.6	classification of errors - true and most probable values	1
4.7	weighed observations	1
4.8	principle of least squares	1
4.9	normal equation	1
5.0	**Modern Surveying**	
5.1	Total Station: Accessories - Digital Theodolite, EDM, Electronic field book	2
5.2	Advantages –– Working principle – Observables – Errors	1
5.3	Field procedure and applications	1
5.4	GPS: Advantages –System components –Segments -Signal structure	1
5.5	Selective availability and anti-spoofing receiver components and antenna	1
5.6	Planning and data acquisition – Data processing	1
5.7	Errors in GPS	1
5.8	Field procedure and applications	1

Course Designer(s)

1. Dr.R.JAGADEESAN - jagadeesan@ksrct.ac.in

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE 304	Construction Materials and Practices	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To gain knowledge on basic construction materials – Cement, Stone and brick
- To acquire knowledge in miscellaneous construction materials
- To learn the various building components
- To gain knowledge in construction sequence & practices
- To know various equipment used in construction industry

Pre-requisites

Basic knowledge of properties learnt in Physical Science courses

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Learn the manufacture and properties of construction materials	Understand
CO2	Apply the miscellaneous materials for construction works	Understand
CO3	Identify the materials for masonry, flooring and roofing	Analyse
CO4	Understand the construction sequence and procedures	Apply
CO5	Analyse the equipment used in construction industry	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	2	-	-	-	3	-	-	-	2	-
CO2	3	-	-	-	2	-	-	-	3	-	-	-	2	-
CO3	3	2	-	-	3	2	-	-	3	-	-	-	2	-
CO4	3	2	-	-	3	2	-	-	3	-	-	-	2	-
CO5	3	2	2	-	3	2	-	-	3	-	-	-	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	30	20	50
Analyse	10	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 304 - Construction Materials and Practices

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Cement, Stone and Bricks* Cement – Manufacture, Grades & Types –Stones – Qualities of good building stone, Test on Stones – Crushing, Abrasion, Impact, Hardness test and Freezing & thawing test- Classification of Bricks &Manufacture of Clay Bric k– Test on bricks – Compressive Strength, Water absorption and Efflorescence test - Fly ash bricks - Interlocking bricks	[9]
Miscellaneous Construction materials* Paints - Properties, types and defects, Varnishes, Distempers – Timber – Market forms – Industrial timber, Plywood and Veneer - Steel - Aluminium - Application of geotextile materials	[9]
Building Components* Substructure & Superstructure - Types of Brick masonry – Types of Stone masonry - Flooring - Granite, marbles, tiles, mosaic, wooden and synthetic flooring – Roofing - Asbestos, galvanized iron and Reinforced cement concrete	[9]
Construction Practices* Selection of site for building - Site Clearance – Marking – Earthwork – Temporary shed – Requirements of a good formwork and its types – Scaffolding and its types- Construction joints and its types – Damp proofing- Waterproofing	[9]
Construction Equipment* Selection of equipment for earth work: power shovel, scrapers, earth moving equipment – tractors, tipper, dumper, front end loaders – Equipment for foundation: pile driving equipment - Tools used for plastering	[9]
Total Hours: 45	45
Text Book(s):	

1.	Gupta R K, “Civil Engineering Materials and Practices”, Jain Brothers, New Delhi, 2014
2.	Rangwala, “Engineering Materials”, Charotar Publishing House Pvt., Ltd., Gujarat, 2019
Reference(s):	
1.	Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2012
2.	Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2015
3.	Rajput R K., “Engineering Materials”, S Chand and Company Ltd., 2014
4.	IS 1597 Part 1 & 2 . “Construction of Stone Masonry - Code of Practice” , BIS, New Delhi.

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Cement, Stone and Bricks**	
1.1	Introduction to construction materials	1
1.2	Cement – Manufacture & Grades	1
1.3	Types of cement	1
1.4	Stones - Qualities of good building stone - Crushing test	1
1.5	Abrasion and Impact test	1
1.6	Hardness test and Freezing & thawing test	1
1.7	Classification of Bricks & Manufacture of Clay Brick	1
1.8	Test on bricks – Compressive Strength & water absorption	1
1.9	Efflorescence test - Fly ash bricks - Interlocking bricks	1
2.0	**Miscellaneous Construction materials**	
2.1	Paints – Properties & Types	1
2.2	Defects in painting	1
2.3	Varnishes - Components & Types	1
2.4	Distempers – Components & Steps	1
2.5	Timber – Market forms – Industrial timber	1
2.6	Plywood and Veneer	1
2.7	Steel & Aluminium as building material	2
2.8	Application of geotextile materials in construction	1
3.0	**Building Components**	
3.1	Substructure & Superstructure	1
3.2	Types of Brick masonry	2
3.3	Types of Stone masonry	2
3.4	Selection of flooring materials - Granite, marbles	1
3.5	Tiles and Mosaic flooring	1
3.6	Wooden and Synthetic flooring	1
3.7	Materials for roofing - Asbestos and galvanized iron	1
3.8	Reinforced cement concrete roof	1
4.0	**Construction Practices**	
4.1	Selection of site for building, Site clearance and marking	1
4.2	Earthwork & temporary shed	1
4.3	Requirements in formwork and stripping time	1
4.4	Different materials used in formwork	1
4.5	Scaffoldings & its types	1
4.6	Different types of joints in construction	2
4.7	Damp-proofing - Materials and process	1
4.8	Water-proofing - Materials and process	1
5.0	**Construction Equipment**	
5.1	Introduction to construction equipment and selection of equipment	1
5.2	Earthwork- Power shovel & scrapers	2
5.3	Earthmoving equipment -Tractors & tippers	1
5.4	Dumper and front end loaders	1
5.5	Equipment used in foundation works	1
5.6	Pile driving equipment	1
5.7	Tools used for plastering	1
	Total	**45**

Course Designer(s)

1. Mr.K.ANGU SENTHIL - angusenthil@ksrct.ac.in

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60 CE 305	Engineering Geology	Category	L	T	P	Credit
		BS	2	0	0	2

Objectives

- To understand the importance of earthquake, volcanism.
- To acquire knowledge about various properties of minerals.
- To gain knowledge about the applications of geology in projects such as dams, tunnels, bridges, roads, airport and harbor.

Pre-requisites

Basic knowledge on earth structure.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.	Remember
CO2	Acquire knowledge about various physical and chemical properties of various minerals with its application.	Understand
CO3	Learn the properties, types and applications of rocks.	Understand
CO4	Understand about geological map and sub-surface investigation.	Understand
CO5	Gain knowledge about the applications of geology in projects such as dams, tunnels, bridges, roads, airport and harbor.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	3	2	2	2	2	2	2	3	2	-
CO2	2	2	2	-	-	-	2	2	2	2	2	3	2	-
CO3	1	-	2	-	-	-	3	2	2	2	2	3	2	-
CO4	-	2	2	-	3	-	3	3	3	3	3	3	2	-
CO5	1	-	2	3	-	2	3	3	3	3	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	30	50
Understand	30	30	50
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 305 - Engineering Geology

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	2	0	0	45	2	40	60	100

Physical Geology* Geology in civil engineering – branches of geology – structure of earth and its composition – weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.	[9]
Minerology* Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.	[9]
Petrology* Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.	[9]
Structural Geology and Geophysical Methods* Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.	[9]
Application of Geological Investigations* Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings – Hydrogeological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.	[9]
Total Hours:	45

Text Book(s):

1.	Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2.	Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.

Reference(s):

1.	Muthiayya, V.D. " A Text of Geology", Oxford IBH Publications, Calcutta, 1969.
2.	Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
3.	Bell .F.G.. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.
4.	Dobrin, M.B "An introduction to geophysical prospecting", McGraw Hill, New Delhi, 1988.

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Physical Geology**	
1.1	Geology in civil engineering	1
1.2	Branches of geology	1
1.3	Structure of earth and its composition	1
1.4	Weathering of rocks and scale of weathering	1
1.5	Soils - landforms and processes associated with river, wind, groundwater and sea	1
1.6	Relevance to civil engineering	1
1.7	Plate tectonics	1
1.8	Earth quakes zones in India.	1
1.9	Seismic zones in India.	1
2.0	**Minerology**	
2.1	Physical properties of minerals – Quartz group	1
2.2	Physical properties of minerals – Feldspar group	1
2.3	Pyroxene - hypersthene and augite	1
2.4	Amphibole – hornblende	1
2.5	Mica – muscovite and biotite,	1
2.6	Calcite	1
2.7	Gypsum	1
2.8	Clay minerals	1
2.9	Clay minerals	1
3.0	**Petrology**	
3.1	Classification of rocks	2
3.2	Distinction between Igneous, Sedimentary and Metamorphic rocks.	2
3.3	Engineering properties, distribution and uses of Granite and Dolerite.	1
3.4	Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses – Basalt and Sandstone	1
3.5	Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses – Limestone and Laterite	1
3.6	Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses – Shale and Quartzite	1
3.7	Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses – Marble, Slate, Gneiss and Schist	1
4.0	**Structural Geology and Geophysical Methods**	
4.1	Geological maps – attitude of beds	1
4.2	Study of structures – folds	1
4.3	Study of structures – faults	1
4.4	Study of structures –joints	1
4.5	Relevance to civil engineering.	1
4.6	Geophysical methods – Seismic methods for subsurface investigations.	2
4.7	Geophysical methods – Electrical methods for subsurface investigations.	2
5.0	**Application of Geological Investigations**	
5.1	Remote sensing for civil engineering applications	1
5.2	Geological conditions - construction of Dams and Reservoirs.	2
5.3	Geological conditions - construction of Tunnels, and Road cuttings.	2
5.4	Hydrogeological investigations and mining - Coastal protection structures.	2
5.5	Investigation of Landslides causes and mitigation.	2

Course Designer(s)

1. Dr.S.Gunasekar - gunasekar@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE 3P1	Fluid Mechanics and Hydraulics Engineering Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

To be able to verify the principles studied in theory by performing the experiments in lab.

- To reinforcing the basics of fluid mechanics and machinery by hands on experiment.
- To hands on experiments in calibration of flow meters.
- To evaluate the Performance characteristics of turbines.
- To evaluate the Performance characteristics of pumps.

Pre-requisites

Engineering Mathematics, Physics and Fluid Mechanics.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Measure the flow in the open channels using orifice and notches.	Apply
CO2	Measure the flow in pipe section using orificemeter and venturimeter	Apply
CO3	Measure and compute the major and minor losses in Pipes.	Apply
CO4	Study the performance of different types of hydraulic Turbines.	Analyse
CO5	Study the performance of different types of pumps	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	2	-	-	2	-	-	-	2	-
CO2	3	2	3	3	-	3	-	-	2	-	-	-	2	-
CO3	3	3	2	3	-	2	-	-	3	-	-	-	2	-
CO4	2	3	3	2	-	3	-	-	2	-	-	-	2	-
CO5	2	3	3	3	-	2	-	-	2	-	-	-	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	25	12	50		50
Analyse	25	13	50		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

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TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 3P1 - Fluid Mechanics and Hydraulics Engineering Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	0	0	4	45	2	60	40	100

1. Determination of co-efficient of discharge for orifice (Constant head).
2. Determination of co-efficient of discharge for orifice (Variable head).
3. Flow measurement in open channel using notches.
4. Flow measurement in pipe using Venturimeter.
5. Flow measurement in pipe using Orifice meter.
6. Determination of frictional loss in pipes system.
7. Determination of minor losses in pipes system.
8. Study on performance characteristics of Pelton turbine.
9. Study on performance characteristics of Francis turbine.
10. Study on performance characteristics of Kaplan turbine.
11. Assessment on performance characteristics of Centrifugal pump.
12. Assessment on performance characteristics of Reciprocating pump

Lab Manual	
1.	Manual prepared by course designer.

****SDG 7 – Affordable and Clean Energy**

Course Designer(s)

1. Dr.M.Velumani-velumani@ksrct.ac.in

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60 CE 3P2	Surveying Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To Measure the surveying quantities Length, Area and Volume.
- To Learn the horizontal and vertical angle measurements using compass and theodolite.
- To get practice on Graphical surveying by practicing of Plane table surveying.
- To make aware the concept leveling in surveying and contour making.
- To handle the digital surveying instruments GPS and Total station.

Pre-requisites

Engineering Mathematics, Surveying.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Familiar to chaining, ranging and apply it to take the angular measurement and Identify local attraction and appropriate methods to rectify it.	Apply
CO2	Calculate the irregular traverse area using Plane table methods, Collect the level of different points and calculate the reduced level of the respective points by appropriate methods.	Apply
CO3	Apply the lens principle to find the tachometric constants. Setting out of curve by linear and angular methods and trigonometric leveling.	Apply
CO4	Identify the ground co-ordinates with elevation of earth surface points with help of GPS and Calculate the area and volume using total station.	Apply
CO5	Explain Aerial photo Interpretation through stereo model creation with help of provided aerial photographs	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	2	-	-	2	-	-	-	2	-
CO2	3	2	3	3	-	3	-	-	2	-	-	-	2	-
CO3	3	3	2	3	-	2	-	-	3	-	-	-	2	-
CO4	2	3	3	2	-	3	-	-	2	-	-	-	2	-
CO5	2	3	3	3	-	2	-	-	2	-	-	-	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 3P2 -Surveying Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	0	0	4	45	2	60	40	100

List of Experiments:

1. Calculate the area of given irregular boundary using conventional chain and accasories.
2. Establish the compass traverse, introduce the correction for local attraction and calculate the area for the same.
3. Calculate the area for the given irregular polygon by conducting plane table surveying methods.
4. Find the elevation differences of the given area through finding the RL value of given points by height of the Instrument method and Rise & fall method.
5. Apprise the gradient of the given land / topography through field observation.
6. Determine the tachometric constant of the analytical lens fixed transit theodolite
7. Assess the horizontal and vertical angles of given points for transit.
8. Prepare the calculation for setting out of circular curve and execute the same in the ground uning instrument.
9. Record fiend data using GPS and prepare contour map using software.
10. Practice on Total station
11. Calculate the area and volume using total station on under prism mode

Lab Manual	
1.	Manual prepared by course designer.

**G 7 – Affordable and Clean Energy

Course Designer(s)

1. Dr.R.Jagadeesan – jagadeesan@ksrct.ac.in

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60 CG 0P2	Career Skill Development - II	Category	L	T	P	Credit
		CG	0	0	2	1*

Objectives

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Pre-requisites

- Basic knowledge of reading and writing in English.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	2	3	3	2	3	-	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	2
CO4	-	-	-	-	-	-	-	2	3	3	2	3	-	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	10	10	20	No End Semester Examination
Understand	10	10	20	
Apply	20	20	30	
Analyse	20	20	30	
Evaluate	0	0	0	
Create	0	0	0	
Total	60	60	100	

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TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to all Branches								
60 CG 0P2 - Career Skill Development – II								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	0	0	2	30	**1***	100	-	100

List of Experiments:

Listening*

Evaluative Listening: Advertisements, Product Descriptions, - Audio / video; filling a graphic organiser (choosing a product or service by comparison) - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects, documentaries depicting a technical problem and suggesting solutions - Listening to TED Talks.

Speaking*

Marketing a product, persuasive speech techniques - Describing and discussing the reasons of accidents or disasters based on news reports, Group Discussion (based on case studies), presenting oral reports, Mini presentations on select topics with visual aids, participating in role plays, virtual interviews.

Reading*

Reading advertisements, user manuals and brochures - longer technical texts– cause and effect essays, and letters / emails of complaint - Case Studies, excerpts from literary texts, news reports etc. - Company profiles, Statement of Purpose (SoPs).

Writing*

Professional emails, Email etiquette - compare and contrast essay - Writing responses to complaints Precis writing, Summarizing and Plagiarism- Job / Internship application – Cover letter & Resume

Verbal Ability II*

Reading Comprehension (Inferential fillups) – Spotting Errors – Verbal Analogies – Theme Detection – Change of Voice – Change of Speech – One word substitution

Lab Manual

1.	*'English for Engineers & Technologists'* Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, *'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book'*, Penguin Random House India, 2020
3.	Raman. Meenakshi, Sharma. Sangeeta, 'Professional English'. Oxford University Press. New Delhi. 2019
4.	Arthur Brookes and Peter Grundy,' Beginning to Write: Writing Activities for Elementary and Intermediate Learners', Cambridge University Press, New York, 2003

*** SDG- 04- Quality Education**

Course Designer(s)

1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

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TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2023-2024 onwards)

FOURTH SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CE 401	Structural Analysis I	2	40	60	100	45	100
2	60 CE 402	Soil Mechanics	2	40	60	100	45	100
3	60 CE 403	Water Supply and Wastewater Engineering	2	40	60	100	45	100
4	60 CE 404	Concrete Technology	2	40	60	100	45	100
5	60 CE L*	Open Elective – I	2	40	60	100	45	100
6	60 MY 002	Universal Human Value (UHV)*	2	40	60	100	45	100
PRACTICAL								
8	60 CE 4P1	Building Planning and Drawing Laboratory	3	60	40	100	45	100
9	60 CE 4P2	Materials Testing Laboratory	3	60	40	100	45	100
10	60 CG 0P3	Career Skill Development II	3	100	-	100	-	100
11	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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Passed in the BOS Meeting Held on 22.05.2024
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60 CE 401	Structural Analysis I	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To introduce the students to basic theory and concepts of classical methods of structural analysis
- To understand the concept of stresses and strains
- To identify the best suitable method of analysis
- Analyse arches with different end conditions.
- To understand the behaviour of continuous beams subjected to different types of loadings.

Pre-requisites

- Fundamentals of Mathematics, knowledge of properties of construction materials and its Mechanics

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Analyze the structures using the Energy principles concepts.	Analysis
CO2	Solve the problems in various arches with various loading condition.	Evaluate
CO3	Analysis the Beam, Trusses and frames using three moment equation.	Analysis
CO4	Analysis the Beam and rigid frames using slope deflection equation.	Analysis
CO5	Analysis the Beam and frames using moment distribution method.	Analysis

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	1	3	2	3	2	1	1	-	1	2	2	-
CO2	2	1	2	3	2	3	2	1	1	-	1	2	2	-
CO3	3	2	2	2	1	3	-	1	1	-	1		2	-
CO4	2	2	1	2	3	3	2	1	1	-	1	2	2	
CO5	1	2	1	1	3	3	-	1	1	-	1		2	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	10	20
Apply	20	20	30
Analyse	10	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E.Civil Engineering								
60 CE 401 - Structural Analysis I								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	1	0	60	4	40	60	100

Energy Principles * Strain energy and strain energy density: strain energy in axial, shear, flexure and torsion – Principle of virtual work – Energy theorems – Castigliano's theorems, Maxwell's reciprocal theorem, Engessor's theorem – Application of energy theorems for computing deflections in beams and trusses.	[9]
Arches** Analysis of three hinged and two hinged arches – parabolic and circular arches – Determination of Reaction, Normal thrust, Radial shear and Bending moment.	[9]
Theorem of three moments** Static and kinematic Indeterminacy – Beams, Trusses and frames; Analysis of statically indeterminate structures – Theorem of three moments (Only two dimension).	[9]
Slope Deflection Method** Continuous beams and rigid frames – symmetry and anti-symmetry loading – Deformed shape, Shear force and Bending moment diagram (Unknowns restricted to three only).	[9]
Moment Distribution Method** Basic concepts –, stiffness, distribution and carry over factors – Analysis of continuous Beams – plane rigid frames with and without sway – Deflected shape, shear force and bending moment diagrams.	[9]
Total Hours: 45 + 15 (Tutorial)	60
Text Book(s):	

1.	Thandavamoorthy, T.S. "Structural Analysis", Oxford University Press, New Delhi 2011.
2.	Vaidyanadhan.R and Perumal.P, "Comprehensive structural Analysis – Vol.1 & Vol2", Laxmi Publications, New Delhi, 2010.
Reference(s):	
1.	Ghali.A, Nebille, A.M. and Brown, T.G. "Structural Analysis" A unified classical and Matrix approach" – 5th edition. Spon press London and Newyork , 2009.
2.	Hibbeler, R.C. "Structural Analysis" pearson Education (Singapore) Pvt. Ltd – Delhi – 110 092, 2009.
3.	Rajesekaran, S. and Sankara Subramanian, G. "Computational structural mechanics, "Prentice Hall of India Pvt Ltd, New Delhi, 2001.
4.	Vazrani.V.N And Ratwani, M.M, "Analysis of Structures, Vol.II", Khanna Publishers, 2015.

*** SDG:04- Quality Education**

****SDG:9: Industry, innovation and infrastructure**

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Energy Principles**	
1.1	Strain energy and strain energy density	1
1.2	Derivation in strain energy in axial, shear, flexure and torsion	1
1.3	Principle of virtual work	1
1.4	Derivation in Energy theorems	1
1.5	Problems using Castigliano's theorems, Maxwell's reciprocal theorem, Engessor's theorem	1
1.6	Application of energy theorems for computing deflections in beams and trusses	2
2.0	**Arches**	
2.1	Introduction to Arches, Types and applications	1
2.2	Derivation in three hinged arches	1
2.3	Problems in three hinged arches	2
2.4	Problems in three hinged arches	1
2.5	Derivation in two hinged arches	1
2.6	Problems in two hinged arches	1
2.7	Derivation in Parobolic arches	1
2.8	Problems in Parobolic arches	1
2.9	Problems in Circular arches	2
3.0	**Theorem of three moments**	
3.1	Static and kinematic Indeterminacy	2
3.2	Problem in finding Static and kinematic Indeterminacy for various beam	2
3.3	Problem in finding Static and kinematic Indeterminacy for various Truss	1
3.4	Analysis of statically indeterminate structures (Fixed Beam)	1
3.5	Analysis of statically indeterminate structures (Continuous Beam)	1
3.6	Analysis of statically indeterminate structures (Cantilever Beam)	1
3.7	Analysis of statically indeterminate structures (Truss)	1
4.0	**Slope Deflection Method**	
4.1	Derivation of Slope Deflection Equation	2
4.2	Calculating Fixed End Moments for various beams	1
4.3	Problems Using Slope Deflection method (Beam - Determinate)	1
4.4	Problems Using Slope Deflection method (Beam - Indeterminate)	1
4.5	Problems Using Slope Deflection method (2 D Frame- Determinate)	1
4.6	Problems Using Slope Deflection method (2 D Frame - Indeterminate)	1
4.7	Problems Using Slope Deflection method (3 D Frame- Determinate)	1
5.0	**Moment Distribution Method**	
5.1	Basic concepts	2
5.2	Stiffness, distribution and carry over factors	1
5.3	Problems Using Slope Deflection method (2 Span Beam)	1
5.4	Problems Using Slope Deflection method (Continuous Beam)	1
5.5	Problems Using Slope Deflection method (2 Span Frame)	1
5.6	Problems Using Slope Deflection method (Portal Frame)	1
5.7	Problems Using Slope Deflection method (Space Frame)	2

Course Designer(s)

1. Dr.K.VIJAYA SUNDRAVEL - vijayasundravel@ksrct.ac.in

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60 CE 402	Soil Mechanics	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To provide students with basic understanding of physical and mechanical properties of soil.
- To impart knowledge of basic index and engineering properties of soil
- To identify factors controlling soil behavior and methods to determine soil properties.
- To acquire basic knowledge in engineering design of geotechnical systems
- To Analyse the stability of slopes with protection measures

Pre-requisites

Basic knowledge of properties learnt in Geology courses

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Impart the fundamental concepts of soil mechanics and identify the soil properties.	Remember
CO2	Understand the importance engineering properties such as Consolidation and compaction of soils	Apply
CO3	Understand the knowledge aspects of Shear strength	Understand
CO4	Evaluate the stress developed in the soil medium	Analyse
CO5	Analyse the stability of slopes.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	1	3	2	3	2	1	1	-	1	2	2	-
CO2	2	1	2	3	2	3	2	1	1	-	1	2	2	-
CO3	3	2	2	2	1	3	-	1	1	-	1		2	-
CO4	2	2	1	2	3	3	2	1	1	-	1	2	2	-
CO5	1	2	1	1	3	3	-	1	1	-	1		2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	10	20
Apply	20	20	30
Analyse	10	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Approved in Academic Council Meeting held on 25.05.2024

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TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E.Civil Engineering								
60 CE 402 - Soil Mechanics								
Semester	**Hours/Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	1	0	60	4	40	60	100

Soil Classification and Compaction* Nature of soil – phase relationships – Soil description and classification for engineering purposes- their significance – Index properties of soils - BIS Classification system; Soil compaction :Theory-comparison of laboratory and field compaction methods- Compaction – Proctor's test – Moisture – density relations -Factors influencing compaction behaviour of soils.	**[09]**
Effective Stress Principle and Permeability* Soil water :static pressure in water - Effective stress concepts in soils – capillary stress; Permeability measurement in the laboratory and field pumping in and pumping out tests – factors influencing permeability of soils; Seepage – Introduction to flow nets – Simple problems.	**[09]**
Stress Distribution Concept and Settlement ** Stress distribution - soil media – Boussinesq theory - Use of New marks influence chart; Settlement: Components of settlement –– immediate and consolidation settlement - Methods of minimising settlement – Terzaghi"s one dimensional consolidation theory – computation of rate of settlement – square root 't' and log t methods– e-log p relationship - Factors influencing compression behaviour of soils.	**[09]**
Shear StrengthBehaviour of Soil ** Shear strength of cohesive and cohesionless soils – Mohr's and Coulomb's failure theory – Relationship between principal stresses at failure - Measurement of shear strength: Direct shear Test – Triaxial compression Test - Unconfined Compression Test and Vane shear Test; Pore pressure parameters: cyclic mobility – Liquefaction.	**[09]**
Stability of Slopes * Slope failure mechanisms – Types: infinite slopes – finite slopes; Total stress analysis for saturated clay – Fellenius method - Friction circle method; Factor of safety - use of stability number; Slope protection measures.	**[09]**
Total Hours: 45 + 15 (Tutorial)	**60**

Textbook(s):

1.	Gopal Ranjan, "Basic and Applied Soil Mechanics" New Age International, New Delhi, 2022
2.	Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications, New Delhi, 2017.

Reference(s):

1.	Braja M. Das, "Principles of Geotechnical Engineering", Cengage learning Pvt. Ltd, 8th Edition, 2014.
2.	Holtz D. and Kovacs, W.D., "An Introduction to Geotechnical Engineering", Prentice Hall, 2nd Edition, 2011.
3.	PurshotamRaj,P. "Geotechnical Engineering", Tata McGraw Hill , 2013
4.	Alam Singh and Chowdhary, G.R., "Soil Engineering in Theory and Practice", Volume-2, Geotechnical testing and instrumentation, CBS Publishers and Distributors, New Delhi, 2014.

***SDG:4 – Quality Education**
****SDG:9 – Industry, Innovation and Infrastructure**

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Weak Soil and Improvement Techniques**	
1.1	Role of ground improvement in foundation engineering	1
1.2	Methods of ground improvement	2
1.3	Geotechnical problems in alluvial soil	1
1.4	Geotechnical problems in lateritic soil	1
1.5	Geotechnical problems in black cotton soil	1
1.6	Selection of suitable ground improvement techniques based on soil conditions	2
1.7	Reclaimed soil for the land reclamation	1
2.0	**Dewatereing**	
2.1	Dewatering Techniques	1
2.2	Well points	1
2.3	Vacuum and electroosmotic methods	1
2.4	Seepage analysis	1
2.5	Dimensional flow for fully penetrated slots in homogeneous deposits	1
2.6	Dimensional flow for partially penetrated slots in homogeneous deposits	2
2.7	Simple cases	1
2.8	Design	1
3.0	**Insitu Treatment of Cohesionless and Cohesive Soils**	
3.1	Insitu densification of cohesion-less soils	1
3.2	Insitu densification of consolidation of cohesive soils	1
3.3	Dynamic compaction Vibroflotation	1
3.4	Sand compaction piles	1
3.5	Deep compaction	1
3.6	Consolidation Overview	1
3.7	Preloading with sand drains, and fabric drains, Stone columns and Lime piles-installation techniques	1
3.8	Simple design – relative merits of above methods and their limitations	1
3.9	Combined footings (for two columns only foundations)	1
4.0	**Grouting**	
4.1	Classifications ofChemical systems	1
4.2	Grouting operations	2
4.3	Grouting applications	1
4.4	Compaction and Techniques	1
4.5	Application and limitations	1
4.6	Plant for preparing grouting materials	2
4.7	Jet Grouting	1
4.8	Geometry and properties of treated soils	1
4.9	Applications of geometry and properties of treated soils	1
5.0	**Stabilization**	
5.1	Introduction to Soil improvement by adding materials.	1
5.2	Improvement adding materials like lime, fly ash, cement	2
5.3	Improvement adding materials like chemicalsand bitumen	1
5.4	Sand column, stone column, sand drains, prefabricated drains	1
5.5	Soil lime column	1
5.6	Stabilization of soft clay or silt with lime	1
5.7	Bearing capacity and settlement oftreated soils	1
5.8	Improvement in slope stabilitycontrol methods	1
5.9	Soil Structure Interaction and Nailing Techniques.	1

List of MATLAB Programmes:

1. Introduction to MATLAB for Ground Improvement Techniques.
2. Matrix Operations foralluvial soil and lateritic
3. Solution of system forpreparing grouting materials.
4. Computation of values for Soil improvement by adding materials.
5. Finding bearing capacity and settlement of treated soils.
6. Solving Sand compaction piles using differential equations.
7. Computing Maxima and Minima of Dynamic compaction Vibroflotation.
8. Computing dimensional flow for fully penetrated slots in homogeneous deposits.

Course Designer(s)

1. . Dr. S. Ramesh - rameshs@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE 403	Water Supply and Waste Water Engineering	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the sources and conveyance of water supply system.
- To learn the principles of various water treatment processes.
- To gain knowledge on the sources, characteristics and conveyance of sewage.
- To know the principles of secondary treatment of sewage.
- To acquire knowledge on sewage disposal and sanitation systems

Pre-requisites

Basic knowledge on environmental science.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the water demand and elements of water conveyance.	Understand
CO2	Describe the principles of water purification methods.	Remember
CO3	Report the quantity of waste water generated and it's transmitting.	Understand
CO4	Explain the principles of biological processes of sewage treatment.	Apply
CO5	Recognize appropriate sewage disposal methods and sanitation system.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	-	1	3	3	3	1	2	1	3	2	-
CO2	3	2	2	2	1	3	3	3	-	2	-	3	2	-
CO3	3	3	2	-	1	3	3	3	1	2	1	3	2	-
CO4	3	2	3	2	1	3	3	3	-	2	-	3	2	-
CO5	3	2	3	-	1	3	3	3	1	2	1	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	40
Understand	20	10	40
Apply	20	20	20
Analyse	-	20	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 403 - Water Supply and Wastewater Engineering								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Water Supply, Source and Conveyance * Objectives - Water demand – Design period - Population forecasts - Sources of water - Water quality parameters and standards - Intake structures - Laying, jointing and testing of pipelines - Pipe appurtenances.	[9]
Principles of Water Treatment* Unit operations and processes - Principles and operation of Screens - Aeration - Sedimentation tanks – Coagulation and flocculation - Filters - Disinfection methods	[9]
Collection and Conveyance of Sewage** Sources and characteristics of wastewater - Dry weather flow - Storm runoff estimation - Minimum and Maximum velocity - Laying, jointing and testing of sewers - Sewer appurtenances.	[9]
Principles of Sewage Treatment** Basic principles of biological treatment - Principles and operation of Grit chamber - Trickling filter - Activated sludge process - Waste stabilization ponds - Layout of Sewage treatment plant - Septic tanks - Sludge treatment and disposal	[9]
Sewage Disposal and Rural Sanitation* Sewage disposal - Self purification process - Oxygen sag curve - Sewage farming - House drainage - Sanitary fixtures - Systems of plumbing - Rural sanitation system - Environmental legislations.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Garg S.K., “Environmental Engineering: Vol I & Vol II”, Khanna Publishers, New Delhi, 2022.
2.	Metcalf & Eddy, George Tchobanoglous, H. Stensel, Ryujiro Tsuchihashi and Franklin Burton, "Wastewater Engineering: Treatment and Resource Recovery", 5th Edition, McGraw-Hill, New Delhi, 2014.
Reference(s):	
1.	Howard S. Peavy, Donald R. Rowe & George Tchobanoglous, “Environmental Engineering”, McGraw-Hill, New Delhi, 2017.
2.	Punmia B.C., Jain A.K. & Jain A.K., “Environmental Engineering - I & II”, 2nd Edition, Laxmi Publications, New Delhi, 2022.
3.	CPHEEO, “Manual on Operation and Maintenance of Water Supply Systems”, Central Public Health and Environmental Engineering Organization, Ministry of Urban Development, New Delhi, 2005.
4.	CPHEEO, “Manual on Sewerage and Sewage Treatment Systems”, Central Public Health and Environmental Engineering Organization, Ministry of Urban Development, New Delhi, 2005.

* SDG 6 – Clean Water and Sanitation,
** SDG 11 – Sustainable Cities and Communities

R4/ w.e.f. 01.06.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Water Supply, Source and Conveyance**	
1.1	Introduction & objectives	1
1.2	Water demand	1
1.3	Design period	1
1.4	Population forecasts	1
1.5	Sources of water	1
1.6	Water quality parameters and standards	1
1.7	Intake structures	1
1.8	Laying, jointing and testing of pipelines	1
1.9	Pipe appurtenances	1
2.0	**Principles of Water Treatment**	
2.1	Unit operations and processes	1
2.2	Screens	1
2.3	Aeration	1
2.4	Sedimentation tanks	1
2.5	Coagulation and flocculation	1
2.6	Filters	2
2.7	Disinfection methods	1
2.8	Water Softening Methods	1
3.0	**Collection and Conveyance of Sewage**	
3.1	Sources of sewage	1
3.2	characteristics of sewage	1
3.3	Dry weather flow	1
3.4	Storm runoff estimation	2
3.5	Minimum and Maximum velocity	1
3.6	Laying, jointing and testing of sewers	1
3.7	Sewer appurtenances	2
4.0	**Principles of Sewage Treatment**	
4.1	Basic principles of biological treatment	1
4.2	Grit Chamber	1
4.3	Trickling filter	1
4.4	Activated sludge process	1
4.5	Waste stabilization ponds	1
4.6	Layout of Sewage treatment plant	1
4.7	Septic tanks	1
4.8	Sludge treatment and disposal	2
5.0	**Sewage Disposal and Rural Sanitation**	
5.1	Sewage disposal	1
5.2	Self purification process	1
5.3	Oxygen sag curve	1
5.4	Sewage farming	1
5.5	House drainage	1
5.6	Sanitary fixtures	1
5.7	Systems of plumbing	1
5.8	Rural sanitation system	1
5.9	Environmental legislations	1

Course Designer(s)

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60 CE 404	Concrete Technology	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To acquire knowledge about the properties of concrete making materials
- To perform concrete mix design using IS and ACI methods
- To learn fresh and hardened properties of concrete
- To gain knowledge in manufacture and special concreting methods
- To understand the properties of materials used for making special concrete and its applications

Pre-requisites

Construction Materials and Practices

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Learn the properties of concrete making materials	Remember
CO2	Design Concrete mix as per IS and ACI codes	Understand
CO3	Perform various test on fresh and hardened concrete	Apply
CO4	Outline the manufacturing process of concrete and special concreting methods	Analyse
CO5	Apply special concrete in construction practices	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	2	3	2	2	2	2	3	2	-
CO2	3	3	3	3	3	3	2	2	2	2	2	2	2	-
CO3	3	3	3	3	3	2	3	2	2	2	2	3	2	-
CO4	3	3	3	3	2	3	3	2	2	2	2	2	2	-
CO5	3	3	3	3	2	3	3	2	2	2	2	2	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	10	10	10
Apply	20	20	40
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E.Civil Engineering

60 CE 404-Concrete Technology

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Concrete Making Materials* Cement: Chemical composition and Properties – Hydration of cement - Test on cement – IS Specifications - Gel-Space ratio - Abraham's law, Aggregates: Classification and Tests as per BIS Specification - Alkali aggregate reaction - Water: Quality of water for use in concrete, Admixtures: Their effects on concrete properties.	[10]
Mix Design* Principles of concrete mix design - factors influencing mix design - Nominal and Design mix - IS and ACI Method of concrete mix design.	[07]
Properties of Concrete* Fresh Concrete: Workability - Factors affecting workability & Measurement of workability -Hardened Concrete - Compressive Strength, Split tensile strength, Flexural Strength , Stress-Strain Curve for concrete - Modulus of elasticity - Durability Properties - Water absorption, permeability and acid resistance.	[09]
Concrete Manufacture & Methods** Concrete: manufacturing Process - Batching, Mixing, Transporting, Placing, Compacting and Curing - Special concreting methods : Ready Mix Concrete, Vacuum dewatering, Underwater concrete - Cold and Hot weather Concreting.	[10]
Special Concretes* Properties and Applications : Light weight concrete (Artificial aggregates) - Ferro-cement - Fiber reinforced concrete - Polymer Concrete - Air entrained concrete - High performance concrete - High strength concrete - Self compacting concrete - Self curing concrete and Geo-polymer concrete.	[09]
Total Hours:	**45**

Text Book(s):

1. Shetty, M.S., "Concrete Technology", S.Chand and Company Ltd., Delhi, 2018.
2. Santhakumar, A.R., "Concrete Technology", Oxford University Press, New Delhi, 2018.

Reference(s):

1. Neville, A.M., "Properties of Concrete" , 5th Edition, John Wiley & Sons (Asia) Pvt. Ltd., 2011.
2. Gambhir, M.L., "Concrete Technology", Tata McGraw Hill Company Ltd., Delhi, 2014.
3. Shetty M.S., A.K.Jain, "Concrete Technology: Theory and Practice", S.Chand Publishing, 2018.
4. Brooks J.J., A. M. Neville, "Concrete Technology", Pearson Education, 2019.

***SDG9 – Industry, Innovation and Infrastructure**
****SDG12 – Responsible Consumption and Production**

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Concrete Making Materials**	
1.1	Introduction to the course & concrete making materials	1
1.2	Cement: Chemical composition and Properties – Hydration of cement	1
1.3	Various Test on cement	2
1.4	Gel space ratio, Abrahams law and Classification of aggregates	1
1.5	Various test on aggregates and Alkali Aggregate reaction	2
1.6	Water quality parameters and their impact on concrete	1
1.7	Mineral admixtures	1
1.8	Chemical admixtures	1
2.0	**Mix Design**	
2.1	Principles of concrete mix design	1
2.2	Factors influencing mix design & Nominal and design mix - Differences	1
2.3	IS Method of mix design - Procedure	1
2.4	IS Method of mix design - Problem	2
2.5	ACI Method of mix design - Procedure	1
2.6	ACI Method of mix design - Problem	1
3.0	**Properties of Concrete**	
3.1	Workability and factors affecting workability	1
3.2	Slump cone and Vee bee consistometer test	1
3.3	Compaction factor and Flow table test	1
3.4	Compressive Strength and Split tensile strength	2
3.5	Flexural Strength , Stress-Strain Curve for concrete - Modulus of elasticity	2
3.6	Durability Properties - Water absorption & Permeability	1
3.7	Durability Properties – Acid resistance	1
4.0	**Concreting Manufacture & Methods**	
4.1	Manufacturing Process – Batching & Mixing of concrete	2
4.2	Transporting & Placing of concrete	2
4.3	Compacting & Curing of concrete	2
4.4	Ready Mix Concrete	1
4.5	Vacuum dewatering	1
4.6	Underwater concrete	1
4.7	Cold and Hot weather Concreting	1
5.0	**Special Concretes**	
5.1	Properties and Applications - Lightweight concrete using Artificial aggregates	1
5.2	Ferro-cement	1
5.3	Fiber reinforced concrete	1
5.4	Polymer Concrete	1
5.5	Air entrained concrete	1
5.6	High performance concrete &High strength concrete	1
5.7	Self compacting concrete	1
5.8	Self curing concrete	1
5.9	Geo-polymer concrete	1

Course Designer(s)

1. Mr.K.Angu Senthil- angusenthil@ksrct.ac.in

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60 MY 002	Universal Human Values	Category	L	T	P	Credit
		MY	2	2	0	3

Objectives

- To identify the essential complementarily between 'values' and 'skills'
- To ensure core aspirations of all human beings.
- To acquire ethical human conduct, trustful and mutually fulfilling human behaviour
- To enrich interaction with Nature
- To achieve holistic perspective towards life and profession

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the significance of value inputs in formal education and start applying them in their life and profession	Understand
CO2	Evaluate coexistence of the “I” with the body.	Analyze
CO3	Identify and evaluate the role of harmony in family, society and universal order.	Analyze
CO4	Classify and associate the holistic perception of harmony at all levels of existence and Nature	Analyze
CO5	Develop appropriate human conductand management patterns to create harmonyin professional and personal lives.	Create

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1								3	2		2	3	2	-
CO2						3		3	3			3	2	-
CO3						3	3	3	3			3	2	-
CO4						3	3	3	3			3	2	-
CO5						3	3	3	3	3		3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom’s Category	Continuous Assessment Tests (Marks)			End Semester Examination (Marks)
	1	2	Case Study Report and Presentation	
Remember	10	10	20	No End Semester Examination
Understand	10	10	20	
Apply	20	20	30	
Analyse	20	20	30	
Evaluate	0	0	0	
Create	0	0	0	
Total				

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to all Branches

60 MY 002 - Universal Human Values

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	2	2	0	45	3	100	0	100

Introduction to value Education Understanding value Education-Self exploration as the process for value education-Continuous Happiness and prosperity-the basic human aspirations-right understanding-relationship and physical facility –happiness and prosperity - current scenario – method to fulfill the basic human aspirations	[9]
Harmony in the Human Being * Understanding Human being as the Co-Existence of the self and the Body-Distinguishing between the needs of the self and the body-the body as an instrument of the self-understanding harmony in the self-harmony of the self with the body – programme to ensure self-regulation and health.	[9]
Harmony in the Family and Society Harmony in the Family –the basic unit of human interaction-values in human- to - human relationship –'Trust' the foundation value in relationship –'Respect'- as the right evaluation-understanding harmony in the society –vision for the universal human order.	[9]
Harmony in the Nature/Existence ** Understanding harmony in the Nature-Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature – realizing existence as co-existence at all levels – the holistic perception of harmony in existence.	[9]
Implications of the Holistic Understanding Natural Acceptance of human values- definitiveness of human conduct- a basis for humanistic education, humanistic constitution and universal human order- competence in professional ethics –holistic technologies, production systems and management models-typical case studies – strategies for transition towards value base life and profession	[9]
Total Hours	**45**

Text Book(s):	
1.	A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2.	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G.P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2
Reference(s):	
1.	JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2.	Human Values, A.N. Tripathi, New Age International. Publishers, New Delhi, 2004.

***SDG:3 – Good Health and Well Being**

****SDG:15 – Life on Land**

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Value Education**	
1.1	Discussion on Present Education System and Skill Based Education	1
1.2	Understanding Value Education	1
1.3	Self exploration as the process for value education	1
1.4	Basic Human Aspirations - Continuous Happiness and Prosperity	1
1.5	Basic requirements to fulfill Human Aspirations - Right understanding, Relationship and Physical facility	1
1.6	Transformation from Animal Consciousness to Human Consciousness	1
1.7	Sources of Happiness and Prosperity – Harmony and Disharmony	1
1.8	Current Scenario and Role of Education	1
1.9	Outcome of Human Education and Method to fulfill the basic human aspirations	1
2.0	**Harmony in the Human Being**	
2.1	Understanding Human being - As Co-Existence of the self and the Body - The Needs of the Self and the Body	1
2.2	Understanding Human being - As Co-Existence of the self and the Body - The Activities and Response of the Self and the Body	2
2.3	The body as an instrument of the self	1
2.4	Understanding harmony in the self	1
2.5	Harmony of the self with the body	2
2.6	Programme to ensure self-regulation and health	1
2.7	My Participation (Value) regarding Self and my Body - Correct Appraisal of our Physical needs	1
3.0	**Harmony in the Family and Society**	
3.1	Harmony in the Family - Understanding Values in Human Relationships	1
3.2	Family as the basic Unit of Human Interaction	1
3.3	Values in human Relationships	1
3.4	Trust - the foundation value in relationship	1
3.5	Respect as the right evaluation, the Basis for Respect, Assumed Bases for Respect today	1
3.6	Harmony from Family to World Family: Undivided Society	1
3.7	Extending Relationship from family to society , Identification of the Comprehensive Human Goal	1
3.8	Programs needed to achieve the Comprehensive Human Goal: The Five Dimensions of Human Endeavour	1
3.9	Harmony from Family Order to World Family Order – Universal Human Order	1
4.0	**Harmony in the Nature / Existence**	
4.1	The Four Orders in Nature	1
4.2	Participation of Human Being in Entire Nature	1
4.3	Natural Characteristics - Tendency of Human Living with Animal Consciousness / The Holistic Perception of Harmony in Existence	1
4.4	Present day Problems	1
4.5	Recyclability and self-regulation in Nature	1
4.6	Relationship of Mutual Fulfillment	1
4.7	An Introduction to space, Co-existence of Units in Space	1
4.8	Harmony in Existence – Understanding Existence as Co- Existence	1
4.9	Natural Characteristic of Human Living with Human Consciousness	1
5.0	**Implications of the Holistic Understanding**	
5.1	Natural Acceptance of human values	1
5.2	Definitiveness of Ethical Human Conduct-Development of Human Consciousness	1
5.3	Identification of Comprehensive Human Goal	1
5.4	Basis for Humanistic Education and Humanistic Constitution	1
5.5	Ensuring Competence in professional Ethics	1
5.6	Issues in Professional Ethics-The Current Scenario	1
5.7	Holistic Technologies and Production Systems and management models -Typical Case Studies	2
5.8	Strategies for transition towards value based life and profession	1

Course Designer(s)

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60 CE 4P1	Building Planning and Drafting Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- Achieve skill sets to prepare computer aided engineering drawings.
- Understand the details of construction of different building elements.
- Visualize the completed form of the building and the intricacies of construction based on the engineering drawings.

Pre-requisites

Basic knowledge on CADD Software.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand about various tools and commands in AUTO CADD Software.	Knowledge
CO2	Develop any type of building drawing using CADD software.	Apply
CO3	Create layout plan, sanction drawings, working drawings using CADD software.	Apply
CO4	Sketch sectional view and elevation for different buildings.	Apply
CO5	Draw the various building components and also other structural Components.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	3	2	2	2	2	2	2	3	2	-
CO2	2	2	2	-	-	-	-	-	-	-	1	-	2	-
CO3	1	-	2	-	-	-	-	3	-	-	-	-	2	-
CO4	-	2	2	-	3	-	-	-	-	-	-	-	2	-
CO5	1		2	3	-	2	3	3	3	3	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	25	12	50		50
Analyse	25	13	50		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 4P1 - Building Planning and Drafting Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	0	0	4	45	2	60	40	100

List of Experiments:

1. Introduction about AUTOCADD Software - Basics commands*****.
2. Preparation of key plan and site plan. *****
3. Drawings of Building Components*****.
4. Plan, Section and Elevation of a Load bearing structure. *****
5. Plan, Section and Elevation of a framed structure. *****
6. Plan, Section and Elevation of a Library building. *****
7. Plan, Section and Elevation of a primary school building. *****
8. Plan, Section and Elevation of a primary health care Centre. *****
9. Preparation of Plumbing, wiring, Water supply and sanitary facilities of a building. *****
10. Conservation of 2D plan into 3D plan using REVIT Software (Project).*

Lab Manual

1.	Sesha Praksh, M.N. & Dr.Servesh, G.S.'' Computer Aided Design Laboratory'' Laxmi Publications, NewDelhi – 2016.
2.	Sha P.J. '' Engineering Graphics'' S.Chand& Co., New Delhi – 2015.
3.	Jayaram M.A., D.S.Rajendra Prasad,'' CAD in Civil Engineering a Laboratory Referrel'' Sapna Book House, Chennai – 2014.
4.	Shah M G,'' Building Drawing'' Tata McGraw – Hill, New Delhi – 1992.
5.	Kumaraswamy N., Kameswara Rao A.'' Building Planning & Drawing'' Charotar Publishing, New Delhi, 2015.
6.	Shah, Kale and Patki,''Building Drawing with integrated approach to environment'' Tata McGraw – Hill, 2012.

***SDG9 – Industry, Innovation and Infrastructure**

Course Designer(s)

1. Mr.S.Gunasekar - gunasekar@ksrct.ac.in

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60 CE 4P2	Materials Testing Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To acquire knowledge on properties of bricks
- To gain knowledge on basic properties of cement
- To impart knowledge on the test of fine aggregates
- To understand the test on coarse aggregates
- To learn the various test on metal specimen

Pre-requisites

Courses – Construction Materials & Practices

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Experiment the various test on bricks	Apply
CO2	Perform various test for cement	Apply
CO3	Demonstrate the different test available for fine aggregates	Apply
CO4	Comprehend the properties of coarse aggregates	Apply
CO5	Identify the test available for testing metal specimen	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	3	2	3	3	2	3	2	2	2	2	-
CO2	3	2	3	3	2	3	3	2	3	2	2	2	2	-
CO3	3	2	2	3	2	2	2	2	3	2	2	2	2	-
CO4	3	2	2	3	2	2	2	2	3	2	2	2	2	-
CO5	3	2	2	3	2	2	2	2	3	2	2	2	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	25	12	50		50
Analyse	25	13	50		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

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TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 4P2 - Materials Testing Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	0	0	4	60	2	60	40	100

List of Experiments:

1. Determine the properties of brick*****
2. Determine the properties of cement*****
3. Determine the properties of fine aggregate*****
4. Determine the properties of coarse aggregate*****
5. Perform the tension test on mild steel rod specimen*****
6. Determine the impact resistance of mild steel specimen*****
7. Determine the hardness number for the given specimen*****
8. Perform the bending test on beam specimen*****

Lab Manual	
1.	IS 3495 - Part 1 to 4 - Methods of tests of burnt clay building bricks – BIS, New Delhi
2.	IS 12269 : 2013 - Ordinary Portland Cement 53 Grade – Specification BIS, New Delhi
3.	IS 383 – 2016, Coarse and Fine Aggregate for Concrete - Specification (Third Revision)

***SDG9 – Industry, Innovation and Infrastructure**

Course Designer(s)

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60 CG 0P3	Career Skill Development - III	Category	L	T	P	Credit
		CG	0	0	2	1*

Objectives

- To help learners improve their logical reasoning skillsat different academic and professional contexts.
- To help learners relatebasic quantitative problems and solve them.
- To help learnersInfer critically the statements with optimal conclusions and assumptions.
- To Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively
- To compute quantitative problems related to time and work, speed and distance, and simple and compound interest

Pre-requisites

Basic knowledge of Arithmetic and Logical Reasoning

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Deduce the topics in logical reasoning at the preliminary and intermediate level.	Analyze
CO2	Relate basic quantitative problems and solve them effectively at the preliminary level	Apply
CO3	Infer critically the statements with optimal conclusions and assumptions with the data and information given.	Analyze
CO4	Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively at the pre-intermediate level.	Apply
CO5	Compute quantitative problems related to time and work, speed and distance, and simple and compound interest at intermediate level.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	2	3	-	3	-	-	-	2	3	3	3	-
CO2	3	3	3	3	-	2	-	-	-	2	3	3	3	2
CO3	2	2	2	2	-	3	-	-	-	2	3	3	3	1
CO4	3	3	3	3	-	2	-	-	-	2	3	3	2	2
CO5	3	3	3	3	-	2	-	-	-	2	3	3	3	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	10	10	20	No End Sem Examination
Understand	10	10	20	
Apply	20	20	30	
Analyse	20	20	30	
Evaluate	0	0	0	
Create	0	0	0	
Total	60	60	100	

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K.S.Rangasamy College of Technology – Autonomous R2022								
Common to All Branches								
60 CG 0P3 - Career Skill Development III								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	0	0	2	30	1*	100	-	100

List of Experiments:

Logical Reasoning

Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Blood Relations - Coded Relations - Order and Ranking – odd man out - Direction and distance

Quantitative Aptitude – Part 1

Number system - Squares & cubes - Divisibility - Unit digits - Remainder Theorem - HCF & LCM - Geometric and Arithmetic progression - Surds & indices

Critical Reasoning

Syllogism - Statements and Conclusions, Cause and Effect, Statements and Assumptions - identifying Strong Arguments and Weak Arguments – Cause and Action -Data sufficiency

Quantitative Aptitude – Part 2

Average - Ratio and proportion – Ages – Partnership– Percentage - Profit & loss – Discount - Mixture and Allegation

Quantitative Aptitude – Part 3

Time &Work - Pipes and cistern – Time, Speed & distance - Trains - Boats and Streams - Simple interest and Compound interest

Lab Manual

1.	Aggarwal, R.S. *'A Modern Approach to Verbal and Non-verbal Reasoning'*, Revised Edition 2008,Reprint 2009,S.Chand& Co Ltd., New Delhi.
2.	Abhijit Guha, *'Quantitative Aptitude'*, McGraw Hill Education, 6thedition, 2016
3.	Dinesh Khattar,'Quantitative Aptitude For Competitive Examinations', Pearson Education 2020
4.	Anne Thomson, *'Critical Reasoning: A Practical Introduction'*Lexicon Books, 3rd edition,2022.Warszaw

SDG 4 – Quality Education

SDG 8 – Decent work and Economic growth

SDG 9 – Industry, innovation and Infrastructure

Course Designer(s)

1. R.Poovarasan - poovarasan@ksrct.ac.in

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 AB 001	National Cadet Corps - Air Wing	Category	L	T	P	Credit
		HS	2	0	2	3

Objectives

- To designed especially for NCC Cadets
- To develop character, camaraderie, discipline, secular outlook
- To inculcate spirit of adventure, sportsman spirit
- To teach selfless service amongst cadets by working in teams
- To learning military subjects including weapon training and motivate them to join in tri-services

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion	Knowledge
CO2	Demonstrate the sense of discipline with smartness and have basic knowledge of weapons and their use and handling	Knowledge
CO3	Illustrate various forces and moments acting on aircraft	Apply
CO4	Outline the concepts of aircraft engine and rocket propulsion	Apply
CO5	Design, build and fly chuck gliders/model airplanes and display static models	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	3	3	3	3	3	-	-	-	-
CO2	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			End Sem Examination (Marks)
	DST	AM	SBM	
Remember	-	-	-	-
Understand	10	10	-	40
Apply	10	10	10	60
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	20	20	10	100

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to ALL Branches								
60 AB 001 - NCC Air Wing								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
IV	2	0	2	45	3	50	50	100

NCC Organisation and National Integration NCC Organization — History of NCC- NCC Organization- NCC Training- NCC Uniform — Promotion of NCC cadets — Aim and advantages of NCC Training- NCC badges of Rank- Honors" and Awards – Incentives for NCC cadets by central and state govt. History and Organization of IAF-Indo-PakWar-1971 Operation Safed Sagar. National Integration – Unity in diversity – Contribution of youth in nation building – National integration council –Images and Slogans on National Integration.	[9]
Drill and Weapon Training Basic physical Training- Various exercises for fitness (with Demonstration)- Food-Hygiene and Cleanliness . Drill – Words of commands- Position and commands- Sizing and forming- Saluting- Marching- Turning on the march and wheeling- Saluting on themarch-Sidepace,Paceforwardandtotherear-Markingtime-Drillwitharms-Ceremonialdrill-Guardmounting.(WITH DEMONSTRATION)	[9]
Principles of Flight Laws of motion-Forces acting on aircraft- Bernoulli"s theorem-Stalling-Primary control surfaces- Secondary control surfaces-Aircraft recognition.	[9]
Aero Engines Introduction of Aero engine-Types of engine- Piston engine- Jet engines-Turboprop engines-Basic Flight Instruments-Modern trends.	[9]
Aero Modeling History of Aero modelling - Materials used in Aeromodeling - Types of Aeromodels – Static Models-Gliders-Control line models-Radio Control Models-Building and Flying of Aeromodels.	[9]
Total Hours:	**45**
Text Book(s):	

1.	National Cadet Corps – A Concise handbook of NCC Cadets", Ramesh Publishing House, NewDelhi, 2014.
Reference(s):	
1.	"Cadets Handbook – Common Subjects SD/SW", Published by DGNCC, New Delhi.
2.	"Cadets Handbook – Specialized Subjects SD/SW", Published by DGNCC, New Delhi.
3.	"NCCOTA Precise", published by DGNCC, New Delhi.
ESE	The examination and award of marks will be done by the Ministry of Defence, Government of India whichincludes all K1 to K4 knowledge levels. The maximum marks for the End Semester Examination is 500 marks. Itwillbeconverted to100 marks.

Course Designers

1. Flt LtV.R.SADASIVAM- sadasivam@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 AB 002	National Cadet Corps - Army Wing	Category	L	T	P	Credit
		HS	2	0	2	3

Objectives

- Develop character, camaraderie
- Inculcate discipline, secular outlook
- Enrich the spirit of adventure, sportsman spirit
- Ideals of selfless service amongst cadets by working in teams
- Improve qualities such as self-discipline, self-confidence, self-reliance and dignity of labour in the cadets.

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion.	Apply
CO2	Demonstrate Health Exercises, the sense of discipline, improve bearing, smartness, turnout, develop the quality of immediate and implicit obedience of orders.	Apply
CO3	Basic knowledge of weapons and their use and handling.	Understand
CO4	Aware about social evils and shall inculcate sense of whistle blowing against such evils and ways to eradicate such evils	Apply
CO5	Acquaint, expose & provide knowledge about Army/Navy/ Air force and to acquire information about expansion of Armed Forces, service subjects and important battles	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	1	-	3	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	3	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	20	20	30
Apply	20	20	30
Analyse	10	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to ALL Branches

60 AB 002 - NCC Army Wing

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	2	0	2	45	3	50	50	100

NCC Organization & National Integration NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC cadets – Aim and advantages of NCC Training- NCC badges of Rank- Honors' and Awards – Incentives for NCC cadets by central and state govt. National Integration - Unity in diversity- contribution of youth in nation building- national integration council- Images and Slogans on National Integration	[9]
Basic Physical Training & Drill Basic physical Training – various exercises for fitness(with Demonstration)-Food – Hygiene and Cleanliness.Drill- Words of commands- position and commands- sizing and forming- saluting- marching- turning on the march and wheeling- saluting on the march- side pace, pace forward and to the rear- marking time- Drill with arms- ceremonial drill- guard mounting.(WITH DEMONSTRATION).	[9]
Weapon Training Main Parts of a Rifle- Characteristics of .303 rifle- Characteristics of .22 rifle- loading and unloading – position and holdingsafety precautions – range procedure- MPI and Elevation- Group and Snap shooting- Long/Short range firing(WITH PRACTICE SESSION) - Characteristics of 5.56mm rifle- Characteristics of 7.62mm SLR- LMG- carbine machine gun – pistol.	[9]
Social Awareness and Community Development Aims of Social service-Various Means and ways of social services- family planning – HIV and AIDS- Cancer its causes and preventive measures- NGO and their activities- Drug trafficking- Rural development programmes - MGNREGA-SGSYJGSY-NSAP-PMGSY- Terrorism and counter terrorism- Corruption – female foeticide -dowry –child abuse-RTI Act- RTE Act- Protection of children from sexual offences act- civic sense and responsibility	[9]
Specialized Subject (ARMY) Basic structure of Armed Forces- Military History – War heroes- battles of Indo-Pak war- Param Vir Chakra- Career in the Defence forces- Service tests and interviews.	[9]
Total Hours:	**45**

Text Book(s):

1.	National Cadet Corps- A Concise handbook of NCC Cadets by Ramesh Publishing House, New Delhi, 2014
2.	Cadets Handbook- Specialized Subjects SD/SW published by DG NCC, New Delhi , 2014

Reference(s):

1.	"Cadets Handbook – Common Subjects SD/SW" by DG NCC, New Delhi, 2019
2.	"Cadets Handbook – Specialised Subjects SD/SW" by DG NCC, New Delhi, 2017

Course Designers

1. CT E Chandra Kumar - chandrakumar@ksrct.ac.in

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TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2023-2024 onwards)

FIFTH SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CE 501	Structural Analysis II	2	40	60	100	45	100
2	60 CE 502	Foundation Engineering	2	40	60	100	45	100
3	60 CE 503	Basic Reinforced Concrete Design	2	40	60	100	45	100
5	60 CE E*	Professional Elective I	2	40	60	100	45	100
	60 CE L*	Open Elective – II	2	40	60	100	45	100
6	60 MY 003	Start-ups and Entrepreneurship	-	100	-	100	-	100
PRACTICAL								
8	60 CE 5P1	Geotechnical Engineering Laboratory	3	60	40	100	45	100
9	60 CE 5P2	Environmental Engineering Laboratory	3	60	40	100	45	100
10	60 CE 5P3	Design Thinking and Innovation Laboratory	3	100	-	100	-	100
11	60 CG 0P4	Career Skill Development - IV	-	100	-	100	-	100
12	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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60 CE 501	Structural Analysis - II	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To learn the plastic analysis of structures
- To gain knowledge on the influence line concepts for moving loads
- To analyse the beams and frames using matrix flexibility method
- To understand the concepts of analysis using matrix stiffness method
- To learn basics about finite element method

Pre-requisites

- Strength of Materials, Structural Analysis I

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Examine the indeterminate beams and frames by using plastic theory.	Apply
CO2	Apply Muller Breslau's principle for drawing Influence line diagram of indeterminate structures.	Apply
CO3	Analyse the beams and rigid frames using matrix flexibility method.	Analyse
CO4	Analyse statically indeterminate structures by displacement methods.	Analyse
CO5	Identify the application and characteristics of FEA elements.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	1	2	-	-	-	2	2	-	2	3	-
CO2	3	3	3	1	2	-	-	-	2	2	-	2	3	-
CO3	3	3	3	2	2	-	-	-	2	2	-	2	3	-
CO4	3	3	3	3	2	-	-	-	2	2	-	2	3	-
CO5	3	3	3	3	2	-	-	-	2	2	-	2	3	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	05	05	15
Understand	05	05	20
Apply	30	30	35
Analyse	20	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 501 – Structural Analysis II								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	40	60	100

Plastic analysis of structures * Plastic moment of resistance – shape factor – Load factor – plastic hinge and mechanism – plastic analysis of Indeterminate beams and frames (Single bay and single storey) – Applications of upper and lower bound theorems.	[9]
Moving loads and Influence lines Moving loads in Influence line diagram (ILD) – Load categories: Single concentrated load- Two concentrated loads- UDL shorter and longer than the span – Multiple wheel loads; Influence lines for statically determinate structures – Applications of Muller Breslau's principle. (Indeterminate structures upto 2 degrees of freedom).	[9]
Matrix flexibility method* Basic concepts of flexibility method: Equilibrium and compatibility equation – Primary structure – compatibility conditions; Analysis of indeterminate structures - continuous beams, rigid jointed plane frames (with redundancy restricted to two) – Shear force and bending moment diagrams.	[9]
Matrix stiffness method * Basic concepts of stiffness method: Element and global stiffness matrices – co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors; Analysis of pin – jointed plane frames and rigid frames (with redundancy restricted up to two) – Shear force and bending moment diagrams.	[9]
Introduction to finite element method * Introduction – Discretisation of a structure – Displacement functions – Truss element – Beam element – Plane stress and plane strain - Triangular elements (Concept Only).	[9]
Total Hours: (45 + 15)	**45**

Text Book(s):	
1.	Vaidyanadhan R., and Perumal P., "Comprehensive structural Analysis – Vol.1 & Vol 2", Laxmi Publications, New Delhi, 2016.
2.	Thandavamoorthy T.S., "Structural Analysis" 6th Edition, Oxford University Press, New Delhi, 2015.
Reference(s):	
1.	Ghali A., Nebille A.M., and Brown T.G., "Structural Analysis - A unified classical and Matrix approach" 6th Edition, Spon Press, London and New York, 2013.
2.	Rajesekaran S., and Sankara Subramanian S.,"Computational structural mechanics" Prentice Hall of India Pvt Ltd, New Delhi, 2004.
3.	Manickaselvam V.K., "Elements of Matrix and Stability Analysis of Structures", Khanna Publishers, New Delhi, 2010.
4.	Senthil S., and Panneerdhass R., "Finite Element Analysis" Lakshmi Publications, Chennai, 2017.

***SDG9 – Industry Innovation and Infrastructure**

List of MAT Lab Programmes

1. Determination of Plastic hinges and moments using MAT Lab
2. Analysis of the ILD using MAT Lab
3. Determination of Matrix (nxn) using MAT Lab
4. Determination of Eigen value and Eigen vector by using MAT Lab
5. Determination of stiffness matrix for beams, truss using MAT Lab

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Plastic analysis of structures**	
1.1	Introduction to plastic analysis	1
1.2	Ductility and ultimate load	1
1.3	Plastic hinges and its mechanism	1
1.4	Elastic section modulus and plastic section modulus	1
1.5	Shape factor of different shapes	1
1.6	Moment – Curvature relationships	1
1.7	Plastic analysis of indeterminate beams	1
1.8	Plastic analysis of indeterminate frames	1
1.9	Upper and lower bound theorems and its applications	1
2.0	**Moving loads and influence lines**	
2.1	Concept of moving loads and influence lines	1
2.2	Load categories: Single concentrated load	1
2.3	Load categories: Two concentrated loads	1
2.4	Load categories: UDL shorter than the span	1
2.5	Load categories: UDL longer than the span	1
2.6	Influence lines for statically determinate structures	2
2.7	Applications of Muller Breslau's principle	2
3.0	**Matrix flexibility method**	
3.1	Concepts of flexibility method, equilibrium and compatibility equation.	1
3.2	Indeterminate structures, primary structures and compatibility conditions	1
3.3	Analysis of continuous beam (concentrated load and UDL)	2
3.4	Analysis of pin jointed frames (concentrated load and UDL)	2
3.5	Analysis of overhanging beam (concentrated load and UDL)	2
3.6	Analysis of pin jointed frames (unequal support)	1
4.0	**Matrix stiffness method**	
4.1	Concepts of stiffness method, element and global stiffness matrices	1
4.2	Transformation and rotational matrixes	1
4.3	Transformation of stiffness matrix and its load, deflection vectors	1
4.4	Analysis of continuous beam (concentrated Load and UDL)	2
4.5	Analysis of pin jointed frames (concentrated Load and UDL)	2
4.6	Analysis of overhanging beam (concentrated Load and UDL)	1
4.7	Analysis of pin jointed frames (unequal support)	1
5.0	**Introduction to finite element method**	
5.1	Concepts of finite element method	1
5.2	Element, nodes and discretization of structures	1
5.3	Elemental stiffness matrix for beam element- axial load (derivation)	2
5.4	Elemental stiffness matrix for beam element – UDL (derivation)	1
5.5	Elemental stiffness matrix for truss element (derivation)	2
5.6	Elemental stiffness matrix for triangular (CST) element (derivation)	1
5.7	Plane stress and Plane strain elements	1

Course Designer(s)

1. Dr. J .Abdul Bari - abdulbari@ksrct.ac.in

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60 CE 502	Foundation Engineering	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To provide an exposure to the site investigation and bore-log report
- To impart knowledge in the selection of sites for investigate
- To determine the soil condition and provide the suitable foundation
- To design the pile foundation based on capacity of super structure
- To evaluate the problems for retaining structures

Pre-requisites

- Geology, Soil Mechanics

Course Outcomes

On the successful completion of the course, students will be able to

CO1	State the knowledge on site investigation and soil exploration.	Remember
CO2	Apply the concepts of bearing capacity of shallow foundations in homogeneous deposits.	Understand
CO3	Classify the footings and calculate the contact pressure distribution below footings.	Analyse
CO4	Evaluate the concepts in load carrying capacity of piles, negative skin friction, pile groups and under reamed pile foundations.	Apply
CO5	Review the knowledge of plastic equilibrium in soils and Rankines theory on cohesion less and cohesive soil.	Remember

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	-	2	3	-	3	3	2	3	3	2	-
CO2	3	2	3	2	2	3	-	-	-	2	3	3	2	-
CO3	3	-	-	2	2	3	-	-	3	2	-	3	2	-
CO4	3	3	3	3	2	3	-	-	3	2	3	3	1	-
CO5	3	3	3	-	2	3	3	3	3	2	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	15	15
Understand	10	15	25
Apply	5	10	30
Analyse	25	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 502 - Foundation Engineering								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	40	60	100

Site Investigation and Selection of Foundation* Scope and objectives of soil exploration– Methods of exploration – Depth of exploration – spacing and Number of bore holes – Sampling – Sampling techniques: Disturbed and undisturbed samples –Types of samples: Split spoon sampler – Thin walled sample-Bore log Report – data interpretation – strength parameters – selection of foundation based on soil condition.	[9]
Shallow Foundation** Types of foundation – location and depth – bearing capacity: factors affecting bearing capacity – bearing capacity of shallow foundation on homogenous soil: Terzaghi and BIS formulae; Bearing capacity from In-situ tests: PLT-SPT-SCPT; Allowable bearing pressure; Settlement: types - determination of settlement on granular and clay deposits – total and differential settlement - minimizing the total and differential settlement.	[9]
Footings and Rafts *** Types of Footings – Contact pressure distribution; Types and proportioning: Isolated - Combined footings (for two columns only foundations; Floating foundation) – Raft and Mat.	[9]
Pile Foundation** Introduction to Piles -Classifications of piles; load carrying capacity of single pile in granular and cohesive soils: static and dynamic formulae; Pile group: efficiency of pile groups - settlement of pile group; Pile test: In-situ penetration tests – pile load tests; under reamed pile – pile capacity under uplift. Design of Pile cap.	[9]
Retaining Walls *** Introduction-Plastic equilibrium in soils – Active and passive states – Rankine's theory – Cohesion less and cohesive soil – Coloumb's wedge theory – Earth pressure on retaining walls of simple configurations – Pressure on the wall due to line load – Stability of retaining walls: Active and Passive earth pressure by graphical methods – Culman's methods – Rehbann's methods-Geomembrane.	[9]
Total Hours: 45 + 15 (Tutorial)	**60**
Text Book(s):	

1.	Gopala Ranjan, ASR Rao,"Basic and applied soil mechanics", New Age International Publishers, New Delhi, 2019.
2.	Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2018.
Reference(s):	
1.	Das, B.M."Principles of Foundation Engineering (Fifth edition), Thomson Books / COLE, 2021.
2.	Punmia, B.C., "Soil Mechanics and Foundations", Laxmi publications pvt.Ltd. New Delhi, 2018.
3.	Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, ND, 2019.
4.	McCarthy D.F., "Essentials of Soil Mechanics & Foundations", Prentice-Hall, 2021

*SDG 9 – Industry Innovation and Infrastructure

**SDG 3 – Good Health and Well Being

***SDG 4 – Quality Education

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Site Investigation and Selection of Foundation**	
1.1	Scope and objectives of soil exploration	1
1.2	Methods of exploration	1
1.3	Depth of exploration –spacing and Number	1
1.4	Sampling – Sampling techniques	1
1.5	Disturbed and undisturbed samples	1
1.6	Types of samples	1
1.7	Split spoon sampler, Thin walled sample-Bore log Report	1
1.8	data interpretation and strength parameters	1
1.9	Selection of foundation based on soil condition.	1
2.0	**Shallow Foundation**	
2.1	Types of foundation	1
2.2	Bearing capacity	1
2.3	Factors affecting bearing capacity	1
2.4	Bearing capacity of shallow foundation on homogenous soil	1
2.5	Terzaghi and BIS formulae	1
2.6	Bearing capacity from In-situ tests (PLT-SPT-SCPT)	1
2.7	Introduction to Allowable bearing pressure and settlement	1
2.8	Types - determination of settlement on granular and clay deposits	1
2.9	Simple problems in total and differential settlement	1
3.0	**Footings and Rafts**	
3.1	Types of Footings	1
3.2	Contact pressure distribution	1
3.3	Use of Newmarks influence chart	1
3.4	Types and proportioning of Foundation	1
3.5	Combined footings (for two columns only foundations)	1
3.6	Raft Foundation	1
3.7	Mat Foundation	1
3.8	Isolated Foundation	1
3.9	Floating foundation	1
4.0	**Pile Foundation**	
4.1	Classifications of piles	1
4.2	Load carrying capacity of single pile in granular and cohesive soils	1
4.3	Static and dynamic formulae	1
4.4	Pile group	1
4.5	Efficiency of pile groups	1
4.6	Settlement of pile group	1
4.7	Pile test: In-situ penetration tests	1
4.8	Pile load tests	1
4.9	Under reamed pile – pile capacity under uplift	1
5.0	**Retaining Walls**	
5.1	Introduction-Plastic equilibrium in soils and Geomembrane	1
5.2	Active and passive states	1
5.3	Rankine's theory	1
5.4	Coloumb's wedge theory	1
5.5	Earth pressure on retaining walls of simple configurations	1
5.6	Pressure on the wall due to line load	1
5.7	Problems in Stability of retaining walls	1
5.8	active and passive earth pressure by graphical methods	1
5.9	Culman's methods, Rehbann's methods	1

Course Designer(s)

1. Dr.D.Siva Kumar - sivakumard@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE 503	Basic Reinforced Concrete Design	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To know the various methods available to design reinforced concrete structures
- To learn the design of slab for different boundary conditions
- To understand the design and detail of flexure members
- To gain the knowledge of limit state design for shear, torsion, bond and anchorage
- To carry out column and footing design using Limit state method

Pre-requisites

- Concrete Technology, Strength of Materials and Structural Analysis

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Illustrate the various design philosophy to be used in the design of structural elements	Understand
CO2	Design one way and two way slab using Limit state method	Apply
CO3	Apply IS codes in design of flexural members	Apply
CO4	Design RC beams for shear, torsion, bond and anchorage	Apply
CO5	Perform the design of RC column and isolated footing	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	-	-	-	-	2	-	-	-	3	2
CO2	3	3	3	-	-	-	-	-	2	-	-	-	3	2
CO3	3	3	3	-	-	-	-	-	2	-	-	-	3	2
CO4	3	3	3	2	-	-	-	-	2	-	-	-	3	2
CO5	3	3	3	2	2	-	-	-	2	-	-	-	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	10
Apply	20	30	50
Analyse	20	10	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 503 - Basic Reinforced Concrete Design

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	40	60	100

Design Philosophy* Introduction - Grades of concrete and steel - Stress strain curve for steel and concrete - Concept of elastic method, ultimate load method and limit state method - Advantages of Limit State method over other methods - Limit State philosophy as detailed in IS 456-2000 - Load and Load combinations - Characteristic strength and design strength of materials, Characteristic loads and design loads - Partial safety factor.	[8]
Limit State Design of Slab* Behavior of one way and two-way slab - Design of one way simply supported and continuous slab - Design of Two-way rectangular slab for various boundary conditions - Curtailment of reinforcement - Design of cantilever slab.	[9]
Limit State Design for Flexure* Analysis and design of Singly reinforced beams, doubly reinforced beams and Flanged beams (T and L beams).	[10]
Limit State Design for Shear &Torsion* Behavior of RC members in shear & torsion - Design requirements - Design of RC beams in shear - Design of RC members for combined bending, shear and torsion - Design for bond and anchorages - Detailing of reinforcement.	[8]
Limit State Design of Columns and Isolated Footings* Types of columns - Provisions of IS 456 code for the design of columns - Design of short RC column for axial, uniaxial and biaxial bending - Design of long column subjected to axial load - Use of design aids - Types of footing - Design of Isolated footing.	[10]
Total Hours (45+15):	**60**
Text Book(s):	
1. Punmia B. C., Jain A. K., "Limit State Design of Reinforced Concrete", Laxmi Publications, New Delhi 2016	
2. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors Pvt. Ltd., New Delhi, 2016	
Reference(s):	
1. Sinha S. N., "Reinforced Concrete Design", McGraw Hill Education (India) Private Limited, New Delhi, 2017.	
2. IS 456 - 2000 "Code of Practice for Plain and Reinforced Concrete", BIS, New Delhi.	
3. Bhavikatti S. S., "Design of R.C.C. Structural Elements Vol. I", New Age International Publishers,New Delhi, 2020	
4. Shah H. J., "Reinforced Concrete Vol. I [Elementary Reinforced Concrete]" , Charotar Publishing House Pvt. Ltd., Gujarat, 2016	

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Design Philosophy**	
1.1	Introduction to the course	1
1.2	Grades of concrete and steel - Stress strain curve for steel and concrete	1
1.3	Concept of elastic method, ultimate load method and limit state method	1
1.4	Comparison of all methods &Advantages of Limit State method over other methods	1
1.5	Limit State philosophy as detailed in IS456-2000	2
1.6	Load and Load combinations	1
1.7	Characteristic strength and design strength of materials, characteristic loads and design loads - Partial safety factor	1
2.0	**Limit State Design of Slab**	
2.1	Behavior of one way and two-way slab	1
2.2	Design of one way simply supported and continuous slab (Design Procedure & Problems)	2
2.3	Tutorial	2
2.4	Design of Two-way rectangular slab for various boundary conditions	3
2.5	Reinforcement detailing for two-way slabs (Different boundary conditions - Design Procedure & Problems)	1
2.6	Design of cantilever slab (Design Procedure & Problems)	2
2.7	Tutorial	2
3.0	**Limit State Design for Flexure**	
3.1	Flexure concepts and types of beams	1
3.2	Analysis and design of singly reinforced beams (Procedure & Problems)	3
3.3	Tutorial	2
3.4	Analysis and design of doubly reinforced beams (Procedure & Problems)	3
3.5	Analysis and design of flanged beams (T and L beams - Procedure & Problems)	3
3.6	Tutorial	2
4.0	**Limit State Design for Shear &Torsion**	
4.1	Behavior of RC members in shear & torsion - Design requirements	1
4.2	Design of RC beams in shear - Problems	2
4.3	Tutorial	2
4.4	Design of RC members for combined bending, shear and torsion - Problems	3
4.5	Design for bond and anchorages - Detailing of reinforcement	2
4.6	Tutorial	1
5.0	**Limit State Design of Columns and Isolated Footings**	
5.1	Types of columns, Provisions of IS-456 code for the design of columns	1
5.2	Design of short RC column for axial, uniaxial and biaxial bending - Problems	3
5.3	Tutorial	2
5.4	Design of long column subjected to axial load – Use of design aids	3
5.5	Types of footing - Design of Isolated footing – Problems	3
5.6	Tutorial	2

Course Designer(s)

1. Mr.K. Angu Senthil - angusenthil@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 MY 003	Startups and Entrepreneurship	Category	L	T	P	Credit
		MY	2	0	0	2*

Objectives

- To Learn basic concepts in entrepreneurship, develop mind-set and skills necessary to explore entrepreneurship
- To provide practical proven tools for transforming an idea into a product or service that creates value for others.
- To Comprehend the process of opportunity identification through design thinking, identify market potential and customers while developing a compelling value proposition solution and prototypes
- To create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture ideas & solutions built with domain expertise
- To Prepare and present an investible pitch deck of their practice venture to attract stakeholders

Pre-requisites

- Basic knowledge of reading and writing in English

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Develop an entrepreneurial mindset and appreciate the concepts of design thinking, entrepreneurship and innovation	Understand
CO2	Apply process of problem -opportunity identification and validation through human centred approach to design thinking in building solutions	Apply
CO3	Understand market types, conduct market estimation, identify customers, create customer persona, develop the skills to create a compelling value proposition and build a Minimum Viable Product	Apply
CO4	Create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture	Apply
CO5	Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders	Create

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	1	3	1	2	1	-	2	2	3	3	-
CO2	2	3	3	2	2	-	2	2	2	-	2	2	2	3	-
CO3	3	2	3	1	2	-	-	-	1	3	1	3	3	2	-
CO4	3	3	3	3	3	2	2	1	-	1	3	3	3	3	-
CO5	3	2	3	3	3	-	-	2	-	-	3	2	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Pitch Deck final submission & Via voce
	Milestone 1 (25Marks)	Milestone 2 & 3 (25Marks)	
Remember	10	-	50
Understand	05	10	
Apply	10	15	
Analyse	-	-	
Evaluate	-	-	
Create	-	-	
Total	25	25	

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to ALL Branches

60 MY 003 – Startups and Entrepreneurship

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	0	30	2*	100	-	100

Introduction to Entrepreneurship & Entrepreneur Meaning and concept of Entrepreneurship, the history of Entrepreneurship development, Myths of Entrepreneurship, role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management and Future of Entrepreneurship. The Entrepreneur: Meaning, the skills required to be an entrepreneur, the entrepreneurial decision process, Role models, Mentors and Support system. Innovation and Creativity, types of innovations, Innovations in current scenario	[6]
Problem-Opportunity Identification, Customers Discovery and competitive advantage Understanding the Problem and opportunity, define problem using Design thinking principles and validate problem. Exploring market types and estimating the market size, knowing your customer and consumer, Customer segmentation and creating customer personas. Importance of Value Proposition, Value Proposition Canvas, Developing Problem-solution fit, Competition analysis, Blue ocean strategy, Competitive positioning and understanding unique selling points.	[6]
Business model and build your MVP Introduction to Business model and types, Lean approach, 9 block lean canvas model, riskiest assumptions to Business models. Prototyping, building a Minimum viable product, Hypothesis testing and MVP Validation, MVP Iteration-Importance of Build - Measure – Learn approach	[6]
Business Plan, Financial feasibility and Managing growth Business planning: components of Business plan- Sales plan, People plan and financial plan, Preparing a business plan. Financial Planning: Types of costs, preparing the financial plan using financial template, understanding basics of Unit economics and analyzing Growth and the financial performance	[6]
Go To Market Strategies and Funding Introduction to Go to market strategies, start-up branding and its elements, Selecting the Right Channel, creating digital presence, building customer acquisition strategy. Choosing a form of business organization specific to your venture, identifying sources of funds: Debt & Equity, Map the Start-up Lifecycle to Funding Options, Build an Investor ready pitch deck.	[6]
Total Hours:	**30**

Text Book(s):

1.	Stephen Key, “One Simple Idea for Startups and Entrepreneurs: Live Your Dreams and Create Your Own Profitable Company” 1st Edition, Tata Mc Grawhill Company, New Delhi, 2013.
2.	Charles Bamford and Garry Bruton, “Entrepreneurship: The Art, Science, and Process for Success”, 2nd Edition, Tata Mc Grawhill Company, New Delhi, 2016.

Reference(s):

1.	Philip Auerswald, “The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy”, Oxford University Press, 2012.
2.	Janet Kiholm Smith; Richard L. Smith Richard T. Bliss, “Entrepreneurial Finance: Strategy, Valuation and Deal Structure, Stanford Economics and Finance”, 2011.
3.	Edward D. Hess, “Growing an Entrepreneurial Business: Concepts and Cases”, Stanford Business Books, 2011.
4.	Ignite program, wadhwani platform, Entrepreneurship, NPTEL online course By Prof. C Bhaktavatsala Rao | IIT Madras

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Entrepreneurship & Entrepreneur**	
1.1	Meaning and concept of Entrepreneurship and the history of Entrepreneurship development	1
1.2	The Entrepreneur: Meaning, the skills required to be an entrepreneur, the entrepreneurial decision process,	1
1.3	Myths of Entrepreneurship, How to Become a Successful Entrepreneur - Dr Romesh Wadhwani (Platform on boarding)	1
1.4	Role models, Mentors and Support system- Masterclass on My Story - Joshua Salins	1
1.5	Role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management and Future of Entrepreneurship	1
1.6	Innovation and Creativity, types of innovations, Innovations in current scenario, Concepts of Entrepreneurial Thinking, General Enterprising tendency test	1
2.0	**Problem-Opportunity Identification, Customers Discovery and competitive advantage**	
2.1	Understanding the Problem and opportunity, define problem using Design thinking principles and validate problem. Case study and Fireside chat – Desi Hangover	1
2.2	Identifying a problem for practice venture and filling Problem statement canvas (Handout week 1 - class activity)	1
2.3	Customer and markets discovery , knowing your customer and consumer, Customer segmentation and Exploring market types and estimating the market size. Case study and Fireside chat – Verloop	1
2.4	Creating customer personas & Market estimation (Handout week 2 - class activity)	1
2.5	Importance of Value Proposition, Introduce Value Proposition Canvas, Developing Problem-solution fit. Case study and Fireside chat – Honey Twigs	1
2.6	Competition analysis, Blue ocean strategy, Competitive positioning and understanding unique selling points. Case study and Fireside chat on Inzpira Fill Value Proposition Canvas (Handout week 3 - class activity) and Competition analysis framework (Handout week 5 - class activity) **Briefing on Assignment 1 - Milestone 1**	1
3.0	**Business model and Build your MVP**	
3.1	Introduction to Business model and types. Case study and Fireside chat – NUOS	1
3.2	Lean approach, 9 block lean canvas model, riskiest assumptions to Business models	1
3.3	Class Activity- Fill Lean canvas for you idea and understand revenue model (Handout week 6)	1
3.4	Prototyping, Meaning of MLP , Difference between MLP and MVP, How to build an MLP? Different types MLP that you can build. Case study and Fireside chat – KNORISH	1
3.5	Hypothesis testing and MVP Validation, MVP Iteration-Importance of Build - Measure – Learn approach	1
3.6	Class Activity- Fill MVP framework (Handout week 7) and learn validation	1
4.0	**Business Plan, Financial feasibility and Manging growth**	
4.1	Business planning: components of Business plan- Sales plan, People plan and financial plan, Preparing a business plan. Case study and Fireside chat – Bodh Gems	1
4.2	Financial Planning: Types of costs, preparing the financial plan using financial template (Handout week 9)	1
4.3	Class activity - starting up costs, COGS, Sales plan and people plan template.	1
4.4	Class activity - One year P&L projection, Breakeven Analysis, Five year projection	1
4.5	Understanding basics of Unit economics and analyzing Growth and the financial performance	1

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4.6	Class activity - Financial template - Unit economics (Handout week 12)	1
5.0	**Go To Market Strategies and Funding**	
5.1	Introduction to Go to market strategies, start-up branding and its elements, Selecting the Right Channel	1
5.2	Creating digital presence, building customer acquisition strategy.	1
5.3	Class activity: Handout week 10 - create your GTM strategy	1
5.4	Choosing a form of business organization specific to your venture	1
5.5	Identifying sources of funds: Debt & Equity, Map the Start-up Lifecycle to Funding Options	1
5.6	Class activity - Visit relevant GOI websites, other sites to help students explore funding opportunities and **briefing on final submission of the pitch deck** Build an Investor ready pitch deck, What Should You Cover in Your Pitch Deck? Art of pitching and storytelling	1

Course Designer(s)

1. Dr.N.Tiruvenkadam - tiruvenkadam@ksrct.ac.in

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60 CE 5P1	Geotechnical Engineering Laboratory	Category	L	T	P	Credit
		PC	0	0	3	1.5

Objectives

- To acquire knowledge on index properties of soils
- To determine engineering properties of the soils
- To Provide field in-situ test for cohesive soil
- To know the settlement of foundation by consolidation test
- To understand the California Bearing ratio test

Pre-requisites

- Geology, Soil Mechanics Foundation Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	List the basic concepts and the properties of soil.	Understand
CO2	Classify the soils by sieve analysis, hydrometer method and specific gravity.	Apply
CO3	Apply the knowledge of science and techniques in engineering properties of soil.	Apply
CO4	Identify to design and conduct experiments to analyze critically and interpret resulting data related to various engineering properties of soil.	Analyse
CO5	Evaluate the impact of field density of soil and California Bearing Ratio Test.	Remember

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	-	3	3	3	3	3	-	2	2	3
CO2	3	2	2	-	-	3	3	3	3	3	-	2	2	3
CO3	3	3	3	-	-	-	-	3	3	3	-	2	2	3
CO4	3	2	3	-	-	3	3	3	3	3	-	2	2	3
CO5	3	2	3	-	-	3	3	3	3	3	-	2	2	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	10	8	20	-	-
Understand	10	8	30	-	-
Apply	15	4	20		50
Analyse	15	5	30		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

R3/ w.e.f. 01.06.2024
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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 5P1 – Geotechnical Engineering Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	0	0	3	45	1.5	60	40	100

List of Experiments:

1. Determination of Specific gravity of soil solids
2. Determination of Grain size distribution by using Sieve analysis*
3. Determination of Grain size distribution by using Hydrometer analysis*
4. Determination of Liquid limit, Plastic limit and Shrinkage limit tests
5. Performance Test on Field density test by Sand replacement method and Core Cutter Method
6. Measurement of Permeability using constant head and falling head methods
7. Determination of moisture content, density relationship using standard Proctor compaction test
8. One dimensional consolidation test on Determination of co-efficient of consolidation
9. Determination of Direct shear test in cohesion-less soil**
10. Determination of Unconfined compression test in cohesive soil**
11. Measurement of Laboratory vane Shear test in cohesive soil**
12. Performance test on California Bearing ratio***

Design Experiments:

1. Determine the water content using pycnometer for the sample collection from your place
2. Determination of pH of the given soil sample.

Lab Manual	
1.	"Geotechnical Engineering Lab Manual", Department of Civil Engineering, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 4 – Quality Education

Course Designer(s)

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TIRUCHENGODE - 637 215

60 CE 5P2	Environmental Engineering Laboratory	Category	L	T	P	Credit
		PC	0	0	3	1.5

Objectives

- To understand the general quality of water and wastewater
- To evaluate the physico-chemical parameters of water and wastewater
- To estimate the presence of organic matter and nutrients in water and wastewater
- To detect the contamination in water for various uses
- To decide the type of treatment required and evaluate the efficiency of treatment units

Pre-requisites

- Water Supply and Wastewater Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Estimate the basic parameters of water and wastewater.	Apply
CO2	Determine the chemical parameters present in water and wastewater.	Apply
CO3	Compute the optimum coagulant dosages for water treatment.	Apply
CO4	Analyze the available chlorine in bleaching powder for chlorination.	Analyse
CO5	Determine the parameters used in wastewater treatment plants.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	3	1	3	3	2		2		2	2	3
CO2	3	3	2	3	1	3	3	2		2		2	2	3
CO3	3	3	2	3	1	3	3	2		2		2	2	3
CO4	3	3	2	3	1	3	3	2		2		2	2	3
CO5	3	3	2	3	1	3	3	2		2		2	2	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	25	12	50		50
Analyse	25	13	50		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 5P2 – Environmental Engineering Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	0	0	3	45	1.5	60	40	100

List of Experiments:

1. Sampling and preservation methods of water and wastewater *
2. Determination of Turbidity, Conductivity and pH *
3. Determination of Hardness *
4. Determination of Chlorides *
5. Determination of Sulphates *
6. Determination of Fluorides *
7. Determination of Iron *
8. Estimation of Optimum Coagulant Dosage *
9. Estimation of Available Chlorine in Bleaching Powder *
10. Determination of Dissolved Solids and Suspended Solids *
11. Determination of Dissolved Oxygen *
12. Determination of Biochemical Oxygen Demand *
13. Determination of Chemical Oxygen Demand *

Design Experiments:

1. Based on the working efficiencies of various treatment units, design a water treatment scheme for the given characteristics of water sample
2. Propose a wastewater treatment scheme for the given sample characteristics by calculating the BOD and Solids removal efficiencies of treatment units

Lab Manual

1.	Vennila G, Ramesh N, Ramesh S, Mageshkumar P, “Experimental Methods for Environmental Engineering Laboratory”, Royal Book Publishing-International, Coimbatore, 2019.

* SDG 6 – Clean Water and Sanitation

Course Designer(s)

1. Dr. P. Mageshkumar - mageshkumarp@gmail.com

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60 CE 5P3	Design Thinking and Innovation Laboratory	Category	L	T	P	Credit
		PC	0	0	2	1

Objectives

- Study a problem from multiple perspectives
- Learn how to frame the design challenge properly.
- Learn how to ideate, prototype and Iterate solutions.
- Learn from the overall design process how to create value as entrepreneurs
- Learn how to design successful products or enterprises

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify an Opportunity from a Problem	Understand
CO2	Frame a Product/Service Idea	Analyse
CO3	Empathize with the customers	Apply
CO4	Design and develop a Prototype	Analyse
CO5	Pitch their idea	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	3
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	3
CO4	3	3	3	3	-	-	-	3	3	3	-	3	3	3
CO5	3	3	3	3	-	-	-	3	3	3	-	3	3	3

3 - Strong; 2 - Medium; 1 – Some

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 5P3 - Design Thinking and Innovation Laboratory

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	0	0	2	30	1	60	40	100

Introduction to Design Thinking LRI Assessment, Introduction to Design Thinking, Understanding the Mindsets-Empathy, Optimism, Embrace Ambiguity, Make it, Learn from Failure, Iterate, Create Confidence, Creativity Convergent & Divergent Thinking	[6]
Design Thinking Methodology The 5 Stages of the Design Thinking Process-Empathise, Define (the problem), Ideate, Prototype, and Test.	[6]
Ideation tools & exercises. Sample Design Challenge, Introduction to the Design Challenge Themes, Storytelling and Tools for Innovation	[6]
Empathize-Understand customers: Empathy Maps, Empathise-Step into customers shoes Customer Journey Maps, Define-Analysis & Drawing Inferences from Research	[6]
The Design Challenge: Define the Design Challenge, Prototyping & Iteration- Feasibility Study, Testing-Documentation and the Pitching.	[6]
Total Hours:	30

Text Book(s):

1.	Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School - IdrisMootee.

Reference(s):

1.	Zero to One: Note on Start-Ups, or How to Build the Future
2.	The Lean Startup: How Constant Innovation Creates Radically Successful Businesses
3.	Start With Why: How Great Leaders Inspire Everyone To Take Actions.

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60 CG 0P4	Career Skill Development IV	Category	L	T	P	Credit
		CS	0	0	2	1*

Objectives

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Pre-requisites

Basic knowledge of Arithmetic and Logical Reasoning

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	2	3	-	3	-	-	-	2	3	3	3	-
CO2	3	3	3	3	-	2	-	-	-	2	3	3	3	2
CO3	2	2	2	2	-	3	-	-	-	2	3	3	3	1
CO4	3	3	3	3	-	2	-	-	-	2	3	3	2	2
CO5	3	3	3	3	-	2	-	-	-	2	3	3	3	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	10	10	20	No End Sem Examination
Understand	10	10	20	
Apply	20	20	30	
Analyse	20	20	30	
Evaluate	0	0	0	
Create	0	0	0	
Total	60	60	100	

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K.S.Rangasamy College of Technology – Autonomous R2022								
Common to all Branches								
60 CG 0P4 - Career Skill Development IV								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	0	0	2	30	**1***	100	00	100

List of Experiments:

Verbal & Analytical Reasoning

Seating Arrangements – Analytical Reasoning (PUZZELS) – Machin input and output - Coded Inequality – Eligibility Test

Quantitative Aptitude - Part – 4

Permutation and Combination - Probability - Quadratic equation - Geometry – Clock – Calendar – Logarithmic

on-Verbal Reasoning

Series Completion of Figures – Classification – Courting of figure – Figure matrix – Embedded Figure – Complete Figure – Paper Cutting and Folding – Mirror images and Water Images

Quantitative Aptitude - Part – 5

Mensuration of Area, Volume and Surface area in 2D and 3D Shapes – 2D Shapes – Square, Rectangle, Triangle, Circle, etc. - 3D Shapes – Cube, Cuboid , Sphere , Cone , etc.

Data Interpretation and Analysis

Data interpretation Based on text - Data interpretation Based on Tabulation, Pie chart , Bar graph, And Line graph – Venn Diagram - Data sufficiency

Lab Manual

1.	Aggarwal, R.S. *'A Modern Approach to Verbal and Non-verbal Reasoning'*, Revised Edition 2008,Reprint 2009,S.Chand & Co Ltd., New Delhi.
2.	Abhijit Guha, *'Quantitative Aptitude'*, McGraw Hill Education, 6th edition, 2016
3.	Dinesh Khattar,'Quantitative Aptitude For Competitive Examinations', Pearson Education (2020)
4.	Anne Thomson, *'Critical Reasoning: A Practical Introduction'*Lexicon Books, 3rd edition,2022. Warszaw

SDG 4 – Quality Education

SDG 8 – Decent work and Economic growth

SDG 9 – Industry, innovation and Infrastructure

Course Designer(s)

R.Poovarasan - poovarasan@ksrct.ac.in

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2023-2024 onwards)

SIXTH SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CE 601	Advanced Reinforced Concrete Design	2	40	60	100	45	100
2	60 CE 602	Design of Steel Structures	2	40	60	100	45	100
3	60 CE 603	Highway, Railway and Airport Engineering	2	40	60	100	45	100
4	60 CE 604	Hydrology and Water Resources Engineering	2	40	60	100	45	100
5	60 CE E*	Professional Elective II	2	40	60	100	45	100
6	60 CE L**	Open Elective – II	2	40	60	100	45	100
7	60 AB 00*	NCC\NSS\NSO\YRC\RRC\ Yoga\Fine Arts	-	100	-	100	-	-
PRACTICAL								
8	60 CE 6P1	Concrete and Highway Laboratory	3	60	40	100	45	100
9	60 CE 6P2	Computer Aided Analysis and Design Laboratory	3	60	40	100	45	100
10	60 CE 6P3	Design Thinking and Product Development Laboratory	3	100	-	100	-	100
11	60 CG 0P5	Comprehensive Test	-	100	-	100	-	100
12	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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60 CE 601	Advanced Reinforced Concrete Design	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To understand the design concept of various structures and detailing of Reinforcements
- To Understand the basic concepts and behavior of continuous flexural members
- To bring about an exposure to advanced topics in structural design comprising of RCC retaining walls, water tanks and Flat slabs
- To study the design of staircases
- To gain design knowledge related to structures, systems that are likely to be encountered in professional practice

Pre-requisites

- Fundamendals of reinforced concrete Design

Course Outcomes

On the successful completion of the course, students will be able to

CO1	To gain design knowledge related to structures, systems that are likely to be encountered in professional practice.	Understand
CO2	Design interior and exterior panels of flat slab.	Understand
CO3	Identify the suitable retaining wall and design cantilever, counter fort retaining wall.	Apply
CO4	Design various types of liquid storage structures as per Indian standard codal provision.	Analyse
CO5	Design and detail the stair case, RCC wall and Deep beam.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1		3	-	-	-	-	3	-	-	3	-	1	-
CO2	1	2	3	-	-	-	-	3	-	-	3	-	1	-
CO3	1	2	3	-	-	-	-	3	-	-	3	-	2	2
CO4	1		3	-	-	-	-	3	-	-	3	-	2	2
CO5	1	2	3	-	-	-	-	3	-	-	3	-	3	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	25
Apply	20	20	25
Analyse	20	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 601 - Advanced Reinforced Concrete Design								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	40	60	100

Design of Continuous Flexural Members* Concept of moment redistribution- Live load arrangements - Design of Continuous beams and slab.	[9]
Design of Flat Slabs** Flat slab- Types and components – Design of interior and exterior panels.	[9]
Retaining Wall** Retaining wall- Types – Components- Forces and Stability requirements- Design of cantilever and counter fort retaining walls.	[9]
Water Tank** Water tank- Classification- Design of circular and rectangular water tank- resting on ground and underground.	[9]
Miscellaneous** Types of staircases- Design of doglegged staircases – Design of reinforced concrete walls- Design of combined footing – Approximate method of structural analysis.	[9]
Total Hours: 45 + 15 (Tutorial)	**60**

Text Book(s):	
1.	Gambhir.M. L, “Design of Reinforced Concrete Structures”, Prentice Hall of India, Ed Fourth, 2021.
2.	N Krishna Raju and R.N. Pranesh, “Design of Reinforced Concrete Structures”, New Age International Ed First,2018.
Reference(s):	
1.	James K. Wight and James G. MacGregor, "Reinforced Concrete: Mechanics and Design", 8th Edition, Pearson, 2023.
2.	Arthur H. Nilson, David Darwin, and Charles W. Dolan, "Design of Concrete Structures", 16th Edition, McGraw-Hill Education, 2023.
3.	Tony Threlfall, "Structural Design to Eurocode 2 and Eurocode 3: Theory and Worked Examples", ICE Publishing, 2021.
4.	Mosley, W.H., Bungey, J.H., and Hulse, R., "Reinforced Concrete Design: To Eurocode 2", 7th Edition, Palgrave Macmillan, 2019.

*SDG 4 – Quality Education

**SDG 9 – Industry, innovation and infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Design of Continuous Flexural Members**	
1.1	Definition and types of flexural members	1
1.2	Analysis and design considerations for moment redistribution	1
1.3	Case studies and practical examples of live load arrangements in different structures	1
1.4	Analysis and design of continuous beams under different loading conditions	2
1.5	Analysis and design considerations for continuous slabs	2
1.6	Real-world case studies highlighting the application of concepts learned	2
2.0	**Design of Flat Slabs**	
2.1	Overview of flat slabs and their applications in modern construction	1
2.2	Classification of flat slabs based on different parameters	1
2.3	Two-way flat slabs, one-way flat slabs, and their specific characteristics	2
2.4	Behavior and load-carrying capacity of different types of flat slabs	1
2.5	Detailing of flat slab components for efficient load distribution	1
2.6	Structural analysis of interior panels in flat slab systems	1
2.7	Design considerations for interior panels under various loading conditions	1
2.8	Reinforcement detailing for controlling cracking and improving structural performance	1
2.9	Group design projects to apply learned principles in practical scenarios	1
2.10	Sustainable design practices and their application in flat slab construction	1
3.0	**Retaining Wall**	
3.1	Comparison of different types of retaining walls and their applications	2
3.2	Gravity retaining walls, cantilever retaining walls, counterfort retaining walls, and their specific characteristics	2
3.3	Detailed study of the key components of retaining walls	1
3.4	Analysis of the design process for cantilever retaining walls	1
3.5	Analysis of the role of counterforts in improving the stability and load-bearing capacity of retaining walls	1
3.6	Calculation of forces and moments in counterfort retaining walls for optimal design and performance	1
3.7	Introduction to innovative materials and technologies in the construction of retaining walls	1
4.0	**Water Tank**	
4.1	Comparison of different types of water tanks and their specific characteristics	2
4.2	Evaluation of factors influencing the design of water tanks, such as water pressure, seismic loads, and environmental factors	1
4.3	Determination of required reinforcement and detailing for circular water tanks resting on the ground	1
4.4	Design of Circular Water Tanks Underground	1
4.5	Detailing of reinforcement and considerations for construction joints in rectangular water tanks resting on the ground	1
4.6	Seismic design considerations for water tanks	1
4.7	Introduction to innovative technologies in water tank design and construction	1

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4.8	Exploration of future trends and advancements in the field of water tank design	2
5.0	**Miscellaneous**	
5.1	Analysis of different types of staircases, including ordinary and dog-legged	2
5.2	Detailing and reinforcement requirements for ensuring stability and strength of concrete wall	1
5.3	Evaluation of shear, flexural, and axial forces in reinforced concrete walls	1
5.4	Implementation of design considerations for ensuring the stability and performance of combined footings	1
5.5	Understanding the interaction between different structural elements in a building system	1
5.6	Analysis of load transfer mechanisms between staircases, walls, and footings	1
5.7	Presentation and discussion of design projects for constructive feedback	1

Course Designer(s)

1. Dr.K. Vijaya Sundravel - vijayasundravel@ksrct.ac.in

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60 CE 602	Design of Steel Structures	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To understand the basic concepts of limit state design of structural members
- To Design bolted and welded connections
- To Learn the design of compression members & tension members
- To understand the concept of lateral buckling and design various elements like, plate girder and beam- column.
- To understand the Design of purlin, elements of truss and gantry girder.

Pre-requisites

- Strength of Materials, Structural Analysis

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the concepts of bearing & friction type bolted connections and welded connections	Apply
CO2	Illustrate the design of tension members	Apply
CO3	Design the compression members and plate girders.	Apply
CO4	Outline the design concepts of laterally supported and laterally unsupported beams	Apply
CO5	Analyze the different types of truss for the calculated loads	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	2	3	-	-	-	-	-	-	3	-
CO2	3	3	3	3	3	2	-	-	-	-	3	-	3	3
CO3	3	3	3	3	3	3	-	3	-	-	-	3	3	3
CO4	3	3	3	3	3	3	-	-	-	-	-	-	-	3
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	40	-	40
Understand	20	40	40
Apply	-	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 602 - Design of Steel Structures

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	40	60	100

Introduction* Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures –Connections using rivets, welding, bolting – Design of bolted and welded joints – Eccentric connections – Efficiency of joints.	[9]
Tension Members* Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag	[9]
Compression Members* Types of compression members – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns – Gusseted base.	[9]
Beams Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders – Intermediate and bearing stiffeners – Flange and web splices.	[9]
Roof trusses and Industrial Structures* Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing – Design of gantry girder.	[9]
Total Hours (45 + 15):	**60**

Text Book(s):	
1.	Subramaniam.N. “Design of Steel Structures “,(As per IS 800-2007), Oxford University Press, 2021.
2.	Bhavikatti SS, “Design of Steel Structures”, I.K.International Publishing House Pvt. Ltd 2012
Reference(s):	
1.	Duggal S K.,’’Limit State Design of Steel Structures”, Tata McGraw Hill, New Delhi, 2021.
2.	Teaching Resources for Structural Steel Design, INSDAG, Kolkata, 2010.
3.	IS 800 – 2007, “Code of Practice for General Construction in steel”, BIS, New Delhi.
4.	Sairam K.S “Design of Steel Structures”, Pearson Publication, 2013

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Course Contents and Lecture Schedule		
S.No	**Topic**	**No.of Hours**
1.0	**Introduction**	
1.1	Properties of steel and Structural steel sections	1
1.2	Limit State Design Concepts and Loads on Structures	1
1.3	Connections using rivets, welding, bolting	1
1.4	Design of bolted and welded joints-Concepts	1
1.5	Design of bolted and welded joints- Solve the problems	1
1.6	Eccentric connections - Concepts	1
1.7	Eccentric connections- Solve the problems	1
1.8	Efficiency of joints Concepts	1
1.9	Efficiency of joints- Solve the problems	1
2.0	**Tension Members**	
2.1	Types of sections – Net area	1
2.2	Net effective sections for angles and Tee in tension	1
2.3	Design of connections in tension members- Concepts	1
2.4	Design of connections in tension members- Solve the problems	1
2.5	Use of lug angles	1
2.6	Design of tension splice- Concepts	1
2.7	Design of tension splice- Solve the problems	1
2.8	Concept of shear lag- Concepts	1
2.9	Concept of shear lag- Solve the problems	1
3.0	**Compression Members**	
3.1	Types of compression members	1
3.2	Basis of current codal provision for compression member design	1
3.3	Slenderness ratio – Design of single section and compound section compression members- Concepts	1
3.4	Design of single and compound section- Concepts	1
3.5	Design of single and compound section- Solve the problems	1
3.6	Design of laced and battened type columns- Concepts	1
3.7	Design of laced and battened type columns- Solve the problems	1
3.8	Design of column bases- Concepts	1
3.9	Design of column bases- Solve the problems	1
4.0	**Beams**	
4.1	Design of laterally supported and unsupported beams- Concepts	1
4.2	Design of laterally supported and unsupported beams-Solve the problems	1
4.3	Built up beams- Concepts with problems	1
4.4	Beams subjected to uniaxial and biaxial bending- Concepts with problems	1
4.5	Design of plate girders- Concepts with problems	1
4.6	Design of plate girders- Solve the	1
4.7	Intermediate and bearing stiffeners- Concepts with problems	1
4.8	Flange and web splices- Concepts with problems	2
5.0	**Roof Trusses and Industrial Structures**	
5.1	Roof trusses	1
5.2	Roof- Concepts	1
5.3	Side coverings- Concepts	2
5.4	Design of purlin and elements of truss- Concepts	1
5.5	Design of purlin and elements of truss- Solve the problems	1
5.6	Design end bearing- Concepts	1
5.7	Design end bearing- Solve the problems	1
5.8	Design of gantry girder- Concepts	1
5.9	Design of gantry girder- Solve the problems	1

Course Designer(s)

1. Dr. M. Velumani - velumani@ksrct.ac.in

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60 CE 603	Highway, Railway and Airport Engineering	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To gain knowledge about planning, design, construction of highway
- To study the essentials materials used in Highway
- To understand the basic concepts of practices and maintenance of pavement.
- To acquire knowledge of location and planning and design of track of railway.
- To gain knowledge about planning, geometrics of the elements of airport.

Pre-requisites

Basic knowledge of surveying.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the engineering survey and highway geometric design	Remember
CO2	Select the suitable highway materials and pavements.	Understand
CO3	Explain the importance of highway construction and maintenance works	Understand
CO4	Infer the importance of railways, signaling and the layouts of railway station and yards.	Apply
CO5	Describe the airport planning and geometric design	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	1	2	3	1	2	1	1	-	3	2	-
CO2	3	3	2	1	2	3	2	2	3	1	-	3	2	-
CO3	3	2	1	3	1	1	1	2	2	1	-	3	2	-
CO4	3	2	3	2	3	1	1	3	2	1	-	3	2	-
CO5	3	2	3	2	3	1	1	3	1	1	-	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	40
Understand	20	20	40
Apply	20	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 603 Highway, Railway and Airport Engineering								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Highway Planning and Geometric Design History of road development in India - Classification of highways – Engineering surveys for alignment - Highway geometrics and their standards: width of element, camber – Horizontal curves - Super elevation , transition curves – Widening of pavements - Sight distances - Vertical curves – Gradients.	[9]
Highway Materials and Design of Pavements Highway materials, their requirements and testing-Design principles- Pavement components and their role - Factors affecting the design of pavements - Design practice for flexible pavement - CBR and IRC method - Rigid pavements - IRC recommendations.	[9]
Highway Construction Practice and Maintenance Construction practice: Water bound macadam road, Bituminous road and Concrete road – Modern materials and methods of construction - Highway drainage – Special considerations for hill roads – Highway project formulation - Pavement distress in flexible and rigid pavements - Pavement evaluation by deflection measurements – Strengthening of pavements – Highway maintenance – Over lay design by Benkelman Beam method (procedure only) – Plastic Roads.	[9]
Railways Planning and Railway Track Operation Role of Indian Railways in National Development – Private railway coaches in India - Permanent way: components and Functions; Rails: Types, rail fastenings, Rail joints; Gauges, coning of wheels, creeps and kinks; Sleepers: Function, Materials, Density; Ballasts: Function, materials - Working Principle of Signaling, interlocking and Track Circuiting - Layouts of railway station and yards – Rolling stock, Tractive power, Track Resistance, Level Crossing, Underground Railways.	[9]
Airport Planning and Design Components of Airports - Airport Planning – Airport size and site selection - Air traffic potential, Site Selection, Design of Components - Run Way Design - Wind rose and orientation of runway, factors affecting runway length, basic runway length, and corrections to runway length, runway geometrics and runway patterns (configurations). Taxiway Design- Controlling factors, taxiway geometric elements, layout, exit taxiway, location and geometrics. Aprons - locations, size, gate positions, aircraft parking configurations and parking systems, hanger-site selection, planning and design considerations, blast and erosion control. Terminal Area Design-Terminal area elements and requirements, terminal building functions, space requirements, location planning concepts, vehicular parking area.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Khanna, S.K and Justo, C.E.G., “Highway Engineering”, Nem Chand and Brothers, 2019
2.	Arora, S.P and Saxena, S.C., “A text book of Railway Engineering “, Dhanpat Rai and Sons, 2014.
Reference(s):	
1.	Beverly T. Kuhn., “Transportation Engineering: A Practical Approach to Highway Design, Traffic Analysis, and Systems Operations”, Tata Mc Graw Hill, 2019.
2.	Kadiyali, L.R, and Lal,N.B., “Principles and Practice of Highway Engineering”, Khanna Technical Publications, 2014.
3.	Mundrey, J.S., “Railway Track Engineering”, Tata Mcgraw Hill Publishing Co Ltd, 2013
4.	Rangwala, Airport Engineering, Charotar Publishing House, 2007.

***SDG - 4: Quality Education ** SDG - 11: Sustainable Cities and Communities**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Highway Planning and Geometric Design**	
1.1	History of road development in India	1
1.2	Classification of highways	1
1.3	Engineering surveys for alignment	1
1.4	Highway geometrics and their standards	1
1.5	Super elevation and Transition curves	2
1.6	Sight distances and gradients	2
1.7	Horizontal curves and Vertical curves	1
2	**Highway Materials and Design of Pavements**	
2.1	Highway materials, their requirements and testing	1
2.2	Design principles and IRC recommendations	1
2.3	Pavement components and their role	1
2.4	Factors affecting the design of pavements	1
2.5	Design practice for flexible pavement CBR method	2
2.6	Design practice for flexible pavement IRC method	2
2.7	Rigid pavements	1
3	**Highway Construction Practice and Maintenance**	
3.1	Water bound macadam road, Bituminous road and Concrete road	2
3.2	Modern materials and methods of construction	1
3.3	Highway drainage and Its types	1
3.4	Pavement distress in flexible pavements	1
3.5	Pavement distress in rigid pavements	1
3.6	Pavement evaluation by deflection measurements	1
3.7	Strengthening of pavements and Highway maintenance	1
3.8	Over lay design by Benkelman Beam method (procedure only)	1
4	**Railways Planning and Railway Track Operation**	
4.1	Role of Indian Railways in National Development	1
4.2	Private railway coaches in India	1
4.3	Rails: Types, rail fastenings, Rail joints; Gauges, coning of wheels, creeps and kinks	2
4.4	Sleepers and Ballast: Function, Materials, Density	1
4.5	Working Principle of Signaling	1
4.6	Layouts of railway station and yards, Rolling stock, Tractive power	2
4.7	Track Resistance, Level Crossing and Underground Railways.	1
5	**Airport Planning and Design**	
5.1	Components of Airports , Planning, size and site selection	1
5.2	Design of Components and Run Way Design	2
5.3	Factors affecting runway length, basic runway length, and corrections to runway length	1
5.4	Taxiway Design, Controlling factors, taxiway geometric elements	1
5.5	Aprons - locations, size, gate positions, aircraft parking	2
5.6	Terminal Area Design and elements and requirements	1
5.7	Terminal building functions, space requirements, location planning concepts.	1
	Total	**45**

Course Designer

1. Dr.K.Yuvaraj - yuvarajk@ksrct.ac.in

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60 CE 604	Hydrology and Water Resources Engineering	Category	L	T	P	Credit
		PC	3	0	0	3

Objective

- To develop basic understanding about different components of hydrologic cycle
- To learn the concepts of hydrograph and groundwater hydraulics
- To impart knowledge on various irrigationmethods and crop water requirements
- To create understanding about features of various types of dams and reservoirs
- To understand the techniques offlood and drought management

Prerequisite

Fundamentals of Mathematics and knowledge of fluid mechanics

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate various components of hydrologic cycle.	Remember
CO2	Analyze the hydrograph and groundwater hydraulics.	Apply
CO3	Summarize the irrigation methods and crop water requirements.	Understand
CO4	Illustrate the types of reservoirs and dam elements.	Analyse
CO5	Outline the flood and drought management techniques	Understand

Mapping with Programme Outcomes

COS	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	-	1	2	-	-	1	-	-	2	1
CO2	3	2	1	2	-	1	2	-	-	1	-	-	2	2
CO3	3	1	-	-	-	1	-	-	-	1	-	-	1	1
CO4	3	1	-	-	-	1	3	3	3	1	3	-	1	1
CO5	3	2	1	2	1	1	2	-	-	1	-	-	1	2

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem. Examination (Marks)
	1	2	
Remember	08	06	15
Understand	20	20	15
Apply	20	24	50
Analyse	12	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology – Autonomous								R2022
B.E. Civil Engineering								
60 CE 604- Hydrology and Water Resources Engineering								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Precipitation *** Introduction, Hydrologic cycle, Climate and water availability, Water balances, Precipitation: Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method, Infiltration: Factors affecting infiltration, Horton's equation and Green Ampt method.	[09]
Hydrograph and Groundwater Hydraulics* Hyetograph, Runoff: drainage basin characteristics, Hydrograph concepts, assumptions and limitations of unit hydrograph, Derivation of unit hydrograph, S- hydrograph, Flow duration curve, Groundwater: Occurrence, Darcy's law, Well hydraulics, Well losses, Yield, Pumping and recuperation test, Sea water intrusion.	[09]
Irrigation Methods *** Definition, Advantages and Necessity, Methods of Irrigation, Surface Irrigation, Sub surface Irrigation, Micro-Irrigation, Soil moisture and Crop water relationship, Factors governing Consumptive use of water, Principal Indian crops, their season and water requirement– duty, delta, irrigation efficiency.	[09]
Reservoirs and Dams * Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control. Introduction to Dams, types of dams, spillways and ancillary works, Site assessment and selection of type of dam, Information about major dams and reservoirs of India.	[09]
Flood and Drought Management ** Definition and causes of floods and droughts – Design flood, Flood estimation, frequency analysis – flood control measures – drought indices - drought prone area programme – artificial recharge – rain water harvesting****	[09]
Total Hours:	**45**

Text book(s):	
1	Modi PN, "Irrigation Water Resources and Water Power Engineering", Standard Book House, New Delhi, 11th Edition, 2020.
2	Punmia B C, P.B.B. Lal,A.K. Jain and A.K. Jain, "Irrigation and Water Power Engineering", Standard Publishers, 17th Edition, 2021.
Reference(s):	
1	Subramanya K, "Engineering Hydrology", Tata McGraw Hill Pub. Co., New Delhi, 5th Edition, 2020.
2	Raghunath HM, "Hydrology: Principles, Analysis and Design", New Age International,4th Edition, 2022.
3	https://nptel.ac.in/courses/105101214

*SDG – 06:Clean Water and Sanitation , ** SDG – 11:Sustainable Cities and Communities,
***SDG – 13 - Climate Action,, ****SDG – 09 : Industry Innovation and Infrastructure

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1.0	**Precipitation**	
1.1	Hydrology – Definition and Applications Hydrologic cycle	1
1.2	Climate and water Availability, Water Balance Equation	1
1.3	Forms and Types of Precipitation, Measurement of Rainfall	1
1.4	Estimate of missing rainfall data - Problems	1
1.5	Evaporation and its measurement and Pan Coefficient	1
1.6	Evapotranspiration and its measurement – Penman Monteith Method	1
1.7	Infiltration – Definition , Factors affecting infiltration	1
1.8	Horton's Equation and Green Ampt Method	1
1.9	Infiltrometers and Infiltration Indices	1
2.0	**Hydrograph and Groundwater Hydraulics**	
2.1	Hyetograph, Runoff – Classification, Process and Factors affecting, Drainage Basin Characteristics	1
2.2	Hydrograph – Concepts, Assumptions and Limitations of unit Hydrograph	1
2.3	Problems on Unit Hydrograph	1
2.4	S Hydrograph and Flow duration Curve	1
2.5	Groundwater Occurrence : Aquifers and its types, Darcy's Law	1
2.6	Well Hydraulics, Well losses	1
2.7	Yield of an well – Pumping test and Recuperation Test	1
2.8	Problems on Yield of well	1
2.9	Sea Water Intrusion	1
3.0	**Irrigation Methods**	
3.1	Irrigation - Definition, Advantages and Necessity	1
3.2	Methods of Irrigation - Surface Irrigation, Subsurface Irrigation and Micro- Irrigation	1
3.3	Soil moisture and Crop water relationship - Problems	2
3.4	Consumptive use, Factors governing Consumptive use of water	1
3.5	Principal Indian crops, their season and water requirement	1
3.6	Duty and Delta – Relationship and Problems	2
3.7	Irrigation efficiency and its types - Problems	1
4.0	**Reservoirs and Dams**	
4.1	Reservoirs - Types, Investigations and Site selection	1
4.2	Zones of storage, Safe yield	1
4.3	Determination of Reservoir capacity – Mass curve method	2
4.4	Reservoir sedimentation and control	1
4.5	Introduction to Dams, types of dams	1
4.6	Structure of the dam – Spillway and ancillary works	1
4.7	Site assessment and selection of type of dam	1
4.8	Information about major dams and reservoirs of India.	1
5.0	**Flood and Drought Management**	
5.1	Definition and causes of floods and droughts	1
5.2	Design flood – Definition and Terms	1
5.3	Estimation of peak flood and Frequency Analysis - Problems	2
5.4	Flood control measures – Structural and Non structural	2
5.5	Drought indices, drought prone area programme	1
5.6	Artificial recharge – Necessity, Factors Affecting and Methods	1
5.7	Rain water harvesting – Advantages, Ways and Components	1

Course Designer

1. Dr. G.Vennila - vennila @ksrct.ac.in

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60CE6P1	Concrete and Highway Laboratory	Category	L	T	P	Credit
		PC	0	0	3	1.5

Objectives

- To acquire knowledge on properties of fresh concrete
- To know the test on hardened concrete
- To impart knowledge on Non-destructive testing methods
- To understand the test on aggregates
- To learn the various test on Bitumen

Pre-requisites

Courses – Construction Materials & Practices, Concrete Technology, Materials Testing Laboratory & Highway, Railway and Airport Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Experiment the various test on fresh concrete	Apply
CO2	Perform various test for hardened concrete	Apply
CO3	Demonstrate the different non-destructive test available for concrete	Apply
CO4	Comprehend the properties of aggregates	Apply
CO5	Identify the test available for testing bitumen	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	3	2	3	3	2	3	2	2	2	2	3
CO2	3	3	3	3	2	3	3	2	3	2	2	2	2	3
CO3	3	2	3	3	2	2	2	2	3	2	2	2	3	3
CO4	3	2	3	3	2	2	2	2	3	2	2	2	2	3
CO5	3	2	2	3	2	2	2	2	3	2	2	2	2	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	25	12	50		50
Analyse	25	13	50		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 6P1 - Concrete and Highway Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	0	0	3	45	1.5	60	40	100

List of Experiments:

1. Determine the workability of conventional concrete using Slump test*****
2. Determine the workability of conventional concrete using Vee bee consistometer test*****
3. Perform L Box test for self-compacting concrete*****
4. Perform slump flow test for geopolymer concrete*****
5. Perform the compression test on concrete specimens*****
6. Determine the split tensile strength of concrete specimens*****
7. Perform the flexural test on concrete specimens*****
8. Perform the nondestructive test on concrete*****
9. Determine the aggregate impact value of given aggregates*****
10. Determine the abrasion value of given aggregate sample*****
11. Determine the flash and fire point of a given bituminous material*****
12. Determine the softening point of bitumen*****

Lab Manual

1.	"Concrete and Highway Lab Manual", Department of Civil Engineering, KSRCT.

*SDG 4 – Quality Education

**SDG 9 – Industry, innovation and infrastructure

Course Designer(s)

1. Mr. K. Angu Senthil - angusenthil@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE 6P2	Computer Aided Analysis and Design Laboratory	Category	L	T	P	Credit
		PC	0	0	3	1.5

Objectives

- To learn software packages for performing analysis of structures
- To learn software packages for performing design of structures
- To analyse and design concrete structures using software packages
- To analyse and design steel structures using software packages
- To know the design concepts of different structural elements by using excel sheet.

Pre-requisites

- Structural Analysis Fundamentals
- Understanding of Load Analysis
- Reinforced Concrete Design
- Understanding of Building Codes and Standards

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Practice software packages for analysis and design	Apply
CO2	Learn to analyse a beam for various load combinations	Analyse
CO3	Analyse and design of 2D RCC and Steel structures	Analyse
CO4	Perform analysis and design of 3D RCC and steel structures	Analyse
CO5	Prepare excel sheet for design of structural elements	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	1	-	-	-	-	-	-	2	3
CO2	3	3	3	3	3	-	-	-	-	-	-	-	2	3
CO3	3	3	3	3	3	2	-	-	-	-	-	-	3	3
CO4	3	3	3	3	3	2	-	-	-	-	-	-	2	3
CO5	3	3	3	3	1	1	-	-	-	-	-	-	2	3
3 - Strong; 2 - Medium; 1 - Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	25	12	50		50
Analyse	25	13	50		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

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TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 6P1 - Computer Aided Analysis and Design Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	0	0	3	45	1.5	60	40	100

List of Experiments:

1. Analysis of Simply Supported Beam*
2. Analysis of Continuous Beam*
3. Analysis and Design of 2D R.C. Frame**
4. Analysis and Design of 3D R.C. Frame**
5. Analysis and Design of 2D Truss**
6. Analysis and Design of 3D Steel Frame**
7. Design of Beam using Excel Sheet**
8. Design of Column using Excel Sheet**
9. Design of Slab using Excel Sheet**
10. Design of Footing using Excel Sheet**

Lab Manual

1.	"Computer Aided Analysis and Design Lab Manual", Department of Civil Engineering, KSRCT.

*SDG 4 – Quality Education

**SDG 9 – Industry, innovation and infrastructure

Course Designer(s)

1. Dr.K.Vijaya Sundravel – vijayasundravel@ksrct.ac.in

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60 CG 0P5	Comprehension Test*	Category	L	T	P	C	CA	ES	Total
Semester VI		CG	0	0	2	1*	100	-	100

Objectives

- To evaluate the knowledge gained in core courses relevant to the programme of study.
- To assess the technical skill in solving complex engineering problems.

Prerequisite

Fundamental knowledge in all core subjects.

Course Outcomes

Onthesuccessful completion ofthecourse, studentswill beable to

CO1	Infer knowledge in their respective programme domain.	Apply
CO2	Attend interviewsfor career progression	Apply
CO3	Exhibit professional standardsto solve engineering problems	Apply
CO3	Promote holistic approach to problem solving	Apply
CO5	Examine the competency of graduates in specific programme domain	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	2					1	2	2	3		
CO2	3	3	2	2					1	2	2	3		
CO3	3	3	2	2					1	2	2	3		
CO4	3	3	2	2					1	2	2	3		
CO5	3	3	2	2					1	2	2	3		
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

The overall knowledge of the candidate in various courses he/she studied shall be evaluated with multiple choice questions.

***SDG:4- Quality Education**

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2023-2024 onwards)

SEVENTH SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 HS 002	Engineering Economics and Financial Accounting	2	40	60	100	45	100
2	60 CE 701	Prestressed Concrete	2	40	60	100	45	100
3	60 CE 702	Construction Planning and Management	2	40	60	100	45	100
4	60 CE E*	Professional Elective III	2	40	60	100	45	100
5	60 CE E*	Professional Elective IV	2	40	60	100	45	100
6	60 AC 001	Research Skill Development	2	40	60	100	45	100
7	60 AB 00*	NCC\NSS\NSO\YRC\RRC \Yoga\Fine Arts	-	100	-	100	-	-
PRACTICAL								
8	60 CE 7P1	Estimation and Quantity Surveying Laboratory	3	60	40	100	45	100
9	60 CE 7P2	Project Work - I	3	100	-	100	-	100
10	60 CG 0P6	Internship	3	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 HS 002	Engineering Economics and Financial Accounting	Category	L	T	P	Credit
		HS	3	0	0	3

Objectives

- To know about the economic principles underlying demand, supply, and market structure
- To understand the concept related to types of business organization and types of banking
- To know about concepts in financial accounting and capital budgeting
- To understand the different methods of pricing and appraisal of projects
- To know the application of break-even analysis in engineering projects

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of economics, demand, supply, and market structure	Understand
CO2	Understand the forms of business organization and functions of commercial and central bank	Understand
CO3	Understand the basis of financial accounting and capital budgeting techniques	Understand
CO4	Apply different types of pricing strategies and comprehensive project feasibility in diverse business	Apply
CO5	Apply break even analysis in engineering projects and business	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	2	3	-	3	-	-	-	3	2	3	3
CO2	-	-	-	-	-	2	2	-	-	-	3	3	-	3
CO3	-	-	2	3	-	-	-	-	-	-	3	-	2	2
CO4	2	-	-	3	-	2	-	-	-	-	-	3	3	3
CO5	3	3	3	3	-	-	2	2	-	-	2	2	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	25	25	35
Understand	25	25	45
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to CIVIL, EEE, ECE, CSE, IT, AI&DS, CSE(AIML), EE(VLSI D&T), BT, FT

60 HS 002 – Engineering Economics and Financial Accounting

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Basic Economics Definition of Economics – Nature and Scope of Economics, Basic Concepts of Economics, Factors of Production - Definition of Demand – Law of Demand, Exception to Law of Demand, Factors Affecting Demand, Elasticity of Demand, Demand Forecasting – Definition of Supply – Factors Affecting Supply, Elasticity of Supply – Market Structure – Perfect Competition, Imperfect Competition – Monopoly, Duopoly, Oligopoly, and Bilateral Monopoly.	[9]
Organization and Business Financing* Forms of Business – Sole Proprietorship, Partnership, Joint Stock Company, Cooperative Organization, State Enterprise - Mixed Economy - Money and Banking – Kinds of Banking, Functions of Commercial Banks and Central Bank – Definition of Monetary Policy and its Types – Types of financing - Short Term Borrowing, Long Term Borrowing - Internal Generation of Funds – External Commercial Borrowings.	[9]
Financial Accounting and Capital Budgeting The Balance Sheet and Related Concepts – The Profit and Loss Statement and Related Concepts – Financial Ratio Analysis – Definition of Working Capital – Types, Factors – Definition of Capital Budgeting - Techniques – Average Rate of Return, Payback Period, Net Present Value, Profitability Index Method and Internal Rate of Return.	[9]
Cost Analysis Types of Costing – Traditional Costing Approach - Activity Based Costing - Fixed Cost – Variable Cost – Marginal Cost – Cost Output Relationship in the Short Run and in Long Run – Pricing Practice – Full Cost Pricing – Marginal Cost Pricing – Going Rate Pricing – Bid Pricing – Pricing for a Rate of Return – Project Appraisal - Appraisal process, - Cost Benefit Analysis – Feasibility Reports –– Technical Feasibility, Economic Feasibility, Financial Feasibility, Managerial Feasibility, Operational Feasibility.	[9]
Break Even Analysis Basic Assumptions –Break-Even Chart – Profit Zone in Break-Even Chart, Loss Zone in Break-Even Chart, Angle of Incidence – Managerial Uses of Break-Even Analysis, Applications of Break-Even Analysis in Engineering Projects.	[9]
Total Hours:	**45**

Text Book(s):

1. Khan M.Y., Jain P.K., " Financial Management", 8rd Edition, McGraw Hill Education, 2018.
2. Maheshwari K.L., Varshney R.L., "Managerial economics", 22nd Edition, S Chand and Co., New Delhi, 2018.

Reference(s):

1. Samuelson P.A., " Economics - An Introductory", 16th Edition, New Age Publications, New Delhi, 2019.
2. Barthwal R.R., " Industrial Economics - An Introductory", 4th Edition, New Age Publications, New Delhi, 2021.
3. Bhattacharyya S. K., John Deardon, "Accounting for Management Text and Cases", 3rd Edition, S Chand Publication, 2018.

*SDG 9 – Increase Industry Innovation and Infrastructure

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Basic Economics**	
1.1	Definition of economics – Nature and Scope of Economics	1
1.2	Basic Concepts of Economics, Factors of Production	1
1.3	Definition of Demand – Law of Demand	1
1.4	Exception to Law of Demand	1
1.5	Factors Affecting Demand, Elasticity of Demand	1
1.6	Demand Forecasting	1
1.7	Definition of Supply – Factors Affecting Supply, Elasticity of Supply	1
1.8	Market Structure – Perfect Competition, Imperfect Competition	1
1.9	Monopoly, Duopoly, Oligopoly, and Bilateral Monopoly	1
2.0	**Organization and Business Financing**	
2.1	Forms of Business – Sole Proprietorship, Partnership	1
2.2	Joint Stock Company, Cooperative Organization, State Enterprise	1
2.3	Mixed Economy - Money and banking	1
2.4	Kinds of Banking	1
2.5	Functions of Commercial Banks and Central Bank	1
2.6	Definition of Monetary Policy and its Types	1
2.7	Types of Financing	1
2.8	Short Term Borrowing, Long Term Borrowing	1
2.9	Internal Generation of Funds, External Commercial Borrowings	1
3.0	**Financial Accounting and Capital Budgeting**	
3.1	The Balance Sheet and Related Concepts	1
3.2	The Profit and Loss Statement and Related Concepts	1
3.3	Financial Ratio Analysis	2
3.4	Definition of Working Capital – Types, Factors	2
3.5	Definition of Capital Budgeting - Techniques	1
3.6	Average Rate of Return, Payback Period	1
3.7	Net Present Value, Profitability Index Method and Internal Rate of Return	1
4.0	**Cost Analysis**	
4.1	Types of Costing - Traditional Costing Approach - Activity Based Costing	1
4.2	Fixed Cost – Variable Cost – Marginal Cost	1
4.3	Cost Output Relationship in the Short Run and in Long Run	1
4.4	Pricing Practice – Full Cost Pricing	1
4.5	Marginal Cost Pricing, Going Rate Pricing	1
4.6	Bid Pricing, Pricing for a Rate of Return	1
4.7	Project Appraisal - Appraisal Process - Cost Benefit Analysis	1
4.8	Feasibility Reports -— Technical Feasibility, Economic Feasibility	1
4.9	Financial Feasibility, Managerial Feasibility, Operational Feasibility.	1
5.0	**Break Even Analysis**	
5.1	Basic Assumptions – Break-Even Chart	2
5.2	Profit Zone in Break-Even Chart, Loss Zone in Break-Even Chart	2
5.3	Angle of Incidence	1
5.4	Managerial Uses of Break-Even Analysis	2
5.5	Applications of Break-Even Analysis in Engineering Projects	2

Course Designer(s)

1. Mr.V.S.Vijayachander - vijayachander@ksrct.ac.in
2. Dr.E.kalaivani - kalaivanie@ksrct.ac.in

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60 CE 701	Prestressed Concrete	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To gain knowledge on types and methods of prestressing and advantages of prestressing concrete
- To know the design concepts for prestressed concrete elements using IS: 1343 codal provisions
- To study on design of continuous member and other special structural elements like prestressed sleepers, prestressed concrete pipes, prestressed poles
- To understand about flexural members and its design concepts
- To know about special elements in concrete structures and its design philosophies

Pre-requisites

- Concrete Technology

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Evaluate the internal forces and deflection in prestressed concrete.	Apply
CO2	Design the pre-stressing layout and understand the behavior of pre-stressed concreteelements under practical loading conditions	Understand
CO3	Practice the Analysis and design of continuous beams and extend the knowledge onconcept of linear transformation	Analyse
CO4	Outline the design of tension and compression members in prestressing	Remember
CO5	Illustrates the design of composite members and partial prestressing	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	3	-	-	-	-	-	-	3	-
CO2	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	3	3	3	-	3	-	-	-	-	1	3
CO4	3	2	3	3	-	2	2	1	-	-	-	-	-	-
CO5	3	2	-	2	3	2	-	-	-	-	-	2	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	20	20	30
Analyse	20	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 701 – Prestressed Concrete

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	1	0	60	4	40	60	100

Principles of Prestressing* Introduction - Materials for prestressed concrete - Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons - Introduction on Composite Prestressed member.	[9]
Losses and Deflection of Prestressed Concrete Members** Analysis method losses - Elastic shortening – Friction – Anchorage slip – Force variation diagram – Creep of concrete – Shrinkage of concrete – Relaxation of steel - Effect of tendon profile on deflections – Factors influencing deflections – Short term deflection on uncracked members – Predictions of long-term deflections.	[9]
Design of Flexural Members** Behaviour of flexural members - Determination of ultimate flexural strength - Codal provisions - Design of flexural members - Design for shear based on IS 1343 code - Determination of anchorage zone stresses in post - Tensioned beams by Magnel's method and IS 1343 code method - Design of anchorage zone reinforcement.	[9]
Design of Continuous Beams** Analysis and design of continuous beams - Methods of achieving continuity - Concept of linear transformations - Concordant cable profile and cap cables.	[9]
Design of Special Elements** Circular Prestressing - Design of prestressed concrete tanks - Types and design: Prestressed concrete pipes, Poles and sleepers.	[9]
Total Hours: (Lecture - 45; Tutorial - 15)	**60**

Text Book(s):	
1.	Krishna Raju N, "Prestressed Concrete", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2018.
2.	Lin T.Y & Burns, "Design of Prestressed Concrete Structures" John Wiley & Sons, 2010.
Reference(s):	
1.	Devadas Menon & Sengupta A K, "Prestressed Concrete Structure (Web Course)", NPTEL CourseNotes, 2008.
2.	Krishna Raju N, "Problems & Solutions – Prestressed Concrete", CBS Publishers & Distributors,New Delhi, 2015.
3.	Rajagopalan.N "Prestressed Concrete", Narosa Publishing House, 2005.
4.	IS1343:2012, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi, 2012.

* SDG- 4: Quality Education

** SDG:9: Industry, innovation and infrastructure

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Principles of Prestressing**	
1.1	Introduction	1
1.2	Materials for prestressed concrete	1
1.3	Systems and methods of prestressing	1
1.4	Analysis of sections	1
1.5	Stress concept	1
1.6	Strength concept	1
1.7	Load balancing concept	1
1.8	Effect of loading on the tensile stresses in tendons	1
1.9	Introduction on Composite Prestressed member.	1
2.0	**Losses and Deflection of Prestressed Concrete Members**	
2.1	Analysis method losses	1
2.2	Elastic shortening	1
2.3	Friction – Anchorage slip	1
2.4	Force variation Diagram	1
2.5	Creep of concrete – Shrinkage of concrete	1
2.6	Relaxation of steel. Effect of tendon profile on deflections	1
2.7	Factors influencing deflections	1
2.8	Short term deflection uncracked members	1
2.9	Predictions of long-term deflections.	1
3.0	**Design of Flexural Members**	
3.1	Behavior of flexural members, determination of ultimate flexural strength	2
3.2	Codal provisions	1
3.3	Design of flexuralmembers. Design for shear based on IS 1343 code	2
3.4	Determination of anchorage zone stresses in post	2
3.5	Tensioned beams by Magnel's method and IS 1343 code method-.	1
3.6	Design of anchorage zone reinforcement	1
4.0	**Design of Continuous Beams**	
4.1	Analysis and design of continuous beams	2
4.2	Methods of achieving continuity	2
4.3	Concept of linear transformations	2
4.4	Concept of concordant cable profile.	2
4.5	Concept of cap cables	1
5.0	**Design of Special Elements**	
5.1	Circular Prestressing	2
5.2	Design of prestressed concrete tanks	2
5.3	Types and design of prestressed concrete pipes	2
5.4	Types and design of Poles	2
5.5	Types and design of sleepers	1

Course Designer(s)

1. Dr. R. Jagadeesan – jagadeesan@ksrct.ac.in

R4/ w.e.f. 01.06.2024
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TIRUCHENGODE - 637 215

60 CE 702	Construction Planning and Management	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To impart knowledge on construction planning
- To make the students understand about the scheduling procedures
- To know the cost control and monitoring in construction industry
- To understand the quality and safety in construction
- To gain knowledge on project information system.

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Study about the Choice of Technology and Resource Requirements for Work Activities.	Remember
CO2	Recognize the construction planning schedules, crashing and time cost trade-offs.	Analyse
CO3	Examine the cost of the project, control the cost of the project by creating cash flows and budgeting.	Understand
CO4	Recall the quality control and safety in construction.	Remember
CO5	Acquire knowledge about project information system.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	2	-	3	-	-	3	3	-	-	3	-
CO2	3	2	3	3	3	3	-	-	-	-	-	-	3	-
CO3	3	2	3	3	-	3	-	-	3	2	-	-	3	-
CO4	3	-	-	-	-	2	-	-	-	-	-	-	3	-
CO5	3	-	-	-	-	-	-	-	2	3	-	2	3	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	40	20	30
Understand	--	40	60
Apply	-	-	-
Analyse	20	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE 702 - Construction Planning and Management

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Construction Planning* Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems	[9]
Scheduling Procedures and Techniques** Introduction – preparation of Network – Network analysis – Activity and Event oriented network - Construction Schedules – Critical Path Method and PERT – Scheduling Calculations – Float – Presenting Project Schedules – Use of Advanced Scheduling Techniques – Scheduling with Uncertain Durations – Crashing and Time/Cost Tradeoffs – Application of software in project management	[9]
Cost Control, Monitoring and Accounting* The Cost Control Problem – The Project Budget – Forecasting for Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows – Schedule Control – Schedule and Budget Updates – Relating Cost and Schedule Information.	[9]
Quality Control and Safety during Construction* Introduction to quality; Importance of quality; Quality transition – quality control and inspection, quality assurance, total quality management - Planning and control of quality during design of structures - Quality and Safety Concerns in Construction – Organizing for Quality and Safety –- Concept of Safety in Construction Industry, Importance of Construction Safety, Safety Benefits to Employers, Employees and Customers, Construction Safety Problems, approaches to improve Construction Safety	[9]
Organization and use of Project Information* Types of Project Information – Accuracy and Use of Information – Computerized Organization and Use of Information – Organizing Information in Databases – Relational Model of Databases – Other Conceptual Models of Databases – Centralized Database Management Systems – Databases and Applications Programs – Information Transfer and Flow.	[9]
Total Hours:	**45**
Text Book(s):	

1.	Chitkara K. K., “Construction Project Management Planning”, Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 2019.
2.	Moder J, Phillips C., and Davis, “Project Management with CPM”, PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 2018.
Reference(s):	
1.	Raina C. M., “Construction Management and Practice.” Tata McGraw-Hill, 2018.
2.	Srinath L. S., “Pert and CPM Principles and Applications “, Affiliated East West Press, 2019.
3.	Halpin D. W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 2019.
4.	Willis E. M., "Scheduling Construction Projects", John Wiley & Sons, 2019.

* SDG: 4 Quality Education

** SDG: 9 Industry, Innovation and infrastructure

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Construction Planning**	
1.1	Basic Concepts in the Development of Construction Plans	1
1.2	Choice of Technology and Construction Method	2
1.3	Work Tasks	1
1.4	Defining Precedence Relationships among Activities	2
1.5	Estimating Activity Durations	1
1.6	Estimating Resource Requirements for Work Activities	1
1.7	Coding Systems	1
2.0	**Scheduling Procedures and Techniques**	
2.1	Introduction about scheduling procedures	1
2.2	Network analysis	1
2.3	Activity and Event oriented network	1
2.4	Critical Path Method and PERT	2
2.5	Scheduling Calculations	1
2.6	Use of Advanced Scheduling Techniques	1
2.7	Crashing and Time/Cost Trade-offs	1
2.8	Application of software in project management.	1
3.0	**Cost Control and Monitoring and Accounting**	
3.1	Introduction to cost control and Accounting	1
3.2	Project Budget	1
3.3	Forecasting for Activity Cost Control	1
3.4	Financial Accounting Systems and Cost Accounts	2
3.5	Control of Project Cash Flows	1
3.6	Schedule Control	1
3.7	Schedule and Budget Updates	1
3.8	Relating Cost and Schedule Information	1
4.0	**Quality Control and Safety during Construction**	
4.1	Introduction to quality and Importance of quality	1
4.2	Quality control, inspection and assurance	2
4.3	Planning and control of quality during design of structures	1
4.4	Quality and Safety Concerns in Construction	1
4.5	Concept of Safety in Construction Industry	1
4.6	Importance of Construction Safety	1
4.7	Safety Benefits to Employers, Employees and Customers	1
4.8	Approaches to improve Construction Safety.	1
5.0	**Organization and use of Project Information**	
5.1	Types of Project Information	1
5.2	Accuracy and Use of Information	1
5.3	Computerized Organization and Use of Information	1
5.4	Organizing Information in Databases	2
5.5	Relational Model of Databases	1
5.6	Other Conceptual Models of Databases	1
5.7	Centralized Database Management Systems	1
5.8	Databases and Applications Programs	1
5.9	Information Transfer	1

Course Designer(s)

1. Dr.S. Ramesh - rameshs@ksrct.ac.in

R4/ w.e.f. 01.06.2024
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60 AC 001	Research Skill Development	Category	L	T	P	Credit
		AC	1	0	0	0

Objectives

- To identify research problems, formulate hypotheses, collect data and test hypotheses
- To prepare and submit quality manuscripts and understand peer review process
- To utilize software tools for effective manuscript preparation and visualization of research data
- To familiarize different journal metrics and author-level quality indicators
- To protect creative works, inventions, and branding elements using IPR

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Develop structured scientific approach to plan and execute research work	Apply
CO2	Comply with the journal requirements to publish research findings effectively	Understand
CO3	Apply various software tools during the manuscript preparation	Apply
CO4	Select suitable journals to publish the work using different publication metrics	Analyse
CO5	Apply the appropriate form of IP protection to a specific invention or creation	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	2	2	-	2	2	3	3	3	-	3	2	-
CO2	-	-	-	-	-	-	-	3	3	3	-	3	2	-
CO3	-	-	-	-	3	-	-	3	3	3	-	3	2	-
CO4	-	-	-	-	-	-	-	3	3	-	-	3	2	-
CO5	-	-	2	2	-	-	-	3	3	3	-	3	2	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

One review at end of the semester

Parameters	Weightage (Marks)
Research Problem Identification (Research gap, SDG, Objectives)	10
Literature Review preparation (Clarity, Number and quality of sources)	20
Patent Draft/ Manuscript Preparation (Structure, Content)	20
Use of software tools (Plagiarism, Reference Management, etc.,)	10
Journal Identification (Aim & scope of the journal, journal metrics)	10
Presentation & Viva voce	30
Total	**100**

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Cvil Engineering

60 AC 001 – Research Skill Development

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	1	0	0	15	0	100	-	100

Research - Scientific Approach* Types of Research - Identification and Clarification of the problem – Formulating hypothesis, Selection of sample and tools of data collection - Testing the hypothesis - Conclusion	[3]
Manuscript Preparation* Structure of a manuscript - Types of manuscript - Graphical abstract - Highlights - Literature Review - Citation - Reference style - Plagiarism – Journal selection - Peer review process	[3]
Research Toolkit* Software Tools for Writing enhancement - Literature review - Reference management - Data analysis and visualization - Drawing - Plagiarism	[3]
Research Publication Metrics* Journal Index: Scopus - Web of Science - SCI - UGC Care - Q Journal; Journal Metrics: Impact Factor, Cite Score; Quality Indicators: h-index - i-10 index - citations	[3]
Intellectual Property Rights* Patents - Industrial Designs - Copyright - Trademarks - Geographical Indications - Trade Secrets	[3]
Total Hours:	**15**

Reference(s):

1.	Kothari, C.R. and Gaurav Garg, “Research Methodology: Methods and Techniques”, New Age International Publishers, 2023
2.	Chawla H S., “Introduction to Intellectual Property Rights”, CBS Publishers and Distributors Private Limited, 2019

*SDG 9 – Industry Innovation and Infrastructure

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Research - Scientific Approach**	
1.1	Types of Research - Identification and Clarification of the problem - Formulating hypothesis	2
1.2	Selection of sample and tools of data collection - Testing the hypothesis - Conclusion	1
2.0	**Manuscript Preparation**	
2.1	Structure of a manuscript - Types of manuscript - Graphical abstract - Highlights	1
2.2	Literature Review	1
2.3	Citation - Reference style – Plagiarism, Journal selection - Peer review process	1
3.0	**Research Toolkit**	
3.1	Software Tools for Writing enhancement	1
3.2	Literature review, Reference management	1
3.3	Data analysis and visualization – Drawing, Plagiarism	1
4.0	**Research Publication Metrics**	
4.1	Journal Index: Scopus - Web of Science - SCI - UGC Care - Q Journal;	1
4.2	Journal Metrics: Impact Factor, Cite score	1
4.3	Quality Indicators: h-index - i-10 index - citations	1
5.0	**Intellectual Property Rights**	
5.1	Patents	1
5.2	Industrial Designs - Copyright	1
5.3	Trademarks - Geographical Indications - Trade Secrets	1

Course Designer

1. Dr.M.Kathirselvam - mkathirselvam@ksrct.ac.in

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60 CE 7P1	Estimation and Quantity Surveying Laboratory	Category	L	T	P	Credit
		PC	1	0	2	2

Objectives

- To understand the basic units, concepts, techniques and applications of Estimation and Costing
- To gain knowledge on specifications and various item of work in building construction
- To analyse the rates for various items of work and to prepare an abstract estimate
- To study about how to prepare a detailed estimate for a residential building and calculate the quantities for various items of works involved in building, water supply and sanitary works
- To investigate the software application in preparing estimation and quantity surveying

Pre-requisites

- Fundamentals knowledge in Mathematics and basic properties of construction materials

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Assess building elements by length, area and volume in accordance with the principles of quantity surveying.	Understand
CO2	Select the appropriate method of building estimate.	Understand
CO3	Demonstrate the different types of specifications which specifies description and requirements.	Apply
CO4	Categories the schedule of rates for different works and detailed estimate.	Analyse
CO5	Prepare a technical report in such a manner that the report gives an idea about the entire work and the results arrived from software and manual calculation.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	1	1	-	3	-	-	-	-	-	-	2	3
CO2	2	1	-	-	-	-	-	1	-	-	-	-	-	-
CO3	1	3	3	3	1	-	2	-	-	-	-	-	1	-
CO4	-	1	2	1	-	-	-	1	-	-	-	-	-	-
CO5	-	1	-	-	2	1	-	-	-	-	-	-	2	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	20	20	20	-	20
Understand	20	20	20	-	20
Apply	30	20	30		30
Analyse	30	40	30		30
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	100	100	100	-	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 7P1 – Estimation and Quantity Surveying Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	1	0	2	45	2	60	40	100

Introduction and Methods of Building Estimate*

General – Units of measurements – Estimation: Requirement of estimation, Types of estimate – Simple problems on building: Steps, Boundary walls using long wall, short wall and center line method – Lump sum items.

Specifications*

General specification – Detailed specifications for various items of works: Earth work excavation, Cement concrete, Damp proof course, Formwork, Brick masonry, Flooring, False ceiling, Plastering, Painting and wood work, Sanitary and water supply, Interior, Electrical item.

Rate Analysis**

Rate analysis: Purpose, Requirement – Schedule of rates and data book – Procedure of rate analysis – Requirement of labour and materials for different works – Obtaining rates for various items of work: Cement mortar, Cement concrete, Plastering, Flooring, Weathering course, Pointing and Painting.

Detailed Estimation**

Estimation of activities: Earth work, Plain cement concrete, Masonry work, Reinforced cement concrete, Bar bending, Scaffolding, Centering, Concreting, Stair case, Plastering, Wall, Ceiling, Flooring, Woodwork, Wall protective works, Paints, Electrical work, Water supply and Sanitary works – Principles of report preparation.

Software Application**

Introduction to software application in different type of estimates – Calculation of different quantities by Excel spread sheet – Calculation of different quantities by using estimation software – Application of estimator software.

List of Experiments:

1. Estimate the quantity of a single storey building.
2. Estimate the quantity of a double storey building.
3. Estimate of septic tank for 25 user.
4. Analysis the rate for 12 mm thick plaster with Cement Mortar 1:6. Assume plastering area was 100 sq.m.

Textbook(s):

1.	Birdie. G. S., “Estimating and Costing”, Dhanpat Rai Books Publisher, New Delhi, 2014.
2.	Dutta, B.N., “Estimating and Costing in Civil Engineering”, UBS Publishers & Distributors Pvt.Ltd, New Delhi, 2010.

*SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

1. Dr.K. Vijaya Sundravel – vijayasundravel@ksrct.ac.in

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60 CE 7P2	Project Work - I	Category	L	T	P	Credit
		CG	0	0	4	2

Objectives

- To develop the ability to identify and solve a specific problem in the field of Civil Engineering
- To search for a related field in which the members will conduct their project.
- To acquire collaborative skills through working in a team to achieve common goals.
- To develop the skills to communicate effectively and present ideas clearly and coherently to a specific audience, both in writing and verbally.
- To identify the appropriate project, acquire knowledge in that area, and complete preliminary work for phase II of the project.

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Review the literature and data collection for available resources.	Apply
CO2	Select the title and collect relevant information related with selected title	Apply
CO3	Retrieve literature based on the survey and initiate partial system design.	Apply
CO4	Work as an individual or in a group in development of technical projects.	Analyse
CO5	Prepare and present the project report	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	-	3	-	3	3	-	-	2	-	3
CO2	3	2	2	-	-	3	-	3	3	-	-	2	-	3
CO3	3	2	3	-	-	-	-	3	3	-	-	2	-	2
CO4	3	2	3	-	-	3	-	3	3	-	-	2	-	2
CO5	3	2	3	-	-	3	-	3	3	-	-	2	-	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment (Marks)			Total Assessment (100)	End Sem Examination (Marks)
	Review I	Review II	Review III		
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	30	30	40	100	-
Analyse	-	--	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	30	30	40	100	-

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 7P2 – Project Work - I								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	0	0	4	60	2	100	--	100

EVALUATION PROCEDURE

Review I (R1)			**Review II (R2)**		**Review III (R3)**			**Total (R1+R2+ R3)**	**Internal**
Literature Survey	Topic Identi-fication & Justification	Work Plan	Approach	Conclusion	Demo-Existing System	Presen-tation	Report	Total	
10	10	10	20	20	10	10	10	100	100

Total : 100 mark

Course Designer(s)

1. Dr.S.Ramesh – rameshs@ksrct.ac.in

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2023-2024 onwards)

EIGHTH SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CE E*	Professional Elective V	2	40	60	100	45	100
PRACTICAL								
2	60 CE 8P1	Project Work - II	3	60	40	100	45	100
3	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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60 CE 8P1	Project Work - II	Category	L	T	P	Credit
		CG	0	0	16	8

Objectives

- To develop the ability to identify and solve a specific problem in the field of Civil Engineering
- To develop the management skills to achieve the project goal by working as a team.
- To communicate and collaboratively work in peer groups to develop optimized solutions for problems in Civil Engineering Field
- To demonstrate the technical skills acquired to provide feasible solutions for real life problems.
- To develop the skills to communicate effectively and present ideas clearly and coherently to a specific audience, both in writing and verbally.

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply design techniques in the project and experience their outcome in their own project scenario.	Apply
CO2	Review and evaluate the available literature on the chosen problem	Apply
CO3	Formulate the methodology to solve the identified problem	Apply
CO4	Apply the principles, tools and techniques to solve the problem	Analyse
CO5	Prepare and present project report	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	-	3	-	3	3	-	-	2	-	3
CO2	3	2	2	-	-	3	-	3	3	-	-	2	-	3
CO3	3	2	3	-	-	-	-	3	3	-	-	2	-	2
CO4	3	2	3	-	-	3	-	3	3	-	-	2	-	2
CO5	3	2	3	-	-	3	-	3	3	-	-	2	-	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment (Marks)			Internal Assessment (60 Marks)	End Sem Examination (40 Marks)
	Review I	Review II	Review III		
Remember	-	-		-	-
Understand	-	-		-	-
Apply	30	30	40	-	-
Analyse	-	--		-	-
Evaluate	-	-		-	-
Create	-	-		-	-
Total	30	30	40	60	40

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE 8P1 – Project Work – II								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	0	0	16	60	8	60	40	100

EVALUATION PROCEDURE

nal Assessment: 60 Marks + End Semester Examination: 40 Marks)

Internal Assessment (60)					**End Semester (40)**
Items	**Review 1**	**Review 2**	**Review 3**	**Publication***	
Marks	**5**	**10**	**15**	**30**	**40**
	Total internal marks 60				

Note:
***Publication marks shall be awarded based on the following criteria**

1. SCI / WoS Journal = 30 Marks
2. Scopus Indexed Journal / Scopus Indexed Book Chapters/ IEEE Conference = 27 Marks
3. Journals listed in UGC Care = 25 Marks

external examiner appointed by the COE (Autonomous)

Total : 100 marks

Course Designer(s)

1. Dr.S.Ramesh – rameshs@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE E11	Repair and Rehabilitation of Structures	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To impart broad knowledge in the area of repair and rehabilitation of structures
- To gain knowledge on quality of concrete and durability aspects
- To understand the properties of repair materials
- To obtain the knowledge about corrosion of structures
- To know the causes of deterioration and assessment of distressed structures

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Develop the Knowledge about assessment procedure for evaluating a damaged structure	Remember
CO2	Demonstrate the various types of distress in concrete structures	Understand
CO3	Identify the best Materials and Techniques for Repair.	Remember
CO4	Describe corrosion protection techniques and forensic engineering	Remember
CO5	Summarise the demolition techniques carried out for a structure.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	2	-	3	-	-	3	3	-	-	-	3
CO2	3	-			3	3	-	2	-	-	-	-	-	-
CO3	3	3	3	3	-	3	-	-	3	2	-	-	-	-
CO4	3	2	3	3	-	2	-	-	-	-	-	-	2	-
CO5	3	3	-	-	-	-	-	-	2	3	-	2	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	40	40	50
Understand	20	20	50
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E11 - Repair and Rehabilitation of Structures

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Maintenance and Repair Strategies* Definition - Maintenance, Repair, Rehabilitation, Retrofitting. Need for rehabilitation, Importance of maintenance, Facts of maintenance, Various aspects of inspection, Assessment procedure for evaluating a damaged structures, Causes and deterioration of concrete.	[9]
Serviceability and Durability of Concrete Quality assurance for concrete construction, Need for quality assurance, Concrete properties-Strength, Permeability, Thermal Properties, Cracks - Types, Causes and Effects due to cracking, Effect duo to climate, Temperature, Corrosion, Chemicals, Effects of cover thickness Design and construction Errors.	[9]
Materials and Testing Techniques Criteria for material selection - Methodology of selection. Special concretes - Polymer concrete, Sulphur infiltrated concrete, Fiber reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self-compacting concrete. Special cement - Expansive cement and Ferro cement. Destructive and Non-destructive testing techniques.	[9]
Techniques for Repair and Forensic Engineering** Crack repair techniques – Stitching, Routing and sealing, Resin injection, Dry packing, Polymer impregnation, Vacuum impregnation, Autogenous healing, Flexible sealing, Drilling and plugging, Bandaging. Repair distressed due to corrosion, wear, fire, leakage and marine exposure. Methods of corrosion protection - Corrosion inhibitors, Corrosion resistant steels, Reinforcement coating Cathodic protection and Rust eliminators. Forensic engineering – Introduction, Failure of structures, Review of construction theory, Performances problems, Responsibility and accountability, Learning from failure – carbon Wrapping.	[9]
Rehabilitation and retrofitting of Structures and Demolition Techniques Strengthening of superstructure - Plates, Conversation to composite construction, Post stressing, Jacketing, Bonded overlays, Reinforcement addition. Strengthening of substructures - Shoring and Underpinning. Engineered demolition techniques- demolition process, selection of techniques–Case studies	[9]
Total Hours:	**45**

Text Book(s):

1.	Gunasekaran K., and Sudarsan J.S., “Repair and Rehabilitation of structures”, ARS Publications. Chennai, 2019.
2.	Vidivelli B., “Rehabilitation of Concrete Structures”, Standard Publishers Distributiors, Delhi, Reprint, 2019

Reference(s):

1.	CPWD HAND BOOK, “Repair and rehabilitation of R.C.C buildings”, CPWD, Govt. of India, Reprint, 2019
2.	Peter.H.Emmons, “Concrete repair and maintenance illustrated”, Galgotia Publications Pvt. Ltd., 2001.Press, 2011
3.	Sankar, S.K., and Saraswati, S.,,”Construction Technology:, Oxford University. New Delhi, 2008

*SDG 4 – **Quality Education**
SDG 11 – **Sustainable Cities and Communities

R4/ w.e.f. 01.06.2024
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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Maintenance and Repair Strategies**	
1.1	Definition - Maintenance, Repair, Rehabilitation, Retrofitting.	1
1.2	Need, Merit and Demerits for Repair, Rehabilitation, Retrofitting.	1
1.3	Importance of maintenance for Repair, Rehabilitation, Retrofitting.	1
1.4	Facts of maintenance of Repair, Rehabilitation, Retrofitting.	2
1.5	Various aspects of inspection	2
1.6	Assessment procedure for evaluating a damaged structures,	1
1.7	Causes and deterioration of concrete.	1
2.0	**Serviceability and Durability of Concrete**	
2.1	Quality assurance for concrete construction	1
2.2	Need for quality assurance and Compressive Strength Test	1
2.3	Split tensile strength and Flexural strength test	1
2.4	Permeability and Thermal Properties	1
2.5	Cracks - Types, Causes and Effects due to cracking	2
2.6	Effect duo to climate, Temperature, Corrosion	1
2.7	Chemicals, Effects of cover thickness Design and construction Errors.	2
3.0	**Repair and Rebahilitaion of Structures**	
3.1	Criteria for material selection	1
3.2	Methodology of selection and Special concretes	1
3.3	Polymer concrete and Sulphur infiltrated concrete	1
3.4	Fiber reinforced concrete and High strength concrete,	1
3.5	High performance concrete and Vacuum concrete	1
3.6	Self-compacting concrete and Special cement	1
3.7	Expansive cement and Ferro cement	1
3.8	Destructive and Non-destructive testing techniques.	2
4.0	**Forensic Engineering**	
4.1	Crack repair techniques	1
4.2	Stitching, Routing and sealing, Resin injection	1
4.3	Dry packing, Polymer impregnation, Vacuum impregnation	1
4.4	Autogenous healing, Flexible sealing, Drilling and plugging	2
4.5	Bandaging. Repair distressed due to corrosion, wear, fire, leakage	1
4.6	Methods of corrosion protection - Corrosion inhibitors, Corrosion resistant steels	1
4.7	Reinforcement coating Cathodic protection and Rust eliminators. Forensic engineering –	1
4.8	Introduction, Failure of structures, Review of construction theory	1
5.0	**Demolition Techniques**	
5.1	Plates, Conversation to composite construction, Post stressing	1
5.2	Jacketing, Bonded overlays,	1
5.3	Reinforcement addition and Strengthening of substructures	1
5.4	Shoring and Underpinning	2
5.5	Engineered demolition techniques	1
5.6	Demolition process, selection of techniques – Case studies	1
5.7	Strengthening of superstructure	2

Course Designer(s)

1. Dr.K..Yuvaraj – yuvaraj@ksrct.ac.in

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60 CE E12	Energy Science and Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To apply the energy conservation technique in various applications.
- To Gain knowledge in the working of solar photo voltaic system.
- To understand the need of wind energy conversion techniques.
- To analyze the performance of Bio-mass and Bio-gas plants.
- To describe the working of fuel cells and Hydrogen energy.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge on the challenges and problems associated with the use of various energy sources and energy conservation techniques.	Remember
CO2	Analyse the performance of various solar collectors and working of solar photo voltaic system.	Remember
CO3	Classify the performance of wind energy systems and performance of Bio-mass and Bio-gas plants.	Understand
CO4	Recognize the functioning of Geothermal, ocean and small hydro plants	Apply
CO5	Determine the System sizing and battery charging Techniques and working of fuel cells.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	3	-	-	-	-	-	-	2	-
CO2	3	2	-	3	3	2	-	-	-	-	3	-	2	-
CO3	3	2	3	2	-	3	-	3	-	-	-	3	-	-
CO4	3	2	-	3	3	3	-	-	-	-	-	-	-	2
CO5	3	2	2	3	-	-	-	-	-	-	-	-	-	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	30	40
Understand	30	30	40
Apply	-	-	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60CEE12 - Energy Science and Engineering

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Statistics on Energy Sources* Role and potential of non-renewable and renewable source-Importance of renewable energy sources-advantages and disadvantages of non-conventional energy sources-Salient features of non-conventional energy sources. Hidal Energy, Nuclear Energy and Thermal Energy. Availability of resources and future trends-Energy scenario in India–Growth of energy sector and its planning in India .Global environmental crisis-Impact of renewable energy generation on environment, Kyoto protocol, Carbon Credit, CDM.	[9]
Solar Energy* Introduction-Solar radiation at the earth's surface-Solar Radiation measurements-Estimation of average solar Radiation. Solar energy collectors – Classifications – Flat plate collectors - Concentrating collectors - Comparison. Solar greenhouse - Solar thermal Electric power plant. Principles of photovoltaic conversion–PV system components–types of solar cells–PV cell–module and array–array design-equivalent circuit–V and P-V characteristics. Solar Photo Voltaic applications- Solar energy policies and regulations of India.	[9]
Wind Energy* Introduction -Basic principle sofwind energy conversion: Nature of the wind power in the wind, forces on the blades – wind data and energy estimation - site selection - classification of wind energy conversion systems - Advantages and Disadvantages -Types of wind machines - Horizontal axis machine - Vertical axis machine - Generating system - Energy Storage – Application of wind energy - Safety and environmental aspects.	[9]
Other Renewable Energy Sources* Bio energy - Introduction Biomass conversion technologies – types of bio gas plants – applications – Biomass energy programme in India. Tidal energy – Basic principle of tidal power – components and operations of tidal power plant - Geothermal energy-Geothermal Sources–Prospects of geothermal energy in India-Ocean energy resources– principles of ocean thermal energy conversion (OTEC)–Methods of Ocean thermal electric power generation.	[9]
Waste to Energy and Grid Connected Systems* Energy produced from sewage, Industrial effluents, Municipal Solid Waste, Industrial sludge. Energy Audit and rating - Case studies. Basics of stand-alone and grid-connected systems–hybrid systems–synchronization with grid– Battery–types-Battery charging and charge regulator- Fuelcells –Hydrogenenergy – Small hydro resources-basic operation and schematic only.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Rai G.D.,“Non-ConventionalEnergySources”,KhannaPublishers,2019.
2.	Twidelland Wier,“RenewableEnergyResources”,CRCPress(TaylorandFrancis),2021.
Reference(s):	
1.	Tiwariand Ghosal,“Renewableenergyresources”,NarosaPublishingHouse,2020.
2.	Ramesh RandKumar K.U,“RenewableEnergyTechnologies“,NarosaPublishingHouse,2021.
3.	KothariD.P,Singhal.,K.C.,“Renewableenergysourcesandemergingtechnologies”,P.H.I,NewDelhi,2020.
4.	MittalKM,“Non-ConventionalEnergySystems”,WheelerPublishingCo.Ltd,NewDelhi,2019.

*SDG 7 – Affordable and Clean Energy

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Course Contents and Lecture Schedule

S.No.	Topics	No. of hours
1.0	**Statistics on Energy Sources**	
1.1	Role and potential of non-renewable and renewable source- Importance of renewable energy sources	1
1.2	Advantages and disadvantages of non-conventional energy sources-Salient features of non-conventional energy sources, Hidal Energy, Nuclear Energy and Thermal Energy	1
1.3	Availability of resources and future trends	1
1.4	Energy scenario in India	1
1.5	Growth of energy sector and its planning in India .Global environmental crisis	1
1.6	Impact of renewable energy generation on environment, Kyoto protocol, Carbon Credit, CDM	1
2.0	**Solar Energy**	
2.1	Introduction-Solar radiation at the earth's surface-Solar Radiation measurements-Estimation of average solar Radiation	1
2.2	Solar energy collectors – Classifications – Flat plate collectors - Concentrating collectors - Comparison	1
2.3	Solar greenhouse - Solar thermal Electric power plant.	1
2.4	Principles of photovoltaic conversion–PV system components–types of solar cells	1
2.5	PV cell–module and array–array design-equivalent circuit–V and P-V characteristics	1
2.6	Solar Photo Voltaic applications- Solar energy policies and regulations of India.	1
3.0	**Wind Energy**	
3.1	Introduction- Basic principle sofwind energy conversion :Nature of the wind, power in the wind forces on the blades	1
3.2	wind data and energy estimation - site selection	1
3.3	classification of wind energy conversion systems - Advantages and Disadvantages	1
3.4	Types of wind machines - Horizontal axis machine -	1
3.5	Vertical axis machine - Generating system - Energy Storage	1
3.6	Application of wind energy - Safety and environmental aspects.	1
4.0	**Other Renewable Energy Sources**	
4.1	Bio energy - Introduction Biomass conversion technologies	1
4.2	types of bio gas plants – applications – Biomass energy programme in India.	1
4.3	Tidal energy – Basic principle of tidal power – components and operations of tidal power plant	1
4.4	Geothermal energy-Geothermal Sources–Prospects of geothermal energy in India Ocean energy resources	1
4.5	principles of ocean thermal energy conversion (OTEC)–	1
4.6	Methods of Ocean thermal electric power generation	1
5.0	**Waste to Energy and Grid Connected Systems**	
5.1	Energy produced from sewage, Industrial effluents	1
5.2	Municipal Solid Waste, Industrial sludge, Energy Audit and rating	1
5.3	Case studies. Basics of stand-alone and grid-connected systems	1
5.4	hybrid systems–synchronization with grid	1
5.5	Battery–types-Battery charging and charge regulator-Fuel cells	1
5.6	Hydrogen energy-Small hydro resources-basic operation and schematic only.	1

Course Designer(s)

1. Dr.N. Ramesh - rameshn@ksrct.ac.in

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E13	Smart Cities	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To provide students with a comprehensive understanding of smart city concepts
- To familiarize students with the integration of smart technologies in urban infrastructure systems
- To enable students to comprehend the role of Information and Communication Technologies (ICT) in optimizing transportation system
- To educate students on sustainable water and energy management practices in smart cities
- To emphasize the importance of resilience and sustainability in urban infrastructure design and planning, equipping students with the knowledge

Pre-requisites

- Urban Planning, Transportation Engineering, Geotechnical Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Comprehensive Understanding of Smart City Concepts.	Apply
CO2	Proficiency in Integrating Smart Technologies in Urban Infrastructure.	Apply
CO3	Competence in Applying Information and Communication Technologies (ICT) in Transportation Systems.	Apply
CO4	Ability to Implement Sustainable Water and Energy Management Practices.	Apply
CO5	Aptitude for Designing Resilient and Sustainable Urban Infrastructure.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	2	3	-	-	-	-	-	-	3	-
CO2	3	2	3	3	2	2	-	-	-	-	3	-	3	3
CO3	3	3	3	3	3	2	-	3	-	-	-	3	3	3
CO4	3	3	2	2	3	3	-	-	-	-	-	-	-	3
CO5	2	3	3	3	3	-	-	-	-	-	-	-	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	40	-	40
Understand	20	40	40
Apply	-	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022							
B.E. Civil Engineering							
60 CE E13 - Smart Cities							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction* Overview of smart cities: Definition, objectives, and significance. Historical background and evolution of smart cities. Role of civil engineers in shaping smart city infrastructure.	[9]
Smart Infrastructure Planning and Design* Principles of urban infrastructure planning and design. Integration of smart technologies in transportation systems, utilities, and buildings. Sustainable site development and green infrastructure strategies. Application of Building Information Modeling (BIM) in smart city projects- Design considerations for resilient infrastructure in the face of climate change.	[9]
Transportation Systems in Smart City* Integration of Information and Communication Technologies (ICT) in transportation planning. Intelligent Transportation Systems (ITS) for traffic management and congestion reduction. Design and optimization of multimodal transportation networks. Case studies of smart transportation projects: Smart traffic signals, vehicle-to-infrastructure communication.	[9]
Smart Water and Energy Management* Sustainable water supply and distribution systems in urban areas. Application of smart sensors for water quality monitoring and leakage detection. Energy-efficient design and operation of buildings and infrastructure. Renewable energy integration: Solar panels, wind turbines, and microgrids. Case studies of smart water and energy management projects.	[9]
Resilient and Sustainable Urban Infrastructure* Resilience planning for infrastructure systems against natural disasters and climate change impacts. Retrofitting existing infrastructure for improved resilience. Sustainable materials and construction techniques for infrastructure projects. Lifecycle assessment and sustainable maintenance practices. Role of civil engineers in promoting sustainability and resilience in smart cities.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Anthony M. Townsend, Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia, W. W. Norton & Company, 2013
2.	Dilip Kumar Kothari and Sanjay R. Singhal, Urban Infrastructure: Finance and Management, CRC Press, 2012
Reference(s):	
1.	Ben Green, The Smart Enough City: Putting Technology in Its Place to Reclaim Our Urban Future, The MIT Press, 2019
2.	Stephen Goldsmith and Susan Crawford, The Responsive City: Engaging Communities Through Data-Smart Governance, John Wiley & Sons, 2014
3.	Mark Deakin and Husam Al Waer, Smart Cities: Governing, Modelling and Analysing the Transition, Routledge, 2014
4.	Simon Marvin, Andres Luque-Ayala, and Colin McFarlane , Smart Urbanism: Utopian Vision or False Dawn, Routledge, 2016

***SDG 9 – Industry Innovation and Infrastructure**

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1.0	**Introduction**	
1.1	Overview of smart cities	2
1.2	Definition, objectives of smart cities	1
1.3	significance of smart cities	1
1.4	Historical background of smart cities	1
1.5	Evolution of smart cities	2
1.6	Role of civil engineers in shaping smart city infrastructure	2
2.0	**Smart Infrastructure Planning and Design**	
2.1	Principles of urban infrastructure planning and design	1
2.2	Integration of smart technologies in transportation systems, utilities, and buildings	2
2.3	Sustainable site development and green infrastructure strategies	2
2.4	Application of Building Information Modeling (BIM) in smart city projects	2
2.5	Design considerations for resilient infrastructure in the face of climate change	2
3.0	**Transportation Systems in Smart City**	
3.1	Integration of Information and Communication Technologies	1
3.2	Intelligent Transportation Systems (ITS) for traffic management	2
3.3	Design and optimization of multimodal transportation networks	2
3.4	Case studies of smart transportation projects	2
3.5	Smart traffic signals, vehicle-to-infrastructure communication.	2
4.0	**Smart Water and Energy Management**	
4.1	Sustainable water supply and distribution systems in urban areas.	1
4.2	Application of smart sensors for water quality monitoring and leakage detection.	2
4.3	Energy-efficient design and operation of buildings and infrastructure.	2
4.4	Renewable energy integration: Solar panels, wind turbines, and microgrids.	2
4.5	Case studies of smart water and energy management projects.	2
5.0	**Resilient and Sustainable Urban Infrastructure**	
5.1	Resilience planning for infrastructure systems against natural disasters and climate change impacts.	1
5.2	Retrofitting existing infrastructure for improved resilience.	2
5.3	Sustainable materials and construction techniques for infrastructure projects.	2
5.4	Lifecycle assessment and sustainable maintenance practices.	2
5.5	Role of civil engineers in promoting sustainability and resilience in smart cities.	2

Course Designer(s)

1. Dr. M. Velumani – velumani@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE E14	Traffic Engineering and Management	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To impart the fundamental knowledge about traffic engineering
- To acquire knowledge in traffic survey
- To learn the fundamental knowledge of traffic design and visual aids
- To acquire knowledge in traffic safety and environment
- To know various traffic management techniques

Pre-requisites

- Highway, Railway and Airport Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Infer the fundamental concepts of traffic engineering	Remember
CO2	Demonstrate the survey of traffic parameters and highway capacity LOS	Understand
CO3	Design channels, intersections, signals, roundabouts and parking arrangements	Apply
CO4	Understand the traffic signs, markings and road safety and the environmental impacts	Understand
CO5	Summarize the traffic planning and management systems	Remember

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	3	-	3	-	-	-	-	-	2	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	2	3
CO3	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	3	-	3	-	-	-	-	-	-	-	2	3
CO5	3	3	-	-	-	-	-	-	-	-	-	-	2	2

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	30	-	30	-	-	34	-
Understand	20	-	20	-	-	46	-
Apply	10	50	10	50	50	20	50
Analyse		50		50	50	-	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

R4/ w.e.f. 01.06.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E14 - Traffic Engineering and Management

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Fundamentals of Traffic Engineering Scope of Traffic Engineering – Elements of Traffic Engineering – Road user, vehicle and road way. Road Characteristics – Road user characteristics – PIEV theory – Vehicle characteristics – IRC standards – Design speed, volume – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India.	[9]
Traffic Surveys and Level of Service Speed, journey time and delay surveys – Vehicles Volume Survey including non-motorized transports – Origin Destination Survey – Parking Survey – Accident analysis – Statistical applications in traffic studies and traffic forecasting – Level of service – Highway capacity – Capacity of urban and rural roads – PCU concept and its limitations – Traffic Flow theory.	[9]
Traffic Design and Visual Aids Design of at-grade intersections – Principles of design – Channelization – Design of rotaries – Traffic signals - pre-timed and traffic actuated – Design of signal setting – phase diagrams – timing diagram – Signal co-ordination – Roundabouts – Grade separated intersections – Geometric elements for divided and access controlled highways and expressways.	[9]
Traffic Safety and Environment Road furniture – Street lighting – Traffic signs including Variable Message Sign and road markings – Networking pedestrian facilities & cycle tracks – Traffic regulation and control Traffic Safety – Principles and Practices – Road Safety Audit – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures.	[9]
Traffic Management Area Traffic Management System – Traffic System Management (TSM) with IRC standards – Traffic Regulatory Measures -Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods – Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education – Car pooling.	[9]
Total Hours:	**45**

Text Book(s):

1. Kadiyali L.R., "Traffic Engineering and Transport Planning", 9th Edition, Khanna Publishers, Delhi, 2017.
2. Srinivasa Kumar, Introduction to Traffic Engineering, Universities Press, 2018

Reference(s):

1. Khanna S. K, and others, Highway Engineering, Nam Chand & Bros, Roorkee, 2014.
2. Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski, “Principles of Highway Engineering and Traffic Analysis”, Wiley, 2011.
3. O’ Flaherty C. A., “Traffic Planning and Engineering”, Elsevier India, 2006.
4. Mike Slinn, Paul Matthews, Peter Guest, “Traffic Engineering Design – Principles and Practice”, Butterworth-Heinemann, 2005.

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Fundamentals of Traffic Engineering**	
1.1	Scope of Traffic Engineering	1
1.2	Elements of Traffic Engineering	1
1.3	Road user, vehicle and road way	1
1.4	Road user characteristics	2
1.5	PIEV theory, Vehicle characteristics	2
1.6	Fundamentals of Traffic Flow	2
2.0	**Traffic Surveys and Level of Service**	
2.1	Speed, journey time and delay surveys	1
2.2	Vehicles Volume Survey including non-motorized transports	2
2.3	Origin Destination Survey	2
2.4	Parking Survey	2
2.5	Highway capacity, Capacity of urban and rural roads	2
3.0	**Traffic Design and Visual Aids**	
3.1	Design of at-grade intersections, Principles of design	1
3.2	Channelization, Design of rotaries	1
3.3	Traffic signals, Pre-timed and traffic actuated	1
3.4	Design of signal setting	2
3.5	Phase diagrams, Timing diagram	2
3.6	Signal co-ordination, Roundabouts, Grade separated intersections	2
4.0	**Traffic Safety and Environment**	
4.1	Road furniture	1
4.2	Street lighting	2
4.3	Traffic signs including Variable Message Sign and road markings	2
4.4	Networking pedestrian facilities & cycle tracks	2
4.5	Traffic regulation and control Traffic Safety	2
5.0	**Traffic Management**	
5.1	Area Traffic Management System	1
5.2	Traffic System Management (TSM) with IRC standards	1
5.3	Traffic Regulatory Measures	1
5.4	Travel Demand Management (TDM)	2
5.5	Direct and indirect methods	2
5.6	Congestion and parking pricing	2

Course Designer(s)

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TIRUCHENGODE - 637 215

60 CE E15	Construction Techniques and Equipments	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To acquire knowledge about techniques adopted in modern construction.
- To impart the fundamental knowledge about building components and construction techniques.
- To gain knowledge in construction sequence & practices.
- To know various equipment used in construction industry.
- To learn about equipment management for various construction works.

Pre-requisites

- Basic knowledge about building materials and machineries.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Associate the knowledge of construction of sub structures and superstructures.	Remember
CO2	Analyse the techniques for erection of construction units.	Apply
CO3	Understand basic knowledge about construction equipment.	Understand
CO4	Discuss about construction, hauling and conveying equipment.	Understand
CO5	Learn the knowledge about various concrete production equipment.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	3	2	2	2	2	2	2	3	2	-
CO2	3	2	3	2	3	2	2	2	2	2	2	3	2	-
CO3	3	2	1	2	2	2	3	2	2	2	2	3	2	-
CO4	2	2	2	3	3	2	3	3	3	3	3	3	2	-
CO5	2	2	2	3	1	2	3	3	3	3	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	40
Understand	20	20	40
Apply	20	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E Civil Engineering							
60 CE E15 - Construction Techniques and Equipments							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Sub Structure* Digging and excavation of trenches–drilling and blasting techniques, pile driving techniques and sinking of wells. SUPER STRUCTURE: Masonry works - Concrete and reinforced concrete works: formwork, reinforcement and concreting – mechanized methods for erection of Buildings and installations. Cast-in-situ and pre-cast concrete. Concreting below ground level, under water concreting.	[09]
Erection of Construction Units* Different types of scaffolding, Tunneling techniques, Pre-cast and prefabricated construction – need and advantages. Modular construction –I.S. recommendations for modular planning, standardization, mass production and transportation, Tunnel boring machine.	[09]
Construction Equipment and Machinery* Earthmoving Equipment-Power shovels, Back hoe, Dragline, Clam shell; tunneling machine-types. Excavating Equipment: Scraper, Bulldozer. Compacting Equipment: Smooth wheel roller sheep-foot roller – Pneumatic typed rollers, paving technology, slip form technique.	[09]
Construction Equipment* Hoisting equipment–such as hoist winch, hoisting chains, hooks and slings, various types of cranes – Tower crane, mobile crane and derric crane, performance and safety in operation. Hauling Equipment: Transit mixers and dumpers. Conveying Equipment: Belt Conveyors, Screw conveyor, Bucket conveyor.	[09]
Concrete Production Equipment* Concrete mixers, truck mixers, pneumatic concrete placer, concrete vibrators. Pile Driving Equipment - Tunneling and rock drilling equipment – Pumps and dewatering equipment, pile and Diapharm walls, drilling techniques.	[09]
Total Hours:	**45**

Text Book(s):	
1.	Gupta R.K.," Civil Engineering Materials and Practices", Jain Brothers, New Delhi,2014
2.	Rangwala, "Engineering Materials",Charotar Publishing House Pvt., Ltd., Gujarat, 2019
3.	Seetharaman S., "Construction Engineering and Management", 4thEdition, Umesh publications, New Delhi, 1999.
Reference(s):	
1.	Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2012
2.	Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2015
3.	Rajput R K., "Engineering Materials", S Chand and Company Ltd., 2014
4.	IS 1597 Part 1 & 2 ."Construction of Stone Masonry- Code of Practice" , BIS, New Delhi

SDG:4 Quality Education, SDG:9: Industry, innovation and infrastructure

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Sub Structure**	
1.1	Digging and excavation of trenches	1
1.2	Drilling and blasting techniques	1
1.3	Pile driving techniques	1
1.4	Pile driving techniques and Sinking of wells	1
1.5	Masonry works	1
1.6	Formwork – reinforcement - concreting	1
1.7	Mechanized methods for erection of buildings and installations	1
1.8	Cast-in-situ and pre-cast concrete	1
1.9	Concreting below ground level, under water concreting	1
2.0	**Erection of Construction Units**	
2.1	Different types of scaffolding	1
2.2	Tunneling techniques	1
2.3	Pre-cast and prefabricated construction	1
2.4	Modular construction	1
2.5	I.S. recommendations for modular planning	1
2.6	Standardization	1
2.7	Mass production	1
2.8	Transportation	1
2.9	Tunnel boring machine.	1
3.0	**Construction Equipment and Machinery**	
3.1	Earthmoving Equipment - Power shovels, Back hoe	1
3.2	Earthmoving Equipment - Dragline, Clam shell	1
3.3	Tunneling machine-types	1
3.4	Tunneling machine-types	1
3.5	Excavating Equipment: Scraper, Bulldozer.	1
3.6	Compacting Equipment: Smooth wheel roller and sheep foot roller	1
3.7	Compacting Equipment: Pneumatic typed rollers	1
3.8	Paving technology	1
3.9	Slip form technique	1
4.0	**Construction Equipment**	
4.1	Hoisting equipment	1
4.2	Cranes –Tower crane	1
4.3	Cranes –Mobile crane	1
4.4	Cranes – Derric crane	1
4.5	Performance and safety in operation - cranes	1
4.6	Transit mixers and dumpers	1
4.7	Belt Conveyors	1
4.8	Screw conveyor	1
4.9	Bucket conveyor	1
5.0	**Concrete Production Equipment**	
5.1	Concrete mixers	1
5.2	Truck mixers	1
5.3	Pneumatic concrete placer	1
5.4	Concrete vibrators	1
5.5	Pile Driving Equipment	1
5.6	Tunneling and rock drilling equipment	1
5.7	Pumps and dewatering equipment	1
5.8	Pile and Diapharm walls	1
5.9	Drilling techniques.	1

Course Designer(s)

1. Dr.S.Gunasekar - gunasekar@ksrct.ac.in

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
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60 CE E16	Water Quality and Management	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the physical, chemical and biological characteristics of water and wastewater
- To Learn about data collection platforms and field kits used for water quality assessment
- To Explore water quality standards and effluent standards
- To Identify sources and types of water pollution including organic and inorganic pollutants
- To Gain familiarity with water quality models used in management practices

Pre-requisites

- Water Supply Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Acquire comprehensive knowledge of the physical and chemical properties of water.	Remember
CO2	Demonstrate competence in designing effective sampling plans.	Understand
CO3	Recognize the sources and types of water pollution, including organic and inorganic pollutants.	Understand
CO4	Identify the specific modeling tools for surface water quality.	Apply
CO5	Illustrate the principles and frameworks for managing water quality.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	-	2	-	1	-	-	-	3	-	2
CO2	3	2	3	-	-	2	-	1	-	-	-	3	-	2
CO3	3	2	2	-	-	1	-	1	-	-	-	3	-	2
CO4	3	2	3	-	-	1	-	1	-	-	-	3	-	2
CO5	3	2	3	-	-	2	-	2	-	-	-	3	-	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	15	15	30
Apply	15	15	20
Analyse	20	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E16 – Water Quality and Management

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Water Quality* Physical and chemical properties of water: Suspended and dissolved solids, EC and pH, major ions –. Water quality investigation – Sampling design: Samplers and automatic samplers – Data collection platforms: Field kits, Water quality data storage, analysis and inference – Software packages.	[9]
Water Quality Control* Water quality standards: effluent standards - overview of water and wastewater treatment methods - Strom water quality control - Concepts of BMPs and LID – Advantages – Computer models – EPA – SWMM	[9]
Water Pollution* Sources and Types of pollution: Organic and inorganic pollutants - BOD – DO relationships – impacts on water resources – NPS pollution and its control – Eutrophication control – Water treatment technologies - Constructed wetland.	[9]
Modeling * Types of models, Model development, calibration and verification – Model Limitations- different numerical methods, finite difference method- surface water quality modeling (QUAL2K), (MODFLOW and MT3D), unsaturated zone modeling (SUTRA/HYDRUS), application of optimization techniques to water quality management, case studies.	[9]
Water Quality Management* Principles of water quality – Water quality classification – Water quality standards - Water quality indices – TMDL Concepts – Water quality models.	[9]
Total Hours:	**45**
Text Book(s):	

1.	Weber, W. J., “Physicochemical processes for water quality control”, John Wiley and sons, New York, 2003.
2.	Mackenzie L Davis., David A Cornwell., “Introduction to Environmental Engineering”, McGraw-Hill 2006.
Reference(s):	
1.	George Tchobanoglous., Franklin Louis Burton., Metcalf & Eddy., David Stense. H., “Wastewater Engineering: Treatment and Reuse”, McGraw-Hill, 2002.
2.	Chapra. S, “Surface Water-Quality Modeling”, Long Grove, Waveland Press, 2008.
3.	Gilbert M. Masters., Wendell P. Ela., “Introduction to Environmental Engineering and Science”, Pearson India Education Services Pvt. Ltd, 2015.
4.	Storm Water Management Model Applications Manual, USEPA - EPA/600/R-09/077, July 2009

*SDG 6 – Clean water and Sanitation

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Water Quality**	
1.1	Physical properties of water	1
1.2	Chemical properties of water	1
1.3	Major Ions in Water	1
1.4	Investigation of Water Quality	2
1.5	Sampling collections and Data collections for water quality	1
1.6	Water quality data storage, analysis and inference	2
1.7	Software for analysis	1
2.0	**Water Quality Control**	
2.1	Standards of Water Quality	1
2.2	Effluent standards	2
2.3	Treatment methods for water and wastewater	2
2.4	Storm water quality control	2
2.5	Concepts of BMPs and LID	1
2.6	Computer Models	1
3.0	**Water Pollution**	
3.1	Sources and Types of pollution	1
3.2	Organic and inorganic pollutants	1
3.3	Relation between BOD and DO	2
3.4	Impacts of water resources	1
3.5	NPS Pollution and control	2
3.6	Water treatment technologies	1
3.7	Eutrophication control	1
4.0	**Modeling**	
4.1	Types of models and Model development	1
4.2	Calibration and verification of models	1
4.3	Surface water quality modeling	2
4.4	Ground water quality modeling	2
4.5	Unsaturated zone modeling	1
4.6	Application of optimization techniques to water quality management	2
5.0	**Water Quality Management**	
5.1	Principles of water quality	1
5.2	Water quality classification	2
5.3	Water quality standards	2
5.4	Water quality indices	2
5.5	Water quality models	2

Course Designer(s)

1. Dr J. Abdul Bari - abdulbari@ksrct.ac.in

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E17	Architecture And Town Planning	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To provide a basic knowledge on architecture and town planning.
- To provide basic knowledge on zoning regulation and building regulation
- To understand the basic components of buildings and plan
- To apply the software tools for planning
- To execute the design for extreme condition

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the elements and principles of architecture.	Understand
CO2	Classify the residential, industrial and public building.	Understand
CO3	Prepare a plan of residential buildings.	Analyse
CO4	Apply GIS and remote sensing techniques in urban and regional planning	Apply
CO5	Acquire knowledge about design of building for abnormal loads.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1		1		2	2	1			2		2	-
CO2	3			2		3	2				2		2	-
CO3	1		3			2		1			1	1	2	-
CO4	3			2		3	2						2	-
CO5			3			1		1			3	1	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	20	20	30
Apply	10	10	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E - Civil Engineering

60 CE E17 - Architecture And Town Planning

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to Architecture * Definition and elements of architecture, principles of composition, qualities and factors in architecture architectural design-an analysis integration of function and aesthetics. Factors influencing the character and style of building.	[9]
Building Types * Building types – Classification of residential, industries and public building - Planning concepts - Residential, institutional, commercial and Industrial - Application of anthropometry and space standards - Building rules and regulations - Building services. Layout regulations.	[9]
Principles of Orientation and Planning of Buildings * Factors affecting orientation-sun-wind-rain-orientation criteria for Indian conditions-Principles governing the theory of planning –planning of residential buildings.	[9]
Techniques of Planning * Planning survey techniques - preparation of urban and regional structure plans, development plans, action plans - site planning - principles and design - statistical methods of data analysis - application of G.I.S and remote sensing techniques in urban and regional planning - decision making models.	[9]
Development Control Rules * Zoning regulations –sub division regulations-building regulations-floor space index-minimum plot sizes and building frontage-open spaces-minimum standard dimensions of building elements- organization and administration of planning agencies at national, state ,regional, local and metropolitan levels.	[9]
Total Hours:	**45**

Text Book(s):

1.	Muthu Shoba Mohan G., Principles of Architecture, Oxford University Press,2006
2.	Rangwala S C, Town Planning, Charotar Publishing House, 2014

Reference(s):

1.	Francis DK Ching ,Architecture, Form, space & order ,John Wiley & Sons Publication, Inc.
2.	Pratap Rao M., Urban Planning, CBS Publishers and Distributors, New Delhi, 2005
3.	David Littlefield ,Metric handbook Planning & design data ,Elsevier publications
4.	Time Saver Standards for Housing & Residential Development , Tata McGraw Hill published by Education Private Limited

*SDG 9 – Industry Innovation and Infrastructure

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction to Architecture**	
1.1	Definition and elements of architecture	1
1.2	principles of composition	2
1.3	Qualities and factors in architecture architectural design	2
1.4	An analysis integration of function and aesthetics	2
1.5	Factors influencing the character and style of building	2
2.0	**Building Types**	
2.1	Building types	1
2.2	Classification of residential, industries and public building	2
2.3	Planning concepts - Residential, institutional, commercial and Industrial	2
2.4	Application of anthropometry and space standards	1
2.5	Building rules and regulations, Building services	2
2.6	Layout regulations	1
3.0	**Principles of Orientation and Planning of Buildings**	
3.1	Factors affecting orientation	1
3.2	Sun-wind-rain-orientation criteria for Indian conditions	3
3.3	Principles governing the theory of planning	3
3.4	Planning of residential buildings	2
4.0	**Techniques of Planning**	
4.1	Planning survey techniques	1
4.2	Preparation of urban and regional structure plans	1
4.3	Development plans, action plans	1
4.4	Site planning, Principles and design	2
4.5	Statistical methods of data analysis	1
4.6	Application of G.I.S and remote sensing techniques	2
4.7	Decision making models	1
5.0	**Development Control Rules**	
5.1	Zoning regulations	1
5.2	Sub division regulations	1
5.3	Building regulations	1
5.4	Floor space index	1
5.5	Minimum plot sizes	1
5.6	Building frontage, open spaces	1
5.7	Minimum standard dimensions of building elements	1
5.8	Organization and administration of planning agencies	2

Course Designer(s)

1. Mr. K. Angu Senthil - angusenthil@ksrct.ac.in

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E21	Dynamics and Earthquake Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the basics of various dynamic forces and its effects on the structure
- To enhance the ability to identify the mode shapes of the structure under dynamic loading
- To understand the concepts of engineering seismology
- To understand the fundamentals on response of structural buildings
- To enhance the ability to design an earthquake resistant structure by using IS codal provisions

Pre-requisites

- Advanced Reinforced Concrete Design

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the theory of vibrations and determine response of structures	Understand
CO2	Illustrate the concepts of two degrees of freedom system and multi degree of freedom system	Apply
CO3	Recognize the concepts of engineering seismology	Apply
CO4	Evaluate the response spectra and design spectra of an earthquake	Analyse
CO5	Describe design guidelines for earthquake resistant masonry buildings.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	1	1	2	-	1	-	-	-	3	2	-
CO2	3	2	3	1	1	2	-	1	-	-	-	3	2	-
CO3	3	2	2	1	1	1	-	1	-	-	-	3	3	-
CO4	3	2	3	1	1	1	-	1	-	-	-	3	3	2
CO5	3	2	3	1	1	2	-	2	-	-	-	3	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	30	30	40
Apply	10	10	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E. Civil Engineering							
60 CE E21 - Dynamics and Earthquake Engineering							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Elements of Vibration* Concept of inertia and damping – Types of damping – Basic concepts of vibration – Basic definitions – Types of vibration – Response of the system – Consequences of vibration – Vibration control measures.	[9]
Structural Dynamics and Response* Undamped free vibration – derivation of equation of motion of SDOF system – D'Alemberts principles –Equivalent stiffness of spring combinations – Natural frequency and time period – Introduction to two degrees of freedom system and multi degree of freedom system.	[9]
Elements of Seismology* Causes of Earthquake – Geological faults – Tectonic plate theory – Elastic rebound theory – Epicentre – Hypocentre – seismic waves – Seismogram – Magnitude and intensity of earthquakes – Magnitude and Intensity scales –Information on some disastrous earthquakes, Concept of seismic microzonation.	[9]
Response of Structures to Earthquake* Response spectra – Design spectrum- concept of peak acceleration – Site specific response spectrum – Lessons learnt from past earthquakes – Types of Base isolation and its effects – Effect of earthquake on different types of structures - Introduction to soil liquefaction - behavior of reinforced cement concrete, steel and prestressed concrete structures under earthquake loading.	[9]
Design Morphology* Seismic design concepts – Earthquake resistant design of simple framed structures – IS 1893, IS 4326 Codal provisions - Importance of ductility -Methods of introducing ductility in RC structures as per 13920.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Chopra A K, "Dynamics of Structures - Theory and Applications to Earthquake Engineering", Pearson Education Ltd., 2019
2.	Pankaj Agarwal & Manish Shrikhande, "Earthquake Resistant Design of Structures", PHI Pvt Ltd, NewDelhi, 2014.
Reference(s):	
1.	Taranath B S, "Wind and Earthquake Resistant Buildings - Structural Analysis & Design", CRC Press, 2019.
2.	Damodarasamy S.R.,& Kavitha.S., "Basics of Structural Dynamics and Aseismic Design", PHI Learning Pvt.Ltd New Delhi. 2014.
3.	Duggal, S.K., "Earthquake Resistant Design of Structures", Oxford University Press, 2013.
4.	Indian Standard Codes: IS: 1893, IS: 4326 and IS:13920, Bureau of Indian Standards, New Delhi.

*SDG 9 – Industry Innovation and Infrastructure

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Elements of Vibration**	
1.1	Concept of inertia and damping	1
1.2	Types of damping	1
1.3	Basic Concepts on Vibrations	1
1.4	Types of damping	1
1.5	Vibration and its types	1
1.6	Consequences of vibration	1
1.7	Degrees of freedom	1
1.8	Vibrations Control Measures	2
2.0	**Structural Dynamics and Response**	
2.1	Damped and Undamped Vibrations	1
2.2	Derivation of equation of motion of SDOF system	1
2.3	D'Alemberts principles	1
2.4	Two degree of freedom system	1
2.5	Natural frequency and time period	1
2.6	Equivalent stiffness of spring combination	1
2.7	Introduction to MDOF systems	2
2.8	Concept of mode superposition	1
3.0	**Elements of Seismology**	
3.1	Causes of Earthquake	1
3.2	Formation of earth and its cores	1
3.3	Effects of Earthquake	1
3.4	Tectonic plate theory and Elastic rebound theory	1
3.5	Seismic Waves and its types	1
3.6	Measurement of Earthquake - Seismogram and Seisomgraph	1
3.7	Magnitude and Intensity scales	1
3.8	Past Earthquakes and its information's	1
3.9	Microzonation	1
4.0	**Response of Structures to Earthquake**	
4.1	Response and Design Spectra	1
4.2	Concepts of Peak Accelerations	1
4.3	Site specific response spectrum	2
4.4	Base Isolation and its types	2
4.5	Introduction to soil liquefaction	1
4.6	Behavior of RCC, steel and prestressed concrete structures under earthquake	2
5.0	**Design Morphology**	
5.1	Seismic design concepts	1
5.2	Earthquake resistant design of simple framed structures	1
5.3	Codal provision of IS 1893 and IS 4326	1
5.4	Ductility and its concepts	1
5.5	Methods of introduction Ductility in RC Structures	2
5.6	Codal Design procedure as per IS 13920	1
5.7	Strong column and weak beam theory	2

Course Designer(s)

1. Dr.J.Abdul Bari - abdulbari@ksrct.ac.in

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E22	Air Pollution Management	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To know the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
- To understand the pollutant dispersion concepts and computer models
- To design stacks and particulate air pollution control devices to meet applicable standards
- To manage the air pollution through preventive measures and impact assessment
- To identify, formulate and solve air and noise pollution problems

Pre-requisites

- Environmental Studies and Climate Change

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Define the sources of air pollution and sampling methods	Remember
CO2	Describe the dispersion of air pollutants	Understand
CO3	Express the particulate and gaseous pollutant control techniques	Understand
CO4	Summarize the air quality management principles	Understand
CO5	Evaluate the indoor air quality and noise pollution effects	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1	-	1	-	2	2	-	-	1	1	3	2	3
CO2	3	2	2	2	-	2	3	-	-	1	-	3	2	3
CO3	3	2	2	2	-	2	3	-	-	1	1	3	2	3
CO4	3	1	-	-	-	2	3	1	-	2	-	3	2	3
CO5	3	1	-	-	-	2	2	-	-	1	1	3	3	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	40
Understand	30	30	40
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E22 - Air Pollution Management

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Sources and Effects of Air Pollutants* ** Classification of air pollutants – Particulates and gaseous pollutants. Sources of air pollution – Source inventory. Effects of air pollution on human beings, materials, vegetation, animals – Global warming – Ozone layer depletion. Sampling and analysis – Basic principles of sampling, Source and ambient sampling. Analysis of pollutants – Principles. Air pollution episodes.	[9]
Dispersion of Pollutants* ** Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate – Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Software applications.	[9]
Air Pollution Control* ** Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - Gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries - Case Studies.	[9]
Air Quality Management* ** Air quality monitoring – Preventive measures – Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment – Air pollution management in Indian cities.	[9]
Indoor air quality and Noise Pollution* ** Sources, types and control of indoor air pollutants, sick building syndrome, types – Radon Pollution and its control – Sources of noise pollution – Effects, Assessment, Standards, Control methods, Prevention.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Anjaneyulu, Y., “Air pollution: Prevention and Control Technologies”, BS Publications, Hyderabad, 2020.
2.	Rao M.N. and Rao H. V. N., “Air Pollution Control”, Tata-McGraw-Hill, New Delhi, 2017.
Reference(s):	
1.	W.L.Heumann., “Industrial Air Pollution Control Systems”, McGraw-Hill, New York, 2001.
2.	Mahajan S.P., “Pollution Control in Process Industries”, Tata McGraw-Hill Publishing Company, New Delhi, 2001.
3.	Noel De Nevers, “Air Pollution Control Engineering”, Waveland Press Inc., Illinois, 2016.
4.	Bhatia, S.C., “Textbook of Air Pollution and its Control”, Atlantic Press, New Delhi, 2010.

* SDG 11 – Sustainable Cities and Communities

** SDG 13 – Climate Action

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Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Sources and Effects of Air Pollutants**	
1.1	Classification of air pollutants	1
1.2	Particulates and gaseous pollutants	1
1.3	Sources of air pollution, Source inventory	1
1.4	Effects of air pollution on human beings, materials, vegetation, animals	1
1.5	Global warming, Ozone layer depletion	1
1.6	Sampling and Analysis, Basic Principles of Sampling	1
1.7	Source and ambient sampling	1
1.8	Analysis of pollutants Principles	1
1.9	Air pollution episodes	1
2.0	**Dispersion of Pollutants**	
2.1	Elements of atmosphere	2
2.2	Meteorological factors	1
2.3	Wind roses	1
2.4	Lapse rate	1
2.5	Atmospheric stability and turbulence	1
2.6	Plume rise	1
2.7	Dispersion of pollutants	1
2.8	Dispersion models	1
2.9	Software applications	1
3.0	**Air Pollution Control**	
3.1	Concepts of control	1
3.2	Particulates control by gravitational & centrifugal methods	1
3.3	Particulates control by filtration & scrubbing methods	1
3.4	Electrostatic precipitation	2
3.5	Selection criteria for equipment	1
3.6	Gaseous pollutant control by adsorption & absorption	1
3.7	Gaseous pollutant control by condensation & combustion	1
3.8	Pollution control for specific major industries	1
3.9	Case Studies	
4.0	**Air Quality Management**	
4.1	Air quality monitoring	1
4.2	Preventive measures	1
4.3	Air pollution control efforts	1
4.4	Zoning	1
4.5	Town planning regulation of new industries	1
4.6	Legislation and enforcement	1
4.7	Environmental Impact Assessment	1
4.8	Air pollution management in Indian cities	2
5.0	**Indoor air quality and Noise Pollution**	
5.1	Sources, types and control of indoor air pollutants	1
5.2	Sick building syndrome types	1
5.3	Radon Pollution and its control	1
5.4	Sources of noise pollution	1
5.5	Effects	1
5.6	Assessment	1
5.7	Standards	1
5.8	Control methods	1
5.9	Prevention	1

Course Designer(s)

1. Dr. P. Mageshkumar - mageshkumarp@ksrct.ac.in

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E23	Bridge Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the fundamental concepts of Construction of Bridges.
- To know composite bridge structures.
- To evaluate the substructure under various soil conditions.
- Understand the process of bridge management, including inspection.
- Understand and be able to calculate demands on a bridge

Pre-requisites

- Advanced reinforced concrete design

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand various types of bridges.	Understand
CO2	Improve the software techniques for various load conditions.	Apply
CO3	Compute the analysis and design of bridges.	Analyse
CO4	Describe the various methods of foundation for bridges.	Understand
CO5	Evaluate the long span bridge design and construction.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	-	2	-	-	3	2	-	3	-	2	3
CO2	-	2	-	-	-	2	1	-	-	-	3	-	2	3
CO3	2	2	1	-	1	-	2	2	-	1	-	-	2	3
CO4	-	3	1	-	3	-	-	-	2	-	3	-	2	3
CO5	3	2	-	2	3	-	2	-	-	-	-	-	2	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	40
Apply	20	20	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E23- Bridge Engineering

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction** Types of bridges - Materials of construction - Codes of practice (Railway and Highway Bridges) - Aesthetics - Loading standards (IRC, RDSO, AASHTO) - Recent developments box girder bridges - Historical bridges (in India and overseas). Planning and layout of bridges: Hydraulic design - Geological and geotechnical considerations - Design aids - Computer softwares- Expert systems.	[09]
Concrete bridges** Bridge deck and approach slabs - Slab design methods - Design of bridge deck systems - Slab-beam systems (Guyon- Massonet and Hendry Jaeger methods) - Box girder systems - Analysis and design - Detailing of box girder systems.	[09]
Steel and composite bridges** Introduction to composite bridges - Advantages and disadvantages - Orthotropic decks - Box girders - Composite steel-concrete bridges - Analysis and design - Truss bridges – Construction methods of Slab culverts, Simply supported bridges and cantilever bridges.	[09]
Sub-structure** Piers - Columns and towers - Analysis and design - Shallow and deep foundations - Caissons - Abutments and retaining walls. Bridge appurtenances: Expansion joints - Design of joints - Types and functions of bearings - Design of elastomeric bearings - Railings - Drainage system - Lighting.	[09]
Long span bridges:** Design principles of continuous box girders - Curved and skew bridges - Cable stayed and suspension bridges - Seismic resistant design - Seismic isolation and damping devices. Construction techniques: Cast in-situ - Prefabricated - Incremental launching - Free cantilever construction - Inspection - Maintenance and rehabilitation - Current design and construction practices.	[09]
Total Hours:	**45**

Text Book(s):

1.	Wai-Fah Chen Lian Duan, "Bridge Engineering Handbook", CRC Press, USA, 2000.
2.	Barker R.M. and J.A. Puckett, “Design of Highway Bridges”, John Wiley & Sons, New York, 1997

Reference(s):

1.	Xanthakos P.P., "Theory and Design of Bridges", John Wiley & Sons, New York, 1994
2.	Victor D.J., “Essentials of Bridge Engineening,” Oxford & IBH Publishing, New Delhi, 2001
3.	Krishna Raju N., “Design of Bridges,” Oxford & IBH Publishing, New Delhi, 1998.

*SDG 9 – Industry Innovation and Infrastructure

R4/ w.e.f. 01.06.2024
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Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Types of bridges &Materials of construction	1
1.2	Codes of practice (Railway and Highway Bridges)	1
1.3	Aesthetics & Loading standards (IRC, RDSO, AASHTO)	1
1.4	Recent developments box girder bridges	1
1.5	Historical bridges (in India and overseas). Planning and layout of bridges: Hydraulic design	1
1.6	Geological and geotechnical considerations	1
1.7	Design aids	1
1.8	Computer softwares	1
1.9	Expert systems	1
2.0	**Concrete bridges**	
2.1	Bridge deck and approach slabs	2
2.2	Slab design methods	1
2.3	Design of bridge deck systems	1
2.4	Slab-beam systems (Guyon- Massonet and Hendry Jaeger methods)	2
2.5	Box girder systems	1
2.6	Analysis and design	1
2.7	Detailing of box girder systems	1
3.0	**Steel and composite bridges:**	
3.1	Introduction to composite bridges	1
3.2	Advantages and disadvantages (composite bridges)	1
3.3	Orthotropic decks	1
3.4	Box girders	1
3.5	Composite steel	1
3.6	concrete bridges	1
3.7	Analysis and design	1
3.8	Truss bridges	1
3.9	Construction methods of Slab culverts, Simply supported bridges and cantilever bridges.	1
4.0	**Applications of Science and Technology for Disaster Management**	
4.1	Piers , Columns and towers	1
4.2	Analysis and design - Shallow and deep foundations	2
4.3	Caissons ,Abutments and retaining walls	1
4.4	Bridge appurtenances, Expansion joints - Design of joints	1
4.5	Types and functions of bearings - Design of elastomeric bearings	1
4.6	Railings	1
4.7	Drainage system	1
4.8	Lighting	1
5.0	**Long span bridges**	
5.1	Design principles of continuous box girders	1
5.2	Curved and skew bridges	1
5.3	Cable stayed and suspension bridges	1
5.4	Seismic resistant design	1
5.5	Seismic isolation and damping devices. Construction techniques: Cast in-situ, Prefabricated ,Incremental launching	1
5.6	Free cantilever construction & Inspection	1
5.7	Maintenance and rehabilitation	1
5.8	Current design and construction practices.	2

Course Designer(s)

1. Dr.R.Jagadeesan- jagadeesan@ksrct.ac.in

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Passed in the BOS Meeting Held on 22.05.2024
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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E24	Transportation Planning	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- T To understand the principles and history of transportation planning
- To analyze transportation policies, regulations, and stakeholder roles
- To apply data analysis techniques for traffic and travel demand modeling
- To evaluate the design of transportation infrastructure and its sustainability
- To assess urban and regional transportation challenges and their impact

Pre-requisites

- Highway, Railway and Airport Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Comprehend transportation planning's fundamentals: history, policies, stakeholders, sustainability	Understand
CO2	Develop skills to analyze data for traffic and travel demand modeling	Apply
CO3	Assess transport modes, challenges, and vital intermodal and sustainable choices	Understand
CO4	Apply urban planning, including design, management, and integration	Apply
CO5	Analyze networks, policies, economics, and regional sustainability	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	2	3	3	2	2	3	3	2	-
CO2	3	3	3	3	3	3	3	2	2	2	3	2	2	-
CO3	3	3	3	3	3	2	3	2	2	2	3	3	2	-
CO4	3	3	3	3	2	3	3	2	2	2	3	2	2	-
CO5	3	3	3	3	2	3	3	2	2	2	3	2	2	-
3 - Strong; 2 - Medium; 1 - Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	40
Understand	20	20	40
Apply	20	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E Civil Engineering								
60 CE E24 - Transportation Planning								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction to Transportation Planning* History and Evolution - Policy and Regulations - Key Stakeholders - Sustainability in Transportation - Transportation and Economic Development - Ethics in Planning - Social Considerations	[08]
Data Collection and Analysis* Data Collection and Methodology - Traffic Flow Theory - Travel Demand Modelling - GIS Applications - Network Analysis Techniques - Environmental Data Usage - Case Study	[09]
Transportation Modes* Road Transport Overview - Rail and Transit - Air and Maritime - Active Transportation - Intermodal Transport Use - Accessibility Planning - Case studies of successful transportation projects in India	[08]
Urban Transportation Planning* Urban Transport Issues - Public Transit Systems - Traffic Control Methods - Bike and pedestrian infrastructure planning for Indian urban areas - Land Use Integration - Intelligent Transportation System - Sustainable Urban Transport - Case Studies	[10]
Regional Transportation Planning* Challenges and considerations in regional transportation planning - City-rural connectivity in India Design and development of regional transport infrastructure - Integration of land use and transportation planning in regional contexts - case studies	[10]
Total Hours:	**45**

Text Book(s):	
1.	Pradip Kumar Sarkar, Vinay Maitri and G. J. Joshi. " Transportation planning : principles, practices and policies." PHI Learning, 2022
2.	C.S. Papacostas , P.D. Prevedouros," Transportation Engineering and Planning," Pearson Publications, 2015
Reference(s):	
1.	Winnie Daamen, Christine Buisson, Serge P. Hoogendoorn, Traffic Simulation and Data Validation - Methods and Applications, CRC Press, 2015
2.	The Institute of Transportation Engineers, Traffic Engineering Handbook, 7th Edition, 2016
3.	Meyer, Michael D, ITE Transportation Planning Handbook, John Wiley & Sons 2016
4.	IRC-SP41: Guidelines for the Design of At-Grade Intersections in Rural & Urban Areas

*SDG 9 – Industry Innovation and Infrastructure

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction**	
1.1	Introduction to the course, History and Evolution	1
1.2	National and regional transportation policies & Legal and regulatory aspects in transportation	1
1.3	Key Stakeholders - Government agencies, private sector, and NGOs	1
1.4	Sustainability in Transportation - Environmental considerations	2
1.5	Transportation and Economic Development	1
1.6	Ethics in Planning	1
1.7	Social Considerations	1
2.0	**Data Collection and Analysis**	
2.1	Data sources and methods	1
2.2	Traffic behavior	1
2.3	Modeling traffic flow	1
2.4	Travel demand modeling - Concepts and techniques & Forecasting travel demand	2
2.5	Geographic Information Systems in planning	1
2.6	Spatial analysis in transportation	1
2.7	Route planning and optimization	1
2.8	Network connectivity in transportation	1
3.0	**Transportation Modes**	
3.1	Road network planning and design	1
3.2	Rail systems and transit modes	1
3.3	Mass transit systems and urban rail	1
3.4	Air transport in India	1
3.5	Maritime and inland water transport	1
3.6	Walking and cycling infrastructure	1
3.7	Non-motorized transport	1
3.8	Interconnected transport modes & Seamless mobility in transportation	1
4.0	**Urban Transportation Planning**	
4.1	Urbanization and traffic congestion	1
4.2	Urban transport challenges - Environmental and social issues	1
4.3	Public transit systems - Design and operation	2
4.4	Public transit systems - Challenges and improvements	1
4.5	Traffic management and control- Traffic signal systems	1
4.6	Intelligent Transporation system	1
4.7	Walkability and bike lanes & Non-motorized transport in urban areas	1
4.8	Transit-oriented development & Mixed-use planning in urban areas	1
4.9	Case Studies	1
5.0	**Regional Transportation Planning**	
5.1	Regional connectivity - Connecting cities and rural areas	1
5.2	Regional transport networks	1
5.3	Rural transport needs - Challenges and solutions	1
5.4	Rural accessibility and mobility	1
5.5	Regional transport infrastructure design Development and expansion	1
5.6	Regional policy framework - Government regulations & Funding and financing mechanisms	2
5.7	Economic and social impact - Regional development and growth	1
5.8	Case studies and regional success stories	2

Course Designer(s)

1. Mr.K.Angu Senthil - angusenthil@ksrct.ac.in

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E25	Building Services	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To acquire knowledge on various facilities like lifts and escalators and machinery involved in buildings
- To study the principles of electrical and air conditioning installations
- To gain exposure in Modern theory of lighting
- To improve skills about basic refrigeration principles and applications
- To provide exposure on the principles of fire safety regulations and National Building Code

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Discuss the application of hot water boilers, vibrators, motors and concrete mixtures.	Remember
CO2	Classify the wiring and earthling system.	Understand
CO3	Describe the modern theory of light and colour in various types of buildings.	Remember
CO4	Summarize the refrigeration principles and air conditioning systems in buildings.	Apply
CO5	Infer the causes of fire, fire safety regulation and installation.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	2	2	-	-	2	-
CO2	3	-	-	-	-	-	-	-	2	2	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	-	-	-	-	-	-	-	-		-	-	2	-
CO5	3	-	-	-	-	-	-	-	2	2	-	-	2	-
3 - Strong; 2 - Medium; 1 - Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	40	40	20
Understand	20	--	60
Apply	-	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E25 - Building Services								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Machineries* Hot Water Boilers - Lifts and Escalators - Special features required for physically handicapped and elderly people - Conveyors - Vibrators - Concrete mixers - DC/AC motors - Generators - Laboratory services - Gas, water, air and electricity.	[9]
Electrical systems in buildings* Basics of electricity: Single, three phase supply - Protective devices in electrical installations - Earthling for safety - Types of ear thing - ISI specifications - Types of wires, wiring systems and their choice - Planning electrical wiring for building - Main and distribution boards - Transformers and switch gears – Layout of substations.	[9]
Principles of illumination and design** Visual tasks: Factors affecting visual tasks - Modern theory of light and colour - Synthesis of light - Additive and subtractive synthesis of color - Luminous flux - Candela - Solid angle illumination - Utilization factor - Depreciation factor - MSCP - MHCP - Lanes of illumination - Classification of lighting - Artificial light sources - Spectral energy distribution - Luminous efficiency - Colour temperature - Colour rendering - . Design of modern lighting: Lighting for stores, offices, schools, hospitals and house lighting - . Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.	[9]
Refrigeration principles and applications** Thermodynamics: Heat, Temperature - measurement transfer – Change of state - Sensible heat - Latent heat of fusion, evaporation, sublimation - saturation temperature - Super heated vapor - Sub cooled liquid - Pressure temperature relationship for liquids - Refrigerants - Vapor compression cycle - Compressors - Evaporators - Refrigerant control devices - Electric motors - Starters - Air handling units - Cooling towers - Window type and packaged air-conditioners - HVAC - Chilled water plant - Fan coil systems - Water piping - Cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A.C. Systems.	[9]
Fire safety installation** Causes of fire in buildings - Safety regulations - NBC - Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies: fire escapes and A.C. systems - special features required for physically handicapped and elderly in building types - Heat and smoke detectors - Fire alarm system, snorkel ladder -Fire lighting pump and water storage - Dry and wet risers - Automatic sprinklers-modern fire safety systems.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Udayakumar R., “Building Services”, Easwar Press, 2021.
2.	Srinivasan A.V., Michal McFarland D., “Smart Structures”, Cambridge University Press, New Delhi, 2019.
Reference(s):	
1.	National Building Code of Practice, Bureau of Indian Standard, 2019.
2.	Philips. “Lighting in Architectural Design”, McGraw-Hill, New York, 2019.
3.	William H. Severns and Julian R. Fellows., “Air-conditioning and Refrigeration”, John Wiley and Sons, London,2018.
4.	Sherratt A. F., “Air-conditioning and Energy Conservation”, The Architectural Press, London, 2018

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Machineries**	
1.1	Hot Water Boilers	1
1.2	Lifts and Escalators	1
1.3	Special features required for physically handicapped and elderly	1
1.4	Conveyors – Vibrators – Concrete mixers	2
1.5	DC/AC motors	2
1.6	Gas, water, air and electricity	2
2.0	**Electrical systems in buildings**	
2.1	Basics of electricity – Single / Three phase supply	1
2.2	Protective devices in electrical installations	1
2.3	Earthling for safety – Types of ear thing – ISI specifications	1
2.4	Types of wires, wiring systems and their choice	2
2.5	Planning electrical wiring for building	1
2.6	Main and distribution boards	1
2.7	Transformers and switch gears	1
2.8	Layout of substations	1
3.0	**Principles of illumination and Design**	
3.1	Visual tasks – Factors affecting visual tasks	1
3.2	Modern theory of light and colour , Synthesis of light	2
3.3	Luminous flux ,Candela, Solid angle illumination	1
3.4	Utilization factor ,Depreciation factor, MSCP,MHCP	1
3.5	Classification of lighting ,Artificial light sources	1
3.6	Design of modern lighting	2
3.7	Special features required and minimum level of illumination required for physically handicapped and elderly in building types.	1
4.0	**Refrigeration principles and applications**	
4.1	Thermodynamics, Heat, Temperature, measurement temperature	1
4.2	Change of state, sensible heat and Latent heat of fusion,	1
4.3	Super-heated vapor , Sub cooled liquid ,Pressure temperature relationship for liquids	1
4.4	Refrigerants, Refrigerant control devices	1
4.5	Vapor compression cycle, Compressors and Evaporators	1
4.6	Air Window type and packaged air-conditioners, HVAC.	2
4.7	Air conditioning systems for different types of buildings	1
4.8	Protection against fire to be caused by A.C. Systems.	1
5.0	**Electric and autonomous vehicles**	
5.1	Causes of fire in buildings – Safety regulations	1
5.2	National Building Code (NBC)	1
5.3	Planning considerations in buildings like non-combustible materials	1
5.4	Construction, staircases and lift lobbies, fire escapes and A.C. systems	2
5.5	Special features required for physically handicapped and elderly in building types	1
5.6	Heat and smoke detectors	1
5.7	Fire alarm system, snorkel ladder – Fire lighting pump and water storage	1
5.8	Automatic sprinklers-modern fire safety systems	1

Course Designer(s)

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E26	Water Resources Systems Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To develop an understanding of systems analysis and apply to problems in Water Resources Engineering
- To learn how to apply various methods of water resources economics to problems in Water Resources Engineering
- To know about surface and sub-surface water quality management
- To learn the legal aspects of water and environment systems
- To introduce the student to the concept of Mathematical approaches for managing the water resources syste

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply concepts of systems analysis for planning of water resources systems and minor levels	Apply
CO2	Perform basic economic analysis between alternate water resources perform basic.	Understand
CO3	Apply knowledge for practical implementation of water resources system related solutions in field	Apply
CO4	Evaluate the economic feasibility of water resources engineering projects	Analyse
CO5	Develop analytical skills to formulate and solve stochastic problems for decision making under uncertainty	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	1	2	3	2	3	3	2	3	3	2	-
CO2	3	3	3	2	2	3	3	3	3	2	3	3	2	-
CO3	3	3	3	2	2	3	3	3	3	2	3	3	2	-
CO4	3	3	3	3	2	3	3	3	3	2	3	3	2	-
CO5	3	3	3	3	2	3	3	3	3	2	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	20
Understand	20	20	20
Apply	10	10	30
Analyse	10	10	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

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Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E26 - Water Resources Systems Engineering								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction* Planning, Meaning and Significance. Need for water resources systems planning, Issues in planning. Planning process.	**[09]**
Planning for Water Resouces Development* Statement of objectives. Data requirements. Project formulation. Environmental considerations in planning, Systems analysis. Pitfalls in project planning. Conservation and augmentation of water resources. Multipurpose projects. Functional requirements in multi-purpose project. Compatibility of multipurpose uses.	**[09]**
Water Resources Systems* Concepts of systems engineering in water resources. Objective function, Production function and optimality conditions. Linear, non-linear and dynamic programming, Sensitivity analysis, Stochastic models, Statistical decision theory. Application of water resources systems engineering to practical problems. .	**[09]**
Economic Analysis of Water Resources System** Principles of Engineering Economy, Capital, Interest and Interest Rates, Time Value of Money, Depreciation, Benefit Cost Evaluation, Discounting Techniques, Economic and Financial Evaluation, Socio-Economic Analysis.	**[09]**
Advanced Optimization Techniques** Integer and parametric linear programming - Goal programming models with applications Discrete differential dynamic programming and incremental dynamic programming - Linear decision rule models with application - Stochastic dynamic programming models	**[09]**
Total Hours:	**45**

Text Book(s):	
1.	Chaturvedi. M.C., Water Resources Systems Planning and Management. Tata McGrawHill, New Delhi, 1997
2.	Goodman Alvin S., Principles of Water Resources Planning, Prentice Hall Inc., Englewood Cliffs, New Jersey, 1995.
Reference(s):	
1.	Hall. W.A. and Dracup, J.A. (1975), “Water Resources Systems”, Tata McGraw Hill Pub. N Delhi
2.	Vedula S and P P Mujumdar., (2005) Water Resources System Analysis’ by McGraw Hill Company Ltd.
3.	James D and R. Lee (2005), Water Resources Economics’ Oxford Publishers.
4.	Wagner H.M.,(1993), Principles of Operations Research with Application to Management Decisions, Prentice Hall, India, New Delhi.

***SGD11 – Sustainable Cities and Communities**

**** SDG 9 – Industry Innovation and infrastructures**

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction**	
1.1	Basics of Planning	
1.2	Definition of Planning	1
1.3	Significance and importance of Planning	1
1.4	Need for water resources system.	1
1.5	Issues in Planning	1
1.6	Process of Planning	1
2.0	**Planning for Water Resouces Development**	
2.1	Statement of objectives	1
2.2	Data requirements	1
2.3	Project formulation	1
2.4	Environmental considerations in planning	1
2.5	Pitfalls in project planning	1
2.6	Conservation and augmentation of water resources	1
2.7	Multipurpose projects	1
2.8	Functional requirements in multi-purpose project	1
2.9	Compatibility of multipurpose uses	1
3.0	**Water Resources Systems**	
3.1	Concepts of systems engineering in water resources	1
3.2	Objectives and Function of Water Resources Systems	1
3.3	Production function of Water Resources systems	2
3.4	Linear, non-linear and dynamic programming	2
3.5	Sensitivity analysis and Stochastic models	2
3.6	Application of water resources systems engineering to practical problems. .	1
4.0	**Economic Analysis of Water Resources System**	
4.1	Principles of Engineering Economy	1
4.2	Capital, Interest and Interest Rates	1
4.3	Time Value of Money	1
4.4	Depreciation and its importance's	2
4.5	Benefits of Cost Evaluation	2
4.6	Discounting Techniques	1
4.7	Economic and Financial Evaluation	1
4.8	Socio-Economic Analysis	
5.0	**Advanced Optimization Techniques**	
5.1	Integer and parametric linear programming	1
5.2	Goal programming models with applications	1
5.3	Discrete differential Programming	2
5.4	Incremental dynamic programming	1
5.5	Linear decision rule models with application	2
5.6	Stochastic dynamic programming models	1

Course Designer(s)

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TIRUCHENGODE - 637 215

60 CE E27	Climatic Changes and Adaptation Measures	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To make them aware of the fundamental factors caused for global warming
- To provides clear picture of the atmosphere and its heat transfer through various atmospheric activities.
- To impart knowledge on climatic change impacts in various sectors and its influences scaling the life standard of the influenced human society.
- To understand the role of international bodies like WMO, UNFCCC and IPCC in and adaptation measures for the sustainable earth.
- To strongly emphasis the necessary of innovative technologies to adopt at various levels of each stage in economic growth

Pre-requisites

- Environmental science and engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Summarize the key concepts, definitions on key perspectives of all causes for global warming.	Remember
CO2	Evaluate the mechanisms of Atmosphere and its components connected with global warming	Understand
CO3	Analyze the impact of global warming in climatic change in various fields.	Apply
CO4	Explain various international conferences on carbon emission rate on different regions of world	Remember
CO5	Identify various mitigation and Adaptive measurement planes for climatic change	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	3	-	-	-	-	-	-	3	3	-	3
CO2	3	2	2	2	-	2	-	-	-	-	-	-	-	2
CO3	3	2	3	2	-	3	3	-	-	-	-	-	-	3
CO4	3	2	-	-	-	-	-	-	-	-	2	2	-	2
CO5	3	-	-	-	-	-	-	-	-	-	-	2	-	2

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	40
Understand	20	20	30
Apply	20	20	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E27 - Climatic Changes and Adaptation Measures								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Earth's Climate System* Role of ozone in environment - ozone layer-ozone depleting gases - Green House Effect, Radioactive Effects of Greenhouse Gases - The Hydrological Cycle - Green House Gases and Global Warming – Carbon Cycle	[9]
Atmosphere and its Components* Importance of Atmosphere - Physical Chemical Characteristics of Atmosphere - Vertical structure of the atmosphere Composition of the atmosphere - Atmospheric stability- Temperature profile of the atmosphere - Lapse rates- Temperature inversion - effects of inversion on pollution dispersion	[9]
Impacts of Climate Change** Causes of Climate change: Change of Temperature in the environment - Melting of ice Pole - sea level rise - Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of limit Change – Risk of Irreversible Changes.	[9]
Observed Changes and its Causes** Climate change and Carbon credits – CDM - Initiatives in India - Kyoto Protocol- Intergovernmental Panel on Climate change Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC –Evidences of Changes in Climate and Environment – on a Global Scale and in India	[9]
Climate Change Mitigation and Adaptation Measures** Difference between climate change mitigation and adaptation: Mitigation: Clean Development Mechanism –Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India. Adaptation measures include: using scarce water resources more efficiently; adapting building codes to future climate conditions and extreme weather events; building flood defences and raising the levels of dykes; developing drought-tolerant crops; choosing tree species and forestry practices etc.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2018.
2.	A report on "Adaptation and mitigation of climate change-Scientific Technical Analysis", Cambridge University Press, Cambridge, 2019.
Reference(s):	
1.	Wallace J. M., and Hobbs P. V., "Atmospheric Science", Elsevier - Academic Press, 2019
2.	Van Dam C., "Impacts of Climate Change and Climate Variability on Hydrological Regimes", Cambridge University Press, 2018.
3.	Uitto , "Evaluating Climate Change Action for Sustainable Development", Open access Book, Springer link, 2019
4.	Thomas E., Kristin and Dowin, "The atlas of Climatic change, mapping the world's greatest challenge", University of California press, Berkeley, 2019.

*SDG 3 – Good Health and Well Being
**SDG 7 – Affordable and Clean Energy

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Earth's Climate System**	
1.1	Introduction to earth climate system	1
1.2	Role of ozone in environment	1
1.3	ozone layer	1
1.4	ozone depleting gases	1
1.5	Green house Effect	1
1.6	Radioactive effects of greenhouse Gases	1
1.7	The hydrological cycle	1
1.8	Green house gases and global warming	1
1.9	Carbon cycle.	
2.0	**Atmosphere and its Components**	
2.1	Introduction about atmosphere and its components	1
2.2	Importance of Atmosphere	1
2.3	Physical Chemical Characteristics of Atmosphere	1
2.4	Vertical structure of the atmosphere	1
2.5	Composition of the atmosphere	1
2.6	Atmospheric stability	1
2.7	Temperature profile of the atmosphere	1
2.8	Lapse rates	1
2.9	Temperature inversion and effects of inversion on pollution dispersion.	1
3.0	**Impacts of Climate Change**	
3.1	Causes of climate change	1
3.2	Change of temperature in the environment	1
3.3	Melting of ice ole	1
3.4	Sea level rise and Impacts of climate change on various sectors	1
3.5	Agriculture, forestry and ecosystem	1
3.6	Water resources	1
3.7	Human health, Industry, Settlement and Society	1
3.8	Methods and scenarios and projected Impacts for different regions	1
3.9	Uncertainties in the projected Impacts and risk of irreversible changes.	1
4.0	**Observed Changes and its Causes**	
4.1	Climate change and Carbon credits	1
4.2	CDM- Initiatives in India	1
4.3	Kyoto protocol	1
4.4	Intergovernmental panel on climate change	1
4.5	Climate sensitivity and feedbacks	1
4.6	The montreal protocol	1
4.7	UNFCCC – IPCC	1
4.8	Evidences of changes in climate and environment	1
4.9	Global scale and in India	1
5.0	**Climate Change Mitigation and Adaptation Measures**	
5.1	Difference between climate change mitigation and adaptation and carbon trading	1
5.2	Biodiesel, natural compost and Eco- friendly plastic	1
5.3	Alternate energy – hydrogen ,bio-fuels, solar energy and wind energy	3
5.4	Mitigation efforts in India	1
5.5	Adaptation measures	1
5.6	Building flood defences and raising the levels of dykes	1
5.7	Choosing tree species and forestry practices etc.	1

Course Designer(s)

1. Dr. S. Ramesh - rameshs@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE E31	Smart Materials and Smart Structures	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To give an insight into the latest developments regarding smart materials and their use in structures
- To provide exposure with a structure which can self-adjust their stiffness with load
- To gain knowledge and understanding of various aspects of measuring techniques
- To Recognize the functioning of sensors, actuators
- To apply the concept signal processing and control systems

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Discriminate the functions and response of instrumented structures and the role of effectors and actuators in smart structures.	Remember
CO2	Apply the concept of Whetstone Bridge in strain measurement and describe the strain measuring techniques using electrical strain gauges	Remember
CO3	Differentiate the Piezoelectric and Electro strictive Material in smart structures.	Understand
CO4	Outline the applications of sensors and actuators in smart structures.	Apply
CO5	Apply the concepts of data acquisition and signal processing in smart structure to minimize the realistic engineering constraint	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	3	-	-	-	-	-	-	-	3
CO2	3	2	-	3	3	2	-	-	-	-	3	-	3	-
CO3	3	2	3	2	-	3	-	3	-	-	-	3	3	3
CO4	3	2	-	3	3	3	-	-	-	-	-	-	3	-
CO5	3	2	2	3	-	-	-	-	-	-	-	3	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	10	-	-	20	-
Understand	20	-	20	-	-	20	-
Apply	20	50	20	50	50	40	50
Analyse	-	50	10	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

R4/ w.e.f. 01.06.2024
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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E.Civil Engineering

60 CE E31 - Smart Materials and Smart Structures

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100

Introduction Introduction to Smart Materials and Structures– Instrumented structures functions and response– Sensing systems – Self-diagnosis – Signal processing consideration.	**[06]**
Measuring Techniques StrainMeasuringTechniquesusingElectricalstraingauges,Types–Resistance–Capacitance–Inductance–Wheatstone bridges – Pressure transducers –– Temperature Compensation – Strain Rosettes.	**[06]**
Sensors Technology – Types of Sensors –– Inductively Read Transducers –Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Fibre Optic Chemical Sensing Systems and Distributed measurement.	**[06]**
Actuators Actuator Techniques –– Multiplexing embedded NiTiNDL actuators. Piezoelectric and Electrostrictive Material – Magneto structure Material –– Electro orheological Fluids–Electromagnetic actuation – Role of actuators and Actuator Materials.	**[06]**
Signal Processing and Control Systems Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as GeometricalProcessors–SignalProcessing–ControlSystem–LinearandNon-Linear.	**[06]**
Practical Excises: • Determination of load on beam specimen using a load cell and LVDT • Develop a earth quake resistant model using shape memory alloy • Monitor the health of the structures using Spectroscopes • Physical Measurement using Piezo Electric Strain measurement. • Actuation systems and effectors. Application forsmartstructures. • Actuator and actuator materials. • Vibration control through shape memoryalloys.	**[30]**
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	BrainCulshaw.“SmartStructureandMaterials”,ArtechHouse–Borton.London-2017.
2.	SrinivasanA. V., ichaclFarland.,“SmartStructures”,CambridgeUniversityPress,NewDelhi2020.

Reference(s):

1.	SrinathS.,“ExperimentalStressAnalysis”,TataMcGraw-Hill,NewDelhi,2018.
2.	DallyJ. W., &RileyW.F.,“ExperimentalStressAnalysis”,TataMcGraw-Hill,NewDelhi,2019
3.	ClarenceW., DeSilva.,“SensorsandActuators”Taylor&Francis, 2017
4.	Nikolay Kirianaki,” DataAcquisition andSignalProcessingforSmartSensors, Wiley,2018

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Introduction**	
1.1	Introduction to Smart Materials and Structures	1
1.2	Instrumented structures functions and response	1
1.3	Sensing systems	1
1.4	Self-diagnosis	1
1.5	Signal processing consideration	1
1.6	Actuation systems and effectors. Application for smart structures.	1
2.0	**Measuring Techniques**	
2.1	Strain Measuring Techniques using Electrical strain gauges, Types	1
2.2	Resistance–Capacitance	1
2.3	Inductance–Wheatstone bridges	1
2.4	Pressure transducers – Load cells	1
2.5	Temperature Compensation	1
2.6	Strain Rosettes.	1
3.0	**Sensors**	
3.1	Technology – Types of Sensors	1
3.2	Physical Measurement using Piezo Electric Strain measurement	1
3.3	Inductively Read Transducers – The LVDT – Fiber optic Techniques	1
3.4	Chemical and Bio-Chemical sensing in structural Assessment	1
3.5	Absorptive chemical sensors – Spectroscopes	1
3.6	Fibre Optic Chemical Sensing Systems and Distributed measurement.	1
4.0	**Actuators**	
4.1	Actuator Techniques – Actuator and actuator materials	1
4.2	Multiplexing embedded NiTiNDL actuators	1
4.3	Piezoelectric and Electrostrictive Material	1
4.4	Magneto structure Material – Shape Memory Alloys	1
4.5	Electro orheological Fluids–Electromagnetic actuation	1
4.6	Role of actuators and Actuator Materials. Vibration control through shape memory alloys.	1
5.0	**Electric and Autonomous Vehicles**	
5.1	**Signal processing and control systems**	1
5.2	Data Acquisition and Processing	1
5.3	Signal Processing and Control for Smart Structures	1
5.4	Sensors as Geometrical Processors	1
5.5	Signal Processing – Control System	1
5.6	Linear and Non-Linear	1
6.0	**Practical Excises**	
6.1	Determination of load on beam specimen using a load cell and LVDT	4
6.2	Develop a earth quake resistant model using shape memory alloy	4
6.3	Monitor the health of the structures using Spectroscopes	4
6.4	Physical Measurement using Piezo Electric Strain measurement.	6
6.5	Evaluate the Actuation systems and effectors.	4
6.6	Demonstrate the lab Actuator for the load movement.	4
6.7	Examine the Vibration control through shape memory alloys.	4

Course Designer(s)

1. Dr.N.Ramesh - rameshn@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE E32	Solid and Hazardous Waste Management	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To understand the solid and hazardous waste sources, characteristics
- To impart knowledge on waste characterization and sampling
- To develop basic understanding about collection and transfer of solid wastes
- To learn the processing techniques of solid wastes
- To know the disposal methods of solid wastes

Pre-requisites

- Environmental Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the sources, characteristics, impacts of solid wastes.	Remember
CO2	Evaluate the composition and source reduction methods.	Understand
CO3	Summarize the methods of collection and transport of solid wastes.	Analyse
CO4	Outline the waste processing techniques & equipments.	Remember
CO5	Explain the disposal methods of solid wastes.	Remember

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	3	-	-	-	2	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	3	-	-	-	2	-	-	2	-
CO4	3	-	-	-	-	2	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	3	-	-	-	2	-	-	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	40	-	30	-	-	32	-
Understand	20	-	10	-	-	62	-
Apply	-	50	-	50	50	--	50
Analyse	-	50	20	50	50	16	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E32 - Solid and Hazardous Waste Management								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100

Sources and Classification of Wastes.* Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management – Elements of integrated waste management - Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes.	[6]
Waste Characterization* Waste generation rates - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – Waste sampling and characterization plan - Practical: Composition of MSW, Determination of Physical and Chemical Properties of MSW.	[6]
Storage, Collection and Transport of Wastes* Handling and segregation of wastes at source – storage and collection of municipal solid wastes – compatibility, storage, labelling and handling of hazardous wastes — hazardouswaste manifests and transport	[6]
Waste Processing Technologies* Objectives of waste processing – material separation and processing technologies – – methods of Composting - Thermal conversion technologies, energy recovery – incineration – solidification & stabilization of hazardous wastes.	[6]
Waste Disposal* Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – siteselection – leachate and landfill gas management – landfill closure and environmental monitoring – landfill remediation.	[6]
Practical: 1. Sampling Procedure for solid waste collection 2. Determination of Density in solid wastes 3. Estimation of Moisture content in solid wastes. 4. Determination of specific gravity in solid wastes 5. Drinking water quality assessment near a landfill site. 6. Irrigation water quality assessment near a landfill site. 7. Leachate extraction from solid and Hazardous waste	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	George Techobanoglous, “llIntegrated Solid Waste Managementll”, McGraw - Hill, 2019.
2.	Sundaresan B. B., and Bhide A. D., “Solid Waste Management, Collection, Processing and Disposal”, Mudrashilpa Offset Printers, 2019.
Reference(s):	
1.	Rao M. N., and Razia Sultana, “Solid and hazardous waste management” BS publications, 2019.
2.	White P. R., Franke M., and Hindle P., “ Integrated Solid Waste Management”, An Aspen Publication,2020
3.	Landrefh P. E., and .Rebers P. A.,, “Municipal Solid Wastes - Problems & Solutions” ,Lewis, 2021
4.	George Tchobanoglous, “Handbook of Solid Waste Management”, 2nd Edition, McGraw - Hill, 2019

*SDG 3 – Good Health and Well Being

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1.0	**Sources and Classification of Wastes**	
1.1	Type of solid and hazardous wastes	1
1.2	Sources of solid and hazardous wastes	1
1.3	Need for solid and hazardous waste management	1
1.4	Elements of integrated waste management	1
1.5	Salient features of Indian legislations on management	1
1.6	Handling of municipal solid wastes, hazardous wastes and biomedical wastes	1
2.0	**Waste Characterization**	
2.1	Waste generation rates	1
2.2	Physical and chemical properties of solid wastes	1
2.3	Biological properties of solid wastes	1
2.4	Hazardous Characteristics and Waste sampling	1
2.5	Source reduction of wastes and Waste exchange and Reuse	1
2.6	Composition of MSW and Determination of Physical and Chemical Properties of MSW	1
3.0	**Storage, Collection and Transport of Wastes**	
3.1	Handling and segregation of wastes at source	1
3.2	Storage and collection of municipal solid wastes	1
3.3	Analysis of Collection systems	1
3.4	Need for transfer and transport	1
3.5	Transfer stations Optimizing waste allocation	1
3.6	Storage, labeling and handling of hazardous wastes	1
4.0	**Waste Processing Technologies**	
4.1	Objectives of waste processing	1
4.2	Material separation and processing technologies	1
4.3	Biological & chemical conversion technologies	1
4.4	Methods of Composting	1
4.5	Thermal conversion technologies and Incineration and types	1
4.6	Solidification & stabilization of hazardous wastes	1
5.0	**Waste Disposal**	
5.1	Waste disposal options	1
5.2	Disposal in landfills	1
5.3	Landfill Classification, types and methods	1
5.4	Design and operation of sanitary landfill	1
5.5	Leachate and landfill gas management	1
5.6	Landfill bio reactors	1
Practical:		
1.	Sampling Procedure for solid waste collection	4
2.	Determination of Density in solid wastes	2
3.	Estimation of Moisture content in solid wastes.	2
4.	Determination of specific gravity in solid wastes	2
5.	Drinking water quality assessment near a landfill site.	8
6.	Irrigation water quality assessment near a landfill site.	8
7.	Leachate extraction from solid and Hazardous waste	4

Course Designer(s)

1. Dr.S. Ramesh - rameshs@ksrct.ac.in

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E33	Ground Improvement Techniques	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To learn the basics of various factors influencing compaction
- To know Treatment of various soil conditions.
- To evaluate the behavior of stabilization of soil
- To understand the concepts of basic mechanism of reinforced earth.
- To enhance the ability to design and Stabilization of expansive clays

Pre-requisites

- Foundation Engineering
- Soil Mechanics

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand various types of ground improvement.	Remember
CO2	Solve the dewatering techniques.	Understand
CO3	Compute the Dynamic compaction Virilization.	Remember
CO4	Describe the various methods of grouting for treated.	Apply
CO5	Analyse the Soil improvement by adding materials.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	-	-	-	-	2	2	-	-	2	-
CO2	3	3	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	3	-	2	-	-	-	-	2	2	-	-	2	-
CO4	3	-	-	2	-	-	-	-			-	-	2	-
CO5	3	-	-	-	-	-	-	-	2	2		2	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	10	20	10	-	34	-
Understand	10	10	10	10	-	66	-
Apply	10	30	10	30	50	-	50
Analyse	20	50	20	50	50	-	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E33 - Ground Improvement Techniques								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100

Dewatering * Introduction – Scope and necessity of ground improvement in Geotechnical engineering basic concepts. Drainage: Ground Water lowering by well points, deep wells, vacuum and electro osmotic methods; Stabilization by thermal and freezing techniques - Applications.	[6]
Compaction and Sand Drains In-situ compaction of granular and cohesive soils, Shallow and Deep compaction methods – Sand piles – Concept, design, factors influencing compaction. Blasting and dynamic consolidation – Preloading with sand drains, fabric drains, wick drains etc. – Theories of sand drain – design and relative merits of various methods.	[6]
Stone Column, Lime Piles and Soil Nailing Systems* Stone column, lime piles – Functions – Methods of installation – design, estimation of load carrying capacity and settlement. Root piles and soil nailing – methods of installation – Design and Applications - Soil liquefaction mitigation methods - case studies.	[6]
Earth Reinforcement * Earth reinforcement – Principles and basic mechanism of reinforced earth, simple design: Synthetic and natural fibre-based Geotextiles and their applications. Filtration, drainage, separation, erosion control – case studies.	[6]
Grouting** Grouting – Types of grout – Suspension and solution grouts – Basic requirements of grout. Grouting equipment – injection methods – jet grouting – grout monitoring – Electro – Chemical stabilization – Stabilization with cement, lime - Stabilization of expansive clays – case studies.	[6]
Practical: 1. Identify the Parts of Grouting and Guniting 2. Check the Condition of Groundwater and drainage 3. Identify and check the circuit connection of Starting, Charging System and Lighting System of a Grouting plant 4. Do the Blasting and dynamic consolidation of selected area 5. Identify the estimation of load carrying capacity and settlement 6. Identify the mechanics of sand drains and installation 7. Identify the Parts of soil nailing tools with modelling 8. Check the natural fibre-based Geotextiles, tensile strength 9. Identify the Parts of Chemical stabilization and strength of equipment 10. Identify the Soil liquefaction and mitigation	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Day, R.W., **Foundation Engineering Handbook**, McGraw – Hill Companies, Inc, 2018.
2.	Vaidyanathan, C.V., and Srinivasalu, P., Handbook of Machine Foundations, McGraw Hill, 2019.
Reference(s):	
1.	Jewell, R.A., Soil Reinforcement with Geotextiles, CIRIA, London, 2019.
2.	Das B.M., Principles of Soil Dynamics, McGraw Hill, 2019
3.	Swami Saran, Soil Dynamics and Machine Foundation, Galgotia Publications Pvt. Ltd. New Delhi 2020.
4.	Moore, P.J.,Analysis and Design of Foundations for Vibrations, Oxford and IBH, 2019

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Dewatering**	
1.1	Introduction – about dewatering	1
1.2	Basic definitions, Scope and necessity of ground improvement in Geotechnical engineering basic concepts	1
1.3	Drainage for dewatering, Ground Water lowering by well points and deep wells	1
1.4	Ground Water lowering by vacuum and electro osmotic methods	1
1.5	Viscous damping	1
1.6	Stabilization by thermal and freezing techniques and applications	1
2.0	**Compaction and Sand Drains**	
2.1	In-situ compaction of granular and cohesive soils	1
2.2	Shallow, Deep compaction methods and Sand piles	1
2.3	Concept, design, factors influencing compaction	1
2.4	Blasting and dynamic consolidation	1
2.5	Preloading with sand drains, fabric drains, wick drains etc	1
2.6	Theories of sand drain, Design and relative merits of various methods	1
3.0	**Stone Column, Lime Piles and Soil Nailing.**	
3.1	Introduction to Stone column and lime piles	1
3.2	Functions and Methods of installation	1
3.3	Design, estimation of load carrying capacity and settlement.	1
3.4	Root piles and soil nailing	1
3.5	methods of installation, Design and Applications	1
3.6	Soil liquefaction mitigation methods, case studies	1
4.0	**Earth Reinforcement**	
4.1	Earth reinforcement	1
4.2	Principles and basic mechanism of reinforced earth	1
4.3	Simple design	1
4.4	Synthetic and natural fibre-based Geotextiles and their applications	1
4.5	Filtration, drainage, separation.	1
4.6	Erosion control and case studies.	1
5.0	**Grouting**	
5.1	Grouting and Types of grout	1
5.2	Suspension and solution grouts	1
5.3	Basic requirements of grout. Grouting equipment	1
5.4	Methods of injection and Use of jet grouting and grout monitoring	1
5.5	Electro – Chemical stabilization and Stabilization with cement	1
5.6	Lime - Stabilization of expansive clays and case studies.	1
Practical:		
1.	Identify the Parts of Grouting and Guniting	4
2.	Check the Condition of Groundwater and drainage	2
3.	Identify and check the circuit connection of Starting, Charging System and Lighting System of an Grouting plant	2
4.	Do the Blasting and dynamic consolidation of selected area	2
5.	Identify the estimation of load carrying capacity and settlement	4
6.	Identify the mechanics of sand drains and installation	2
7.	Identify the Parts of soil nailing tools with modelling	4
8.	Check the natural fibre-based Geotextiles, tensile strength	4
9.	Identify the Parts of Chemical stabilization and strength of equipment	2
10.	Identify the Soil liquefaction and mitigation	4

Course Designer(s)

1. Dr.D.Siva Kumar - sivakumard@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE E34	Urban Planning and Development	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To acquire basic knowledge on issues related to urban planning
- To gain knowledge about various process of urban planning and development
- To learn the formulation of urban plans and approval process
- To select the various urban planning projects and execute in the field
- To analyze the rules and legislation related to urban planning

Pre-requisites

- Fundamentals of planning and basic rules about planning

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Urban design terminologies, basic issues & definition	Remember
CO2	Relevance of Urban design in Planning & Architecture.	Remember
CO3	Urban design Theory and Principles.	Remember
CO4	Designing of appropriate rural development policies and programs and need for integrated approach to planning.	Analyse
CO5	History of urban planning and rules, legislation, policy making in modern cities and to assess the project.	Remember

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	2		-	3	-	-		-	-	2
CO2	-	-	-	-	-	2	-	-	-	3		-	-	2
CO3	1	2	1	3	-		3	-	-	-	2	-	-	2
CO4	-	-	-	-	-	2	-	-	1	-		3	-	2
CO5	2	1	3	-	-	3	-	-	-	-	3	-	-	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	10
Apply	10	10	20
Analyse	10	10	20
Evaluate	10	10	10
Create	10	10	30
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E34 – Urban Planning and Development

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	40	60	100

Basic Issues* Definition of Human settlement, Urban area, Town, City, Urbanization, Suburbanization, Urban sprawl, Peri - urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanization at International, National, Regional and State level.	[6]
Planning Process* Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design.	[6]
Development Plans, Plan Formulation and Evaluation** Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights, Special Economic Zones-Development of small town and smart cities-case studies.	[6]
Planning And Design of Urban Development Projects** Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.	[6]
Legislation, Developmentand Management of Urban System** Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.	[6]
Practical: 1. Conduct a study to classify a local urban area into categories such as CBD, suburban, and peri-urban areas. 2. Analyze urbanization trends at the national or regional level using demographic data. 3. Develop and administer a survey to collect data on community needs 4. Create a simplified master plan for a small town or city, focusing on zoning 5. Perform a site analysis for a proposed urban development project and create a layout plan. 6. Evaluate the impact of local development control rules on urban growth and land use. **7.** Analyze a case study related to the implementation of the Town and Country Planning Act	[30]
Total Hours: (Lecture - 30; Practical - 30)	60

Text Book(s):	
1.	Goel S.L., “Urban Development and Management”, Deep and Deep Publications, New Delhi, 2002.
2.	George Chadwick., “A Systems view of Planning”, Pergamon Press, Oxford 1978.
Reference(s):	
1.	Thooyavan K.R., “Human Settlements – A Planning Guide to Beginners”, M.A Publications, Chennai, 2005.
2.	Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai.
3.	CMDA, “Second Master Plan for Chennai”, Chennai 2008.

*SDG 4 – Quality Education

**SDG 3 – Good Health and Well Being

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basic Issues**	
1.1	Definition of Human settlement, Urban area, Town, City, Urban	1
1.2	Peri - urban areas	1
1.3	Urbanization	1
1.4	Suburbanization & sprawl	2
1.5	Central Business District (CBD) & Classification of urban areas	2
1.6	Trend of Urbanization at International, National, Regional and State level	2
2.0	**Planning Process**	
2.1	Principles of Planning	1
2.2	Types and Level of Plan	2
2.3	Stages in Planning Process	1
2.4	Goals of Planning Areas	1
2.5	Objectives of Planning Areas	1
2.6	Delineation of Planning Areas	1
2.7	Surveys and Questionnaire Design	
3.0	**Development Plans, Plan Formulation And Evaluation**	
3.1	Scope and Content of Regional Plan	1
3.2	Scope and Content of Master Plan	1
3.3	Scope and Content of Detailed Development Plan	1
3.4	Development Control Rules	1
3.5	Transfer of Development Rights	2
3.6	Special Economic Zones	2
3.7	Development of small town and smart cities-case studies.	1
4.0	**Planning and Design of Urban Development Projects**	
4.1	Site Analysis	1
4.2	Layout Design	1
4.3	Planning Standards,	1
4.4	Project Formulation & Evaluation	1
4.5	Plan Implementation	2
4.6	Constraints and Implementation	1
4.7	Financing of Urban Development Projects	2
5.0	**Legislation, Development and Management of Urban System**	
5.1	Town and Country Planning Act	1
5.2	Land Acquisition and Resettlement Act	2
5.3	Urban Planning Standards and Regulations	1
5.4	Involvement of Public & Private Agencies	2
5.5	Involvement of NGO & CBO	2
5.6	Involvement of Beneficiaries	1
	Practical	
1	Conduct a study to classify a local urban area into categories such as CBD, suburban, and peri-urban areas.	4
2	Analyze urbanization trends at the national or regional level using demographic data.	4

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

3	Develop and administer a survey to collect data on community needs	4
4	Create a simplified master plan for a small town or city, focusing on zoning	4
5	Perform a site analysis for a proposed urban development project and create a layout plan.	4
6	Evaluate the impact of local development control rules on urban growth and land use.	4
7	Analyze a case study related to the implementation of the Town Planning Act	4
8	Analyze a case study related to the implementation of the Country Planning Act	2

Course Designer(s)

1. Dr.S.Gunasekar - gunasekar@ksrct.ac.in

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60 CE E35	Quality Control and Assurance	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To understand project quality management principles and factors in construction for efficient project delivery.
- To learn quality systems standards and implementation processes for effective project quality assurance.
- To master quality control methodologies specific to construction projects for compliance and excellence.
- To explore quality assurance and control techniques to minimize risks and optimize project outcomes.
- To acquire knowledge of quality improvement techniques to drive innovation and efficiency in construction practices.

Pre-requisites

- Construction Materials & Management

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate the project quality management principles for successful project delivery.	Understand
CO2	Implement quality systems standards and procedures for certification in construction projects.	Apply
CO3	Execute quality control measures to ensure compliance with standards and client satisfaction.	Apply
CO4	Improve quality assurance processes using analysis techniques to enhance project outcomes.	Analyse
CO5	Utilize improvement techniques for optimized construction activities and environmental considerations.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	2	3	-	2	-	3	2	3	2	2	3
CO2	3	-	-	2	3	-	2	-	3	2	3	2	2	3
CO3	3	-	-	2	3	-	2	-	3	2	3	2	2	3
CO4	3	-	-	2	3	-	2	-	3	2	3	2	2	3
CO5	3	-	-	2	3	-	2	-	3	2	3	2	2	3
3 - Strong; 2 - Medium; 1 – Some-														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	10	-	-	20	-
Understand	20	-	20	-	-	20	-
Apply	20	50	20	50	50	40	50
Analyse	-	50	10	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E35 – Quality Control and Assurance								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100

Project Quality Management* Introduction – Definitions and objectives, Factors influencing construction quality. Responsibilities and authority – Quality plan & Check list – Quality Management Guidelines	[6]
Quality Systems* Introduction – Quality system standard, Requirements. Preparing Quality System Documents – Quality related training – Implementing a Quality system	[6]
Quality Control on Construction Projects* Quality Policy in Construction industry – Consumers satisfaction – Ergonomics – Time of Completion – Masonry, Concrete and steel works – Testing techniques and quality at reports	[6]
Quality Assurance and Control* Techniques and needs of QA/QC – Different aspects of quality – Appraisals – Factors influencing construction quality – Critical – Six sigma – Introduction – Tools – Process - Optimum design	[6]
Quality Improvement Techniques* Selection of new materials – Influence of drawings – Detailing – Specification – Standardization – Bid preparation – Construction activity – Environmental safety – Social and Environmental factors	[6]
Practical Exercises 1. Prepare quality plan for the given set of industrial drawings 2. Prepare a checklist to ensure the quality of slab concreting, tailored to the specified area and materials. 3. Determine the soundness of quick setting cement 4. Perform non-destructive test for existing concrete beam using Digital Rebound hammer 5. Perform non-destructive test for existing concrete column using Digital Ultrasonic pulse velocity meter 6. Perform slump test for fiber reinforced concrete 7. Prepare bid for the structural steel work and painting for the given structural drawings 8. Prepare a drawing for ductile detailing of beams and columns conforming to IS 13920.	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Abdul Razzak Rumane, “Quality Management in Construction Projects”, CRC Press, United States, 2017
2.	Tim Howarth, David Greenwood, “Construction Quality Management: Principles and Practice”, Routledge, United States, 2018
Reference(s):	
1.	Kim H. Pries and Jon M. Quigley, “Total Quality Management for Project Management”, CRC Press,United States, 2012
2.	Peter Fewings, Peter Fewings, Christian Henjewele, “Construction Project Management”, Routledge, United States 2019
3.	“Quality Management in Construction: Theoretical and Practical Aspects”, Routledge, United States, 2018
4.	IS 13920 : 1993 – “Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces” – Code of Practice, BIS, New Delhi

*SDG 9 – Industry Innovation and Infrastructure

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1.0	**Project Quality Management**	
1.1	Introduction to Project Quality Management	1
1.2	Definitions and Objectives	1
1.3	Identifying Key Influencers and Variables	1
1.4	Roles and Accountability in Ensuring Quality	1
1.5	Quality Plan Development	1
1.6	Best Practices and Strategies for Effective Quality Management	1
2.0	**Quality Systems**	
2.1	Introduction to Quality Management Systems	1
2.2	Understanding Quality System Standards and Requirements	1
2.3	Developing Quality System Documents: Procedures, Manuals, and Records	1
2.4	Quality-Related Training: Importance and Strategies	1
2.5	Implementation of a Quality System: Planning and Execution	1
2.6	Monitoring and Continuous Improvement in Quality Systems	1
3.0	**Quality Control on Construction Projects**	
3.1	Quality Policy in the Construction Industry: Principles and Implementation	1
3.2	Ensuring Consumer Satisfaction in Construction Projects	1
3.3	Ergonomics in Construction: Enhancing Safety and Efficiency	1
3.4	Time Management in Construction: Strategies for Timely Completion	1
3.5	Quality Considerations in Masonry, Concrete, and Steel Works	1
3.6	Testing Techniques and Quality Reporting in Construction: Best Practices and Standards	1
4.0	**Quality Assurance and Control**	
4.1	Introduction to QA/QC in Construction	1
4.2	Techniques and Needs of QA/QC	1
4.3	Different Aspects of Quality in Construction	1
4.4	Appraisal Techniques for Construction Quality	1
4.5	Factors Influencing Construction Quality	1
4.6	Six Sigma in Construction	1
5.0	**Quality Improvement Techniques**	
5.1	Selection of New Materials	1
5.2	Influence of Drawings on Quality	1
5.3	Detailing in Construction	1
5.4	Detailed Specifications to Ensure Compliance and Quality Assurance	1
5.5	Standardization in Construction	1
5.6	Bid Preparation and Quality Considerations	1
Practical:		
1.	Prepare quality plan for the given set of industrial drawings	4
2.	Prepare a checklist to ensure the quality of slab concreting, tailored to the specified area and materials	4
3.	Perform non-destructive test for existing concrete beam using Digital Rebound hammer	4
4.	Determine the soundness of quick setting cement	2
5.	Perform non-destructive test for existing concrete column using Digital Ultrasonic pulse velocity meter	4
6.	Perform slump test for fiber reinforced concrete	4
7.	Prepare bid for the structural steel work and painting for the given structural drawings	4
8.	Prepare a drawing for ductile detailing of beams and columns conforming to IS 13920	4

Course Designer(s)

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TIRUCHENGODE - 637 215

60 CE E36	Groundwater Engineering	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To introduce the student to the Characteristics of different aquifers.
- To make the students understand about groundwater well hydraulics.
- To understand the techniques of development and management of groundwater.
- To know the quality of groundwater and regulatory requirements.
- To impart knowledge on groundwater conservation measures.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	State the aquifer properties and its dynamics.	Remember
CO2	Solve well design and practical problems.	Understand
CO3	Demonstrate a model for groundwater management.	Apply
CO4	Describe the importance of groundwater quality concepts and legislations.	Apply
CO5	Execute the conservation measures of groundwater.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	1	-	-	2	-	-	1	1	2	3	-
CO2	3	3	3	2	-	-	3	-	-	1	-	2	3	2
CO3	3	3	3	2	-	-	3	-	-	1	1	2	3	2
CO4	3	3	3	2	-	-	3	1	-	2	-	2	2	-
CO5	3	3	3	2	-	-	2	-	-	1	1	2	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	20	-	-	34	-
Understand	30	-	30	-	-	46	-
Apply	10	50	10	50	50	20	50
Analyse	-	50	-	50	50	-	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E36 - Groundwater Engineering

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100

Hydrogeological Parameters** Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation –Steady state flow - Darcy's Law - Groundwater Velocity.	[6]
Well Hydraulics** Unsteady state flow - tests - Image well theory – Partial penetrations of wells – Well losses – Specific Capacity and Safe yield - Collector well and Infiltration gallery.	[6]
Groundwater Management** Need for Management Model – Database for Groundwater Management – Groundwater balance study – Introduction to Mathematical model – Development of a model.	[6]
Groundwater Quality* Ground water chemistry - Origin, movement and quality - Water quality standards – Drinking water – Industrial water – Irrigation water - Ground water Pollution and legislation.	[6]
Groundwater Conservation** Artificial recharge techniques – Reclaimed wastewater recharge – Soil aquifer treatment (SAT) - Seawater Intrusion and Remediation – Ground water Basin management and Conjunctive use.	[6]
Practical: 1. Use analog models to explore the behavior of groundwater 2. Preparation of water table contour maps 3. Sieve analysis for gravel and well screens design 4. Estimating specific yield and specific retention 5. Create an aquifer and study the properties 6. Determination of Groundwater flow using simulation models 7. Determination of Groundwater contamination using simulation models 8. Estimation of groundwater recharge potential	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Raghunath H.M., "Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010.
2.	Todd D.K., "Ground Water Hydrology", John Wiley and Sons, New York, 2011.

Reference(s):

1.	Fitts R Charles, "Groundwater Science". Elsevier, Academic Press, 2012.
2.	Bear J., "Hydraulics of Groundwater", McGrow-Hill International, 1979.
3.	Karanth KR., "Ground Water Assessment, Development & Management", Tata Mc Graw Hill Co. Ltd., New Delhi, 2004
4.	Rastogi A.K., Numerical Groundwater Hydrology, 2011.

* SDG 6 – Clean Water and Sanitation

** SDG 12 – Responsible Consumption and Protection

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Hydrogeological Parameters**	
1.1	Introduction	1
1.2	Water bearing Properties of Rock	1
1.3	Type of aquifers, Aquifer properties	1
1.4	Permeability, specific yield, Transmissivity and storage coefficient	1
1.5	Steady state flow, Darcy's Law	1
1.6	Groundwater Velocity	1
2.0	**Well Hydraulics**	
2.1	Unsteady state flow	1
2.2	Tests	1
2.3	Image well theory, Partial penetrations of wells	1
2.4	Well losses	1
2.5	Specific Capacity and Safe yield	1
2.6	Collector well and Infiltration gallery	1
3.0	**Groundwater Management**	
3.1	Need for Management Model	1
3.2	Database for Groundwater Management	1
3.3	Groundwater balance study	1
3.4	Introduction to Mathematical model	1
3.5	Development of a model	2
4.0	**Groundwater Quality**	
4.1	Ground water chemistry	1
4.2	Origin, movement and quality	1
4.3	Water quality standards - Drinking water	1
4.4	Industrial water	1
4.5	Irrigation water	1
4.6	Ground water Pollution and legislation	1
5.0	**Groundwater Conservation**	
5.1	Artificial recharge techniques	1
5.2	Reclaimed wastewater recharge	1
5.3	Soil aquifer treatment (SAT)	1
5.4	Seawater Intrusion and Remediation	1
5.5	Ground water Basin management	1
5.6	Conjunctive use	1
Practical:		
1.	Use analog models to explore the behavior of groundwater	2
2.	Preparation of water table contour maps	4
3.	Sieve analysis for gravel and well screens design	4
4.	Estimating specific yield and specific retention	2
5.	Create an aquifer and study the properties	2
6.	Determination of Groundwater flow using simulation models	4
7.	Determination of Groundwater contamination using simulation models	4
8.	Estimation of groundwater recharge potential	2

Course Designer(s)

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E41	Prefabricated Structures	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the principles and advantages of prefabrication in construction
- To analyze the behavior of prefabricated structural components
- To apply design principles for disuniting structures and cross section efficiency
- To develop skills in designing joints for different structural connections
- To gain knowledge on design of prefabricated structures subjected to abnormal loads

Pre-requisites

- Strength of Materials and Structural Analysis & Design

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Integrate prefabrication principles for efficient construction, ensuring optimal material use and standardized systems.	Understand
CO2	Analyze and integrate prefabricated components effectively into structural designs for optimal performance.	Analyse
CO3	Implement design strategies to address structural disunity, optimize cross-sections, and accommodate joint flexibility.	Apply
CO4	Design various structural joints accurately, considering dimensions and expansion requirements for resilience.	Apply
CO5	Evaluate structures for abnormal loads, incorporating code provisions to prevent progressive collapse and ensure safety.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	2	-	-	-	-	-	2	2	-	-	3	2
CO2	2	2	2	2	-	-	-	-	2	2	-	-	3	2
CO3	2	2	3	2	2	-	-	-	2	2	-	-	3	2
CO4	2	2	3	2	2	-	-	-	2	2	-	-	3	2
CO5	2	2	3	2	3	-	-	-	2	2	-	-	3	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	20	30	30
Analyse	20	10	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E41 - Prefabricated Structures

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction* Need for prefabrication - Principles - Materials - Modular coordination - Standardization - Modularisation - Systems - Production - Transportation - Lifting & Erection.	[8]
Prefabricated Components* Behaviour of structural components - Large panel constructions - Construction of roof and floor slabs - Wall panels - Columns - Shear walls.	[9]
Design Principles* Disuniting of structures - Design of cross section based on efficiency of material used - Problems in design because of joint flexibility - Allowance for joint deformation.	[10]
Joint in Structural Members* Joints for different structural connections - Dimensions and detailing - Design of expansion joints.	[8]
Design for Abnormal & Other Loads* Progressive collapse - Code provisions - Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc. Importance of avoidance of progressive collapse - Fire resistant design considerations.	[10]
Total Hours:	**45**

Text Book(s):

1.	Kim S. Elliott, "Precast Concrete Structures", 2nd Edition, CRC Press, United States, 2017
2.	Construction and Design Manual - Prefabricated Housing, DOM Publishers, Mumbai, 2020

Reference(s):

1.	Knaack, Chung-Klatte, Hasselbach, “Prefabricated Systems - Principles of Construction” Birkhauser Publisher, Switzerland, 2012
2.	Mokk L., “Prefabricated Concrete for Industrial and Public Structures”, Publishing House of the Hungarian Academy of Sciences, Budapest, 2007.
3.	“Handbook on Precast Concrete Buildings”, Indian Concrete Institute, 2016.
4.	IS 15658 :2006, “Precast Concrete Blocks for Paving”, Bureau of Indian Standards”, New Delhi.

*SDG 9 – Industry Innovation and Infrastructure

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Introduction to the course	1
1.2	Need for prefabrication - Principles	1
1.3	Materials for prefabrication	1
1.4	Modular Coordination and Standardization	1
1.5	Modularization and Systems	1
1.6	Production Techniques for Prefabrication	1
1.7	Transportation and Logistics	1
1.8	Lifting & Erection techniques	1
2.0	**Prefabricated Components**	
2.1	Introduction to Structural Components	1
2.2	Structural Behavior and Analysis	1
2.3	Large Panel Constructions	1
2.4	Construction of Roof Slabs	1
2.5	Construction of Floor Slabs	1
2.6	Wall Panel Construction	1
2.7	Construction of Columns & Shear walls	2
2.8	Integration and Coordination of Structural Components	1
3.0	**Design Principles**	
3.1	Principles of Disuniting Structures	1
3.2	Structural Integrity and Material Efficiency	2
3.3	Joint Flexibility in Structural Design	1
3.4	Joint Deformation & Problems	2
3.5	Importance of Joint Analysis in Design & Factors Affecting Joint Flexibility	2
3.6	Techniques for Assessing Joint Deformation & Design Strategies for Accommodating Joint Deformation	2
4.0	**Joint in Structural Members**	
4.1	Introduction to Structural Joints	1
4.2	Connection methods in Prefabricated construction	1
4.3	Connection design for structural integrity and performance	2
4.4	Principles of dimensioning prefabricated elements	1
4.5	Detailing considerations	2
4.6	Design of Expansion Joints	1
5.0	**Design for Abnormal & Other Loads**	
5.1	Abnormal loads and its impact on Prefabricated structures	2
5.2	Progressive collapse - Code provisions	1
5.3	Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc.,	3
5.4	Importance of avoidance of progressive collapse	2
5.5	Fire resistant design considerations.	2

Course Designer(s)

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E42	Industrial Waste Management	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To examine the characteristics of industrial wastes
- To acquire knowledge on waste minimization & management approach.
- To learn the pollution from major industries and methods of controlling the same
- To select the various treatment Technologies.
- To analyze the hazardous wastes and impacts

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Classify the industrial pollution.	Remember
CO2	Apply knowledge to waste minimization and waste management system.	Apply
CO3	Identify the various sources and characteristics major industries.	Understand
CO4	Illustrate the various treatment technologies adopted for industrial pollution.	Understand
CO5	Analyse the hazardous wastes impacts.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	3	-	-	3	3	-	-	-	3
CO2	3	2	-	-	3	3	-	2	-	-	-	-	-	3
CO3	3	3	3	3	-	3	-	-	3	2	-	-	-	3
CO4	3	2	2	2	-	2	-	-	-	-	-	-	2	-
CO5	3	3	2	-	-	-	-	-	2	3	-	2	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	40	-	20
Understand	--	40	40
Apply	20	-	20
Analyse	-	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E42 - Industrial Waste Management

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction * Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent –Effects of industrial effluents on streams, sewer, land and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes.	[9]
Waste Minimization and Management* Waste management approach – Waste audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery	[9]
Pollution from Major Industries Report on sources, characteristics, management of waste: Textiles Industries - Dairy Industries - Sugar Industries - SIPCOT Industrial estate - Steel plant - Agro industries.	[9]
Treatment Technologies Report submission for the waste treatment methodologies: Equalization – Neutralization – Removal of suspended and dissolved organic solids – Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes.	[9]
Hazardous Waste Management* Introduction – Impacts on land and human health – Physico chemical treatment – Solidification, Incineration – Secured landfills – Leachate collection and treatment.	[9]
Total Hours:	**45**

Text Book(s):

1.	Rao M. N. & Dutta A. K., “Wastewater Treatment”, Oxford - IBH Publication, 2019
2.	Eckenfelder W. W., “Industrial Water Pollution Control”, McGraw-Hill Higher Education, 2018

Reference(s):

1.	Freeman H. M., “Industrial Pollution Prevention Hand Book”, McGraw-Hill Inc., New Delhi, 2005.
2.	Metcalf and Eddy,”Waste water Engineering Treatment and Resource Recovery”, McGraw-Hill Inc., New Delhi, 2014.
3.	Bhatia H. S., “Industrial waste and its management”, Misha Books; First edition , 2019.
4.	Vimalkumar. “ Industrial processes and waste stream management”, Scitus publications, 2018.

*SDG: 7 – Affordable and Clean Energy

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Types of industries and industrial pollution	1
1.2	Characteristics of industrial wastes	1
1.3	Population equivalent	2
1.4	Effects of industrial effluents on streams, sewer, land and human health	2
1.5	Environmental legislations	1
1.6	Hazardous wastes.	2
2.0	**Waste Minimization and Management**	
2.1	Waste management approach	2
2.2	Waste audit	1
2.3	Volume reduction	2
2.4	Strength reduction	2
2.5	Material and process modifications	2
3.0	**Pollution from Major Industries**	
3.1	Report on sources	2
3.2	characteristics, management of waste	1
3.3	Textiles Industries	1
3.4	Dairy Industries	1
3.5	Sugar Industries	1
3.6	SIPCOT Industrial estate	1
3.7	Steel plant	1
3.8	Agro industries	1
4.0	**Treatment Technologies**	
4.1	Report submission for the waste treatment methodologies:	1
4.2	Equalization	2
4.3	Neutralization	1
4.4	Removal of suspended and dissolved organic solids	1
4.5	Chemical oxidation	1
4.6	Adsorption	1
4.7	Removal of dissolved inorganics	1
4.8	Combined treatment of industrial and municipal wastes.	1`
5.0	**Hazardous Waste Management**	
5.1	Introduction	1
5.2	Impacts on land and human health	1
5.3	Physico chemical treatment	1
5.4	Solidification	2
5.5	Incineration	1
5.6	Secured landfills	1
5.7	Leachate collection and treatment	2

Course Designer(s)

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TIRUCHENGODE - 637 215

60 CE E43	Reinforced Earth and Geotextiles	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the basics of various dynamic forces and its effects on the structure
- To enhance the ability to identify the mode shapes of the structure under dynamic loading
- To understand the concepts of engineering seismology
- To understand the fundamentals on response of structural buildings
- To enhance the ability to design an earthquake resistant structure by using IS codal provisions

Pre-requisites

- Foundation Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Illustrate the principles and mechanisms of reinforced soil.	Remember
CO2	Evaluate applications of reinforced soil.	Understand
CO3	Illustrate the issues of stability and construction of Reinforced Earth Wall.	Apply
CO4	Analyse the durability of reinforcing materials.	Analyse
CO5	Illustrate the application of reinforced soil in Civil Engineering	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	-	-	-	-	2	2	-	-	2	-
CO2	3	2	3	-	-	-	-	-			-	-	2	-
CO3	3	2	2	-	-	-	-	-	2	2	-	-	2	-
CO4	3	2	3	-	-	-	-	-			-	-	-	-
CO5	3	2	3	-	-	-	-	-	2	2	-	2	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	15
Understand	10	10	15
Apply	10	10	30
Analyse	20	20	60
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E43 – Reinforced Earth and Geotextiles

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction to Reinforcement Introduction - Reinforcement action – Mechanism of reinforced soil - Component materials and their properties – fill, various types of reinforcements with advantages, disadvantages, facings.	[9]
Reinforcement Components and Structures Reinforced soil retaining walls - Construction methods of reinforced retaining walls - Bearing capacity improvement using soil reinforcement - Concept of Geocells, encased stone columns, prefabricated vertical drains, geocomposites, soil nailing, geotubes, geobags.	[9]
Introduction to Geotextiles Introduction - Historical development – Geotextile fibres - Natural fibres, synthetic fibres - Classification based on manufacturing: woven, knitted, stich bonded, non-woven, geogrid, geomembranes, geocomposites, geopipes.	[9]
Properties and Functions of Geotextiles Properties: Physical properties, Mechanical properties, Hydraulic properties – Functions: Reinforcement, Separation, Filtration, Drainage, Sealing Function, Confinement.	[9]
Applications of Geotextiles Road works, railway works, river canals and coastal work, drainage, building construction and maintenance, retaining walls, waste landfills, breakwaters, agriculture, geotextiles and the environment.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Sivakumar Babu, G.L., An Introduction to Soil Reinforcement and Geosynthetics, 1st Edition, Orient Blackswan, 2021.
2.	Swami Saran, Reinforced Soil and its Engineering Applications, 1st Edition, IK International (P) Ltd., 2021.
Reference(s):	
1.	Koerner, R.M., Design with Geosynthetics, 5 th Edition, Pearson Prentice Hall, 2018
2.	Damodarasamy S.R.,& Kavitha.S., “Basics of Structural Dynamics and Aseismic Design”, PHI Learning Pvt.Ltd New Delhi. 2019.
3.	S.K.Duggal, “Earthquake Resistant Design of Structures”, Oxford University Press, 2018.
4.	Indian Standard Codes: IS: 1893, IS: 4326 and IS:13920, Bureau of Indian Standards, New Delhi.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 3 – Good Health and Well Being

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Reinforcement**	
1.1	Introduction	1
1.2	Reinforcement action	1
1.3	Mechanism of reinforced soil	1
1.4	Component materials and their properties	1
1.5	Fill materials	1
1.6	Various types of reinforcements with advantages	1
1.7	Various types of reinforcements with disadvantages	1
1.8	Facings	1
2.0	**Reinforcement Components and Structures**	
2.1	Reinforced soil retaining walls	2
2.2	Construction methods of reinforced retaining walls	1
2.3	Bearing capacity	1
2.4	Improvement using soil reinforcement	2
2.5	Concept of Geocells, encased stone columns	2
2.6	Prefabricated vertical drains	
2.7	Geocomposites	
2.8	Soil nailing	
2.9	Geotubes, geobags	
3.0	**Introduction to Geotextiles**	
3.1	Introduction	1
3.2	Historical development	1
3.3	Geotextile fibres	1
3.4	Natural fibres, synthetic fibres	1
3.5	Classification based on manufacturing	1
3.6	Woven, knitted, stich bonded	1
3.7	Non-woven, geogrid	1
3.8	Geomembranes	1
3.9	Geocomposites, geopipes	
4.0	**Properties and Functions of Geotextiles**	
4.1	Properties	1
4.2	Physical, mechanical and hydraulic properties	1
4.3	Functions of Reinforcement	1
4.4	Separation	2
4.5	Filtration	1
4.6	Drainage	1
4.7	Sealing Function	1
4.8	Confinement	1
5.0	**Applications of Geotextiles**	
5.1	Road works	1
5.2	Railway works	1
5.3	Advantages of nailing	1
5.4	River canals and coastal work	1
5.5	Drainage, building construction and maintenance	1
5.6	Retaining walls	2
5.7	Waste landfills	1
5.8	Breakwaters, agriculture	1
5.9	Geotextiles and the environment	

Course Designer(s)

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E44	Intelligent Transport Systems	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To Understand traffic management principles, emphasizing the role of Intelligent Transportation Systems.
- To Conduct thorough traffic surveys to analyze volume, speed, and safety for urban planning.
- To Master intersection design for efficient traffic flow and safety.
- To Implement traffic control measures for enhanced roadway safety.
- To Develop expertise in road safety engineering and hazard mitigation.

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain road user and vehicular characteristics	Remember
CO2	Bring out speed and volume studies and their relationships	Understand
CO3	Design geometrics of intersections	Analyse
CO4	Enumerate the various road safety requirements	Remember
CO5	Identify various traffic control measures	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	2	-	3	-	-	3	3	-	-	-	3
CO2	3	2	3	3	3	3	-	-	-	-	-	-	-	3
CO3	3	2	3	3	-	3	-	-	3	2	-	-	3	3
CO4	3	-	-	-	-	2	-	-	-	-	-	-	3	-
CO5	3	-	-	-	-	-	-	-	2	3	-	2	-	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	40	40	40
Understand	20	--	40
Apply	-	-	-
Analyse	-	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E44 - Intelligent Transport Systems

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Traffic Management Systems Methods and techniques for traffic management - Role of ITS in-traffic management. Significance and scope, Characteristics of Driver, the pedestrian, the vehicle and road, skid resistance and braking efficiency. Components of traffic engineering – road, traffic and land use characteristics	[9]
Traffic Surveys and Analysis Volume, capacity speed and delay studies, origin and destination, parking studies, pedestrian and Accident studies. management	[9]
Geometric Design of Intersection Conflict points at intersections, principles and elements of intersection design, rotary design, Interchanges Warrant for interchanges, design principles of interchange –level of service	[9]
Traffic Control Traffic signs, road markings, design of traffic signal and signal coordination. Traffic Control aids - street furniture, street lighting	[9]
Road Safety Road safety engineering, importance of good crash data, treating hazardous road locations(blackspots), intersection safety, delineation of rural roads, roadside hazard management, road safety at road works, Traffic management plan	[9]
Total Hours:	**45**

Text Book(s):	
1.	Kadiyali L. R., “Traffic Engineering and Transportation Planning” Khanna Publishers, Delhi, 2018.
2.	Khanna S. K., and Justo, “Highway Engineering”, Nem Chand & Bros, Roorkee, 2019.
Reference(s):	
1.	Kadiyali L. R., "Principles and Practice of Highway Engineering", Khanna tech. Publications, New Delhi, 2018.
2.	Jason C., “Transportation Engineering: Introduction to Planning, Design and Operations”, Elsevier,2018.
3.	Mike Slinn, Peter Guest and Paul Matthews “Traffic Engineering Design Principles and Practice,” ,Elesevier, 2019.
4.	http://www.nptel.ac.in/downloads/105101008/.

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Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Traffic Management Systems**	
1.1	Significance and scope	1
1.2	Characteristics of Driver, the pedestrian	1
1.3	The vehicle and road, skid resistance and braking efficiency	1
1.4	Components of traffic engineering	2
1.5	Road, traffic and land use characteristics	2
1.6	Role of ITS in traffic management	2
2.0	**Traffic Surveys and Analysis**	
2.1	Surveys for Traffic Engineering, Speed studies	2
2.2	Volume and capacity Studies	1
2.3	Travel time and Delay Studies	2
2.4	Parking and pedestrian Studies	2
2.5	Accident Studies(concepts and problems)	2
3.0	**Geometric Design of intersection**	
3.1	Conflict points at intersections	2
3.2	Principles and elements of intersection design	2
3.3	Classification of intersection	1
3.4	Concepts of flow in at grade and grade separated intersections	1
3.5	Rotary design	1
3.6	Warrant for interchanges	1
3.7	Design principles of interchange – capacity analysis level of service (concepts)	1
4.0	**Traffic Control**	
4.1	Traffic signs	2
4.2	Road markings	2
4.3	Significance	1
4.4	Classification and purpose	1
4.5	Design of traffic signal and signal coordination.	1
4.6	Design for parking facilities, (concepts and problems).	1
4.7	Traffic control aids -Types of streets furniture's	1
5.0	**Road safety**	
5.1	Street lighting – Purpose, importance	2
5.2	Road safety engineering	1
5.3	Crash data	1
5.4	Treating hazardous road locations	1
5.5	Intersection safety	1
5.6	Delineation of rural roads	1
5.7	Roadside hazard management, road safety at road works	2

Course Designer(s)

1. Dr.K.Vijaya Sundravel - vijayasundravel@ksrct.ac.in

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E45	Project Management	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the fundamental principles and importance of project management, including key processes and stakeholder roles.
- To develop project plans, including WBS, and create detailed project schedules with accurate time, cost, and resource estimates.
- To identify, assess, and manage project risks, including the development of risk response strategies and maintaining a risk register.
- To manage project execution by leading teams, ensuring effective communication, monitoring performance, and controlling changes.
- To conduct project closure activities, evaluate success against criteria, and implement lessons learned for continuous improvement.

Pre-requisites

- Construction Management

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Articulate the fundamental concepts, importance, and methodologies of project management.	Remember
CO2	Develop comprehensive project plans, including Work Breakdown Structures (WBS), time, cost, and resource estimates, and create effective project schedules.	Understand
CO3	Identify, assess, and develop strategies to manage project risks.	Apply
CO4	Effectively manage project execution by developing and leading project teams, monitoring performance, and controlling changes.	Analyse
CO5	Conduct thorough project closure activities, evaluate project success against defined criteria, and implement lessons learned for continuous improvement in project management practices.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	2	3	-	3	-	2	-
CO2	3	3	-	-	3	-	-	-	-	-	3	2	2	-
CO3	3	-	-	-	-	-	-	-	2	-	3	-	2	-
CO4	3	-	-	3	-	-	-	-	2	-	3	-	2	-
CO5	3	-	-	2	-	-	-	-	-	-	3	-	2	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	30	30	60
Apply	10	10	10
Analyse	10	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E45 – Project Management								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction to Project Management* Introduction to Project Management: Definition, Importance, and Evolution - Project Management Framework: Processes, Knowledge Areas, and Competencies - Project Life Cycle Models: Predictive, Incremental, Iterative, Adaptive - Project Stakeholders and their Roles - Key Concepts and Terminologies in Project Management	[9]
Project Planning and Scheduling** Project Initiation: Defining Project Objectives, Scope, and Requirements - Work Breakdown Structure (WBS) Development - Estimation Techniques: Time, Cost, and Resource Estimation - Project Scheduling Techniques: Gantt Charts, Network Diagrams - Resource Allocation and Levelling - Risk Management Planning and Initial Risk Identification	[9]
Risk Management in Projects** Risk Management Process: Identification, Assessment, Mitigation, and Monitoring Risk Analysis Techniques: Qualitative and Quantitative Risk Analysis - Risk Response Planning: Avoidance, Mitigation, Transfer, and Acceptance - Contingency Planning and Reserve Analysis - Risk Register and Documentation	[9]
Project Execution and Control** Project Execution Phase: Team Development and Management - Communication and Stakeholder Engagement - Monitoring and Controlling Project Work - Performance Measurement and Earned Value Management (EVM) - Change Control Process: Change Requests, Impact Analysis, and Approval - Quality Management: Quality Planning, Assurance, and Control	[9]
Project Closure and Evaluation* Project Closure Activities: Deliverable Acceptance, Formal Closure Documentation - Post-Project Evaluation: Lessons Learned, Project Review Meetings – Project - Documentation and Archiving - Project Success Criteria and Metrics Evaluation - Continuous Improvement in Project Management Practices	[9]
Total Hours:	**45**
Text Book(s):	

1.	Meredith, Jack R., Samuel J. Mantel Jr., and Scott M. Shafer. Project Management: A Managerial Approach, 10th Edition, Wiley, 2017.
2.	Kerzner, Harold. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 12th Edition, Wiley, 2017.
Reference(s):	
1.	Schwalbe, Kathy. Information Technology Project Management, 9th Edition, Cengage Learning, USA, 2018.
2.	Fleming, Quentin W., and Joel M. Koppelman. Earned Value Project Management, 4th Edition, Project Management Institute, USA, 2016.
3.	Verzuh, Eric. The Fast Forward MBA in Project Management, 5th Edition, John Wiley & Sons, USA, 2015.
4.	Kerzner, Harold. Project Management Best Practices: Achieving Global Excellence, 4th Edition, John Wiley & Sons, USA, 2018.

*SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Project Management**	
1.1	Introduction to Project Management: Definition, Importance, and Evolution	2
1.2	Project Management Framework: Processes	1
1.3	Project Management Framework: Knowledge Areas, and Competencies	1
1.4	Project Management Framework: Competencies	1
1.5	Project Life Cycle Models: Predictive, Incremental, Iterative	2
1.6	Adaptive - Project Stakeholders and their Roles	1
1.7	Key Concepts and Terminologies in Project Management	1
2.0	**Project Planning and Scheduling**	
2.1	Project Initiation: Defining Project Objectives, Scope, and Requirements	2
2.2	Work Breakdown Structure (WBS) Development	1
2.3	Estimation Techniques: Time, Cost, and Resource Estimation	2
2.4	Project Scheduling Techniques: Gantt Charts	1
2.5	Project Scheduling Techniques: Network Diagrams	1
2.6	Resource Allocation and Levelling	1
2.7	Risk Management Planning and Initial Risk Identification	1
3.0	**Risk Management in Projects**	
3.1	Risk Management Process: Identification, Assessment, Mitigation	2
3.2	Monitoring Risk Analysis Techniques: Qualitative	1
3.3	Monitoring Risk Analysis Techniques: Quantitative Risk Analysis	1
3.4	Risk Response Planning: Avoidance, Mitigation, Transfer	2
3.5	Acceptance - Contingency Planning	1
3.6	Reserve Analysis - Risk Register and Documentation	2
4.0	**Project Execution and Control**	
4.1	Project Execution Phase: Team Development and Management	1
4.2	Communication and Stakeholder Engagement	1
4.3	Monitoring and Controlling Project Work	1
4.4	Performance Measurement and Earned Value Management (EVM)	2
4.5	Change Control Process: Change Requests	1
4.6	Change Control Process: Impact Analysis, and Approval	1
4.7	Quality Management: Quality Planning, Assurance, and Control	2
5.0	**Project Closure and Evaluation**	
5.1	Project Closure Activities	1
5.2	Deliverable Acceptance, Formal Closure and Documentation	2
5.3	Post-Project Evaluation: Lessons Learned, Project Review Meetings	2
5.4	Project - Documentation	1
5.5	Project - Archiving	1
5.6	Project Success Criteria and Metrics Evaluation	1
5.7	Continuous Improvement in Project Management Practices	1

Course Designer(s)

1. Dr. K. Yuvaraj – yuvarajk@ksrct.ac.in

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60 CE E46	Integrated Water Resources Management	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To make the students understand about integrated water resources management process.
- To introduce the student to the public private partnerships.
- To understand the health impacts related to water management.
- To know the agricultural activities in the context of water management.
- To impart knowledge on regulatory framework regarding water management.

Pre-requisites

- Hydrology and Water Resources Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	State the needs, complexity and key elements of IWRM process.	Remember
CO2	Explain the water economics and PPP options.	Understand
CO3	Describe the link between water and human health.	Understand
CO4	Interpret the water management for irrigation and food production.	Apply
CO5	Demonstrate the international and national regulatory settings on water.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	1	-	3	3	-	-	-	-	-	2	-
CO2	3	3	3	2	-	3	3	-	-	2	-	2	2	-
CO3	3	3	3	2	-	3	3	-	-	-	-	-	2	-
CO4	3	3	3	2	-	3	3	-	-	-	-	-	2	-
CO5	3	3	3	2	-	3	3	-	-	-	-	-	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	34
Understand	30	30	46
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E46 - Integrated Water Resources Management								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Context for IWRM** Water as a global issue: key challenges and needs – Definition of IWRM within the broader context of development – Complexity of the IWRM process – Examining the key elements of IWRM process.	[8]
Water Economics** Economic view of water issues: economic characteristics of water good and services – Non-market monetary valuation methods – Water economic instruments, policy options for water conservation and sustainable use – Case studies. Pricing: distinction between values and charges – Private sector involvement in water resources management: PPP objectives, PPP options, PPP processes, PPP experiences through case studies – Links between PPP and IWRM.	[10]
Water and Health* Links between water and human health: options to include water management interventions for health – Health protection and promotion in the context of IWRM – Health impact assessment of water resources development.	[8]
Agriculture in the Concept of IWR** Water for food production: 'blue' versus 'green' water debate – Virtual water trade for achieving global water security – Irrigation efficiencies, irrigation methods and current water pricing.	[9]
Water Legal and Regulatory Settings* Basic notion of law and governance: principles of international and national law in the area of water management. Understanding UN law on non – navigable uses of international water courses – Development of IWRM in line with legal and regulatory framework.	[10]
Total Hours:	**45**

Text Book(s):	
1.	Mollinga P. et al., "Integrated Water Resources Management", Water in South Asia Volume I, Sage Publications, 2006.
2.	Neil S. Grigg, "Integrated Water Resource Management - An Interdisciplinary Approach", Springer Link, 2016.
Reference(s):	
1.	Technical Advisory Committee, Integrated Water Resources management, Technical Advisory Committee Background Papers. Global water partnership, Stockholm, Sweden. 2002.
2.	Karanth KR., "Ground Water Assessment, Development & Management", Tata Mc Graw Hill Co. Ltd., New Delhi, 2004
3.	Sarbhukan MM, "Integrated Water Resources Management", CBS Publishers And Distributors, New Delhi, 2020.
4.	Georg Meran, Markus Siehlow & Christian von Hirschhausen, "Integrated Water Resource Management: Principles and Applications", Springer Water, 2020.

* SDG 6 – Clean Water and Sanitation

** SDG 12 – Responsible Consumption and Protection

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Context for IWRM**	
1.1	Water as a global issue: key challenges and needs	2
1.2	Definition of IWRM within the broader context of development	2
1.3	Complexity of the IWRM process	2
1.4	Examining the key elements of IWRM process	2
2.0	**Water Economics**	
2.1	Economic view of water issues	1
2.2	Economic characteristics of water good and services	1
2.3	Non-market monetary valuation methods	1
2.4	Water economic instruments	1
2.5	Policy options for water conservation and sustainable use	1
2.6	Case study	1
2.7	Pricing: distinction between values and charges	1
2.8	Private sector involvement in water resources management	1
2.9	Case study	1
2.10	Links between PPP and IWRM	1
3.0	**Water and Health**	
3.1	Links between water and human health	2
3.2	Water management interventions for health	2
3.3	Health protection and promotion in the context of IWRM	2
3.4	Health impact assessment of water resources development	2
4.0	**Agriculture in the Concept of IWR**	
4.1	Water for food production	1
4.2	Blue versus green water debate	2
4.3	Virtual water trade	1
4.4	Global water security	1
4.5	Irrigation efficiencies	2
4.6	Irrigation methods and current water pricing	2
5.0	**Water Legal and Regulatory Settings**	
5.1	Basic notion of law and governance	2
5.2	Principles of international law in the area of water management	2
5.3	Principles of national law in the area of water management	2
5.4	International water courses	1
5.5	Understanding UN law on non-navigable uses	1
5.6	Development of IWRM in line with legal and regulatory framework	2

Course Designer(s)

1. Dr. P. Mageshkumar - mageshkumarp@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE E47	Application of Remote Sensing and GIS in Engineering	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To know the basic principles of Remote Sensing (RS) and sensors
- To understand the basic operations and data types in Geographical Information System (GIS)
- To acquire knowledge on the image processing and data analysis techniques
- To learn the applications of RS & GIS in urban planning
- To gain knowledge on the applications of RS & GIS in agriculture, forestry and earth sciences

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the earth surface features and sensor properties in Remote Sensing (RS)	Understand
CO2	Use different data types in Geographical Information System (GIS)	Understand
CO3	Relate the image processing techniques and data analysis using RS & GIS	Understand
CO4	Solve the problems related to urban planning using RS & GIS	Apply
CO5	Execute the projects in agriculture, forestry and earth sciences with the help of RS & GIS	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	3	3	3	3	-	-	-	3	2	2
CO2	3	3	3	2	3	3	3	3	-	-	-	3	2	2
CO3	3	3	3	2	3	3	3	3	-	-	-	3	2	2
CO4	3	3	3	3	3	3	3	3	2	2	3	3	2	2
CO5	3	3	3	3	3	3	3	3	2	2	3	3	2	2

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	40
Understand	30	30	40
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E47 - Application of Remote Sensing and GIS in Engineering

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Principles of Remote Sensing * Definition – Components of remote sensing. EMR spectrum – EMR interaction with earth surface features. Platforms and sensors – Evolution of different types of satellites and their characteristics, Sensor types and properties – Resolution concepts.	[9]
Geographical Information System * Definition and components of GIS. GIS data types – Non-spatial data, Field and statistical data, Spatial data. Maps and map projections, aerial photographs and satellite data – Vector and raster data types, Merits and demerits – Open source software.	[9]
Image Processing and Data Analysis * Digital Image – Characteristics, Image pre-processing techniques, Image enhancement techniques. Classification methods – Database concepts – Image interpretation – Raster and raster data analysis. Modelling surfaces – Types of data products.	[9]
Applications in Urban Planning ** Urban area definition and characterization. Base map preparation – Land use classification, Land cover classification. Urban structure and patterns – Feature extraction techniques, Change detection. Sprawl detection and characterization – Mapping of urban morphology – Building typology.	[9]
Agriculture, Forestry and Earth Sciences *** Crop inventory mapping – Command area mapping – Estimation of soil erosion – Landslides – Forest types and density – Forest fire risk zones mapping – Geology – Geomorphology – Landforms – Targeting mineral resources – Pollution monitoring.	[9]
Total Hours:	**45**

Text Book(s):

1.	Lillesand T, Kiefer R. & Chipman J, "Remote Sensing and Image Interpretation", 7th Edition, John Wiley & Sons, Inc., New York, 2015.
2.	Anji Reddy M, "Text Book of Remote Sensing and Geographical Information Systems", 4th Edition, BS Publications, Hyderabad, 2022.

Reference(s):

1.	Basudeb Bhatta, "Remote Sensing and GIS", 3rd Edition, Oxford University Press, New York, 2021.
2.	Kang-Tsung Chang, "Introduction to Geographical Information Systems", 9th Edition, McGraw Hill Publishing, 2019.
3.	Peter A Burrough, McDonnel RA & Lloyd CD, "Principles of GIS", 3rd Edition, Oxford University Press, United Kingdom, 2015.
4.	Morain Stanley A, Renslow Michael S, Budge Amelia M, "Manual of Remote Sensing", 4th Edition, American Society for Photogrammetry and Remote Sensing, USA, 2019.

* SDG 4 – Quality Education
** SDG 11 – Sustainable Cities and Communities
*** SDG 15 – Life on Land

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Principles of Remote Sensing**	
1.1	Definition	1
1.2	Components of remote sensing	1
1.3	EMR spectrum	1
1.4	EMR interaction with earth surface features	1
1.5	Platforms and sensors	1
1.6	Evolution of different types of satellites and their characteristics	1
1.7	Sensor types and properties	1
1.8	Resolution concepts	1
2.0	**Geographical Information System**	
2.1	Definition and components of GIS	1
2.2	GIS data types	1
2.3	Non-spatial data	1
2.4	Field and statistical data	1
2.5	Spatial data	1
2.6	Maps and map projections	1
2.7	Aerial photographs and satellite data	1
2.8	Vector and raster data types – Merits and demerits	1
2.9	Open source software	1
3.0	**Image Processing and Data Analysis**	
3.1	Digital Image - Characteristics	1
3.2	Image pre-processing techniques	1
3.3	Image enhancement techniques	1
3.4	Classification methods	1
3.5	Database concepts	1
3.6	Image interpretation	1
3.7	Raster and raster data analysis	1
3.8	Modelling surfaces	1
3.9	Types of data products	1
4.0	**Applications in Urban Planning**	
4.1	Urban area definition and characterization	1
4.2	Base map preparation	1
4.3	Land use classification	1
4.4	Land cover classification	1
4.5	Urban structure and patterns	1
4.6	Feature extraction techniques	1
4.7	Change detection – Sprawl detection and characterization	1
4.8	Mapping of urban morphology	1
4.9	Building typology	1
5.0	**Agriculture, Forestry and Earth Sciences**	
5.1	Crop inventory mapping	1
5.2	Command area mapping	1
5.3	Estimation of soil erosion	1
5.4	Landslides	1
5.5	Forest types and density	1
5.6	Forest fire risk zones mapping	1
5.7	Geology, Geomorphology, Landforms	1
5.8	Targeting mineral resources	1
5.9	Pollution monitoring	1

Course Designer(s)

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Faculty of Civil Engineering
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60 CE E48	Disaster Management	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn about various types of natural and man-made disasters.
- To impart the knowledge of pre- and post-disaster management for some of the disasters.
- To demonstrate various information and organizations in disaster management in India.
- To get exposed to technological tools and their role in disaster management.
- To understand the basics of Hazard and Vulnerability of structures

Pre-requisites

- Repair and Rehabilitation of Structures

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Outline the basic information and precautions regarding various disasters.	Remember
CO2	Decide first action to be taken under various disasters.	Analyse
CO3	Identify the organizations in India which are dealing with disasters.	Understand
CO4	Select IT tools to help in disaster management.	Apply
CO5	Increase the understanding of financial management of disaster risks.	Remember

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	2	2	2	2	2	2	2	2	-	2
CO2	3	3	3	2	2	2	2	2	3	2	2	2	-	2
CO3	3	3	2	2	2	2	2	2	3	2	2	2	-	2
CO4	3	3	3	2	2	2	2	2	3	2	2	2	-	2
CO5	3	3	3	3	2	2	2	2	3	2	2	2	-	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	30	20	50
Analyse	10	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E48 - Disaster Management

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Concepts of Disaster* Hazard, Vulnerability, Risk, Capacity Disaster and Development - disaster management. Types, Trends, Causes, Consequences and Control of Disasters Geological Disasters (earthquakes, landslides, tsunami, vibration and collapse due to mining); Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building and other structural collapse, rural and urban fire, road ,rail and Airplane accidents, nuclear, radiological, chemical and biological disasters, water pollution , Food poisoning) Global Disaster Trends - Emerging Risks of Disasters - Climate Change and Urban Disasters.	[9]
Disaster Management Cycle and Framework* Disaster Management Cycle - Paradigm Shift in Disaster Management. Pre-Disaster - Risk Assessment and Analysis, Risk Mapping, zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness. During Disaster - Evacuation - Disaster Communication - Search and Rescue – Emergency Operation Centre - Incident Command System.	[9]
Disaster Management in India* Disaster Profile of India – Major Disasters happened in of India - Bhuj, Lathur earthquakes, Kerala flood (2018), flood in Kedarnath, Tsunami, and Plague in Gujarat hand Lessons Learnt. Disaster Management Act 2005 - Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter Governmental Agencies-Role of public and youth	[9]
Applications of Science and Technology for Disaster Management* Geo-informatics in Disaster Management (Remote Sensing, GIS, GPS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters. Role of Science &Technology Institutions for Disaster Management-NIDM, ILDM, AIDMI.	[9]
Financial Management of Disaster Risks* Information on Natural Hazards and Disaster Reduction, Financial management of disaster risks, Assessment of disaster risks, Financial vulnerabilities and the impact of disasters. Insurance Policies for Disaster Management: Evaluation of risk funding and risk transfer policies, Catastrophe insurance pool, Reserve funds and contingent credit policies, Role of Government and market participants, Insurance policy design, Fiscal cost of relief and reconstruction, Grants and low interest loan for reconstruction.	[9]
Total Hours:	**45**

Text Book(s):

1. Tushar Bhattacharya, " Disaster Science and Management", McGraw Hill Education (India) Pvt. Ltd, 2017.
2. Jagbir Singh, "Disaster Management: Future Challenges and Opportunities", K W Publishers Pvt. Ltd. 2013.

Reference(s):

1. Singhal J.P, "Disaster Management", Laxmi Publications, 2019. Martin W, Stockel and Martin T Stockle, "Automotive Mechanics Fundamentals", The Good Heart – Will Cox Company Inc, USA, 2012.
2. Shailesh Shukla, Shamna Hussain, "Biodiversity, Environment and Disaster Management", Unique Publications, 2013.
3. Murthy D.B.N, "Disaster Management", Deep and Deep Publication PVT. Ltd, New Delhi, 2012.
4. Mrinalini Pandey, "Disaster Management", Wiley India Pvt. Ltd, 2014.

*SDG 9 – Industry Innovation and Infrastructure

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Concepts of Disaster**	
1.1	Hazard, Vulnerability, Risk, Capacity Disaster and Development	1
1.2	Hydro-Meteorological Disasters	1
1.3	Biological Disasters	1
1.4	Technological Disasters	1
1.5	Manmade Disasters	1
1.6	Global Disaster	2
1.7	Emerging Risks of Disasters	1
1.8	Climate Change and Urban Disasters	1
2.0	**Disaster Management Cycle and Framework**	
2.1	Disaster Management Cycle.	1
2.2	Risk Assessment and Analysis	1
2.3	Prevention and Mitigation of Disasters	1
2.4	Emergency Operation Centre	2
2.5	Damage and Needs Assessment	1
2.6	Reconstruction and Redevelopment	2
2.7	Early Recovery	1
3.0	**Disaster Management in India**	
3.1	Disaster Profile of India	1
3.2	Major Disasters happened in of India	1
3.3	Institutional and Financial Mechanism	2
3.4	National Policy on Disaster	2
3.5	Government and Inter Governmental Agencies	2
3.6	Role of public and youth	1
4.0	**Applications of Science and Technology for Disaster Management**	
4.1	Geo-informatics in Disaster Management	2
4.2	Disaster Communication System	2
4.3	Land Use Planning and Development Regulations	1
4.4	Disaster Safe Designs and Constructions	1
4.5	Structural and Non-Structural Mitigation of Disasters	1
4.6	Role of Science &Technology	2
5.0	**Financial Management of Disaster Risks**	
5.1	Natural Hazards and Disaster Reduction	1
5.2	Financial vulnerabilities and the impact of disasters	1
5.3	Reserve funds and contingent credit policies	2
5.4	Role of Government and market participants	2
5.5	Fiscal cost of relief and reconstruction	2

Course Designer(s)

1. Dr.M.Velumani - velumani@ksrct.ac.in

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Passed in the BOS Meeting Held on 22.05.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E51	Tall Structures	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the context and development of Tall buildings
- To analyze and design vertical structural systems
- To evaluate the behavior of High-Rise Structures
- To perform approximate analysis and design
- To explore advanced structural systems and innovations

Pre-requisites

- Strength of Materials and Structural Analysis & Design

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply fundamental principles and advanced concepts in the design and analysis of high-rise building structures	Apply
CO2	Evaluate various vertical structural systems	Analyse
CO3	Demonstrate proficiency in the approximate analysis and design of bearing wall buildings, rigid frame structures, and other high-rise structural systems	Apply
CO4	Conduct approximate analysis and design of various structural systems	Analyse
CO5	Synthesize knowledge to explore and develop innovative structural solutions	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	-	-	-	-	-	2	-	-	-	2	-
CO2	3	3	2	-	-	-	-	-	2	-	-	-	2	-
CO3	3	2	2	-	-	-	-	-	2	-	-	-	2	-
CO4	3	3	3	3	-	-	-	-	2	-	-	-	3	-
CO5	3	2	2	-	3	-	-	-	2	-	-	-	2	2

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	20	30	30
Analyse	20	10	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE E51 - Tall Structures								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction* Tall Building in the Urban Context. Tall Building and its Support Structure. Development of High Rise Building Structures. General Planning Considerations. Loads - Dead Loads - Live Loads - Construction Loads -Snow, Rain, and Ice Loads - Wind Loads -Seismic Loads - Water and Earth Pressure Loads - Loads due to restrained volume changes of material - Impact and Dynamic Loads - Blast Loads - Combination of Loads.	[9]
Vertical Structure System* Dispersion of Vertical Forces Dispersion of Lateral Forces. Optimum Ground Level Space. Shear Wall Arrangement. Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems. Horizontal Bracing. Composite Floor Systems. Skeleton Frame Systems. Load Bearing Wall Panel Systems. Panel. Multistorey Box Systems.	[8]
Behaviour of High Rise Structures* The Bearing Wall Structure . The Shear Core Structure. Rigid Frame Systems. The Wall - Beam Structure: Interspatial and Staggered Truss Systems. Frame - Shear Wall Building Systems. Flat Slab Building Structures. Shear Truss - Frame Interaction System with Rigid - Belt Trusses. Tubular Systems. Composite Buildings. Comparison of High-Rise Structural Systems. Other Design Approaches. Controlling Building Drift. Efficient Building Forms - The Counteracting Force or Dynamic Response.	[10]
Approximate Analysis and Design* Approximate Analysis of Bearing Wall Building - The Cross Wall Structure - The Long Wall Structure. Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings - Lateral Deformation of Rigid Frame Buildings. Other Structures - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.	[9]
Advanced Structural Systems* Deep - Beam Systems - High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Feng Fu, Butterwoth Heinemann, “Design and analysis of Tall and Complex Structures”, Elsevier, 2018
2.	Taranath B.S , “Tall Building Design: Steel, concrete and composite system”, CRC Press, 2016
Reference(s):	
1.	Yit Lin Michael Chew , “Construction Technology for Tall Buildings”, World Scientific Publication, 2017.
2.	NPTEL Module “Structure, Form and Architecture : The Synergy”, IIT Roorkee
3.	Alex Coull, Bryan Stafford Smit, “Tall Building Structures: Analysis and Design” Wiley Publishers, 2011
4.	Taranath B.S., “Structural Analysis and Design of Tall Buildings”, Mc Graw Hill, New York, 2011.

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Introduction to tall buildings	1
1.2	Structural Support for Tall Buildings	1
1.3	Historical Development of High-Rise Structures	1
1.4	Planning Considerations for Tall Buildings	1
1.5	Understanding Dead and Live Loads	1
1.6	Construction Loads and Environmental Loads	1
1.7	Wind Loads and Seismic Loads	1
1.8	Hydrostatic and Earth Pressure Loads	1
1.9	Additional Load Considerations	1
2.0	**Vertical Structure System**	
2.1	Dispersion of Vertical Forces	1
2.2	Dispersion of Lateral Forces	1
2.3	Optimizing Ground Level Space	1
2.4	Shear Wall Systems	1
2.5	Floor Framing Systems and Horizontal Bracing	1
2.6	Composite Floor Systems	1
2.7	Skeleton Frame Systems	1
2.8	Load-Bearing Wall and Multi-storey Box Systems	1
3.0	**Behaviour of High Rise Structures**	
3.1	The Bearing Wall Structure	1
3.2	The Shear Core Structure	1
3.3	Rigid Frame Systems	1
3.4	Wall-Beam Structures	1
3.5	Frame-Shear Wall Building Systems	1
3.6	Flat Slab Building Structures	1
3.7	Shear Truss-Frame Interaction Systems	1
3.8	Tubular Systems	1
3.9	Composite Buildings and Structural Systems Comparison	1
3.10	Controlling Building Drift and Efficient Building Forms	1
4.0	**Approximate Analysis and Design**	
4.1	Approximate Analysis of Bearing Wall Buildings	1
4.2	The Cross Wall Structure	1
4.3	The Long Wall Structure	1
4.4	Approximate Analysis for Vertical Loading	1
4.5	Approximate Analysis for Lateral Loading	1
4.6	Approximate Design of Rigid Frame Buildings	1
4.7	Lateral Deformation of Rigid Frame Buildings	1
4.8	Other Structures: Shear Wall, Vierendeel, and Hollow Tube	1
4.9	Comparison of Structural Systems	1
5.0	**Advanced Structural Systems**	
5.1	Introduction to Deep Beam Systems	1
5.2	Design Principles of Deep Beam Systems	1
5.3	High-Rise Suspension Systems	1
5.4	Design and Analysis of High-Rise Suspension Structures	1
5.5	Pneumatic High-Rise Buildings	1
5.6	Design and Construction of Pneumatic High-Rise Buildings	1
5.7	Space Frame Applied to High-Rise Buildings	1
5.8	Capsule Architecture	1
5.9	Innovations in High-Rise Structural Systems	1
	Total	**45**

Course Designer(s)

1. Mr.K. Angu Senthil - angusenthil@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE E52	Advanced Environmental Engineering	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To acquire knowledge on the concepts of various physico-chemical and biological treatment units with operation and maintenance aspects.
- To study the methods of transporting water and wastewater along with distribution schemes.
- Identify suitable locations for wind energy development based on thorough resource assessment.
- Expand access to solar energy by overcoming barriers to entry,
- Develop strategies for integrating high levels of solar energy into the electrical grid effectively, including grid modernization

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Point out the physico-chemical treatment systems and their kinetics and Outline the biological treatment systems with their kinetics	Remember
CO2	Describe the principles of municipal and industrial physico-chemical treatment units, membrane processes and advanced techniques.	Remember
CO3	Express the principles of aerobic and anaerobic biological treatment of wastewater	Understand
CO4	Point out the transmission operations of water and design the distribution system with loss minimization and leak detection techniques.	Apply
CO5	Illustrate the operations and planning of treatment plants	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	3	-	-	-	-	-	-	-	-
CO2	3	2	-	3	3	2	-	-	-	-	3	-	-	3
CO3	3	2	3	2	-	3	-	3	-	-	-	3	-	3
CO4	3	2	-	3	3	2	-	-	-	-	-	-	-	3
CO5	3	2	2	3	-	-	-	-	-	-	-	-	-	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	40	-	40
Understand	20	40	40
Apply	-	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022							
B.E. Civil Engineering							
60 CE E52 – Advanced Environmental Engineering							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Pollutants in wastewater Pollutants in water and wastewater–characteristics, Standards for performance -Significance of physico - chemical treatment – Selection criteria-types of reactor-reactor selection - batch-continuous type - kinetics - Objectives of biological treatment – significance – kinetics of biological growth – Factors affecting growth – attached and suspended growth.	[9]
Transmission and distribution* Need for Transport of water and wastewater - Planning of Water System – Selection of pipe materials, Water transmission main design - gravity and pumping main; Selection of Pumps – characteristics - economics; Specials, Jointing, laying and maintenance, water hammer analysis - water distribution pipe networks: Design, analysis and optimization – appurtenances – corrosion prevention – minimization of water losses – leak detection - Storage reservoirs.	[9]
Physico-chemical treatment* Treatment plant layouts – selection of process - equalization - neutralization - chemical feeding devices - oil skimmer - tube settlers, duel media filters – softeners – demineralisers – evaporation – adsorption – isotherms – Membrane separation - Reverse Osmosis, nano filtration, ultra filtration and hyper filtration - electro dialysis, distillation– stripping and crystallization - solidification and stabilization - advanced oxidation/reduction.	[9]
Biological Treatment* Design of sewage treatment plant units – aerobic treatment - sequencing batch reactors, membrane biological reactors - bio tower- RBC - moving bed reactors - fluidized bed reactors - aerated lagoons - constructed wet land – anaerobic treatment - attached and suspended growth process – UASB - up flow filters - Fluidized beds – MBR - septic tank and disposal – Nutrient removal systems – Natural coagulants.	[9]
Operations and Maintenance Construction and operational maintenance problems – trouble shooting – planning, organizing and controlling of plant operations – capacity building - retrofitting case studies – sewage treatment plants – sludge management facilities – Environmental policies and regulations.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Qasim S. R., Motley, E. M., and Zhu G., "Water works Engineering, Planning, Design and Operation", Prentice Hall, New Delhi, 2018
2.	Metcalf and Eddy, "Wastewater Engineering, Treatment and Reuse" Tata McGraw Hill, New Delhi, 2019.
Reference(s):	
1.	Spellman F. R., "Hand Book of Water and Wastewater Treatment Plant operations", CRC Press, New York, 2019.
2.	"Manual on water supply and Treatment", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2019
3.	"Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2019.
4.	Lawrence Petersen, "Advanced Environmental Engineering and Green Technologies", Brilliance Publisher, 2023.

*SDG 6 – Clean water and Sanitation

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Pollutants in Wastewater**	
1.1	Pollutants in water and wastewater–characteristics, Standards for performance-	2
1.2	Significance of physico-chemical treatment–Selection criteria	2
1.3	Types of reactor-reactor selection-batch-continuous type-kinetics	1
1.4	Objectives of biological treatment – significance	1
1.5	Kinetics of biological growth – Factors affecting growth	1
1.6	Attached and suspended growth process	2
2.0	**Transmission and Distribution**	
2.1	Need for Transport of water and wastewater-Planning of Water System	1
2.2	Selection of pipe materials, Water transmission main design, gravity and pumping main	1
2.3	Selection of Pumps, characteristics, economics	1
2.4	Specials, Jointing, laying and maintenance, water hammer analysis	2
2.5	water distribution pipe networks Design, analysis and optimization, appurtenances, corrosion prevention	2
2.6	Minimization of water losses, leak detection, Storage reservoirs	2
3.0	**Physico-Chemical Treatment**	
3.1	Treatment plant layouts, selection of process, equalization, neutralization	1
3.2	Chemical feeding devices, oil skimmer, tube settlers, dual media filters, softeners, demineralisers	2
3.3	Evaporation, adsorption, isotherms, Membrane separation	2
3.4	Reverse Osmosis, nano filtration, ultra filtration and hyper filtration, electro dialysis	2
3.5	Distillation, stripping andcrystallization	1
3.6	Solidification and stabilization, advanced oxidation/reduction.	1
4.0	**Biological Treatment**	
4.1	Design of sewage treatment plant units, aerobic treatment, sequencing batch reactors	1
4.2	Membrane biological reactors, bio tower, RBC, moving bed reactors	1
4.3	Fluidized bed reactors, aerated lagoons, constructed wet land	1
4.4	Anaerobic treatment, attached and suspended growth process	1
4.5	UASB, up flow filters, Fluidized beds, MBR, septic tank and disposal	3
4.6	Nutrient removal systems – Natural coagulants	2
5.0	**Operations and Maintenance**	
5.1	Construction and operational maintenance problems	2
5.2	Trouble shooting– planning	2
5.3	Organizing and controlling of plant operations	1
5.4	Capacity building - retrofitting case studies	2
5.5	Sewage treatment plants – sludge management facilities	1
5.6	Environmental policies and regulations	1

Course Designer(s)

1. Dr. N. Ramesh - rameshn@ksrct.ac.in

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E53	Machine Foundation	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the basics of various vibrations and its effects on the structure
- To identify the Pressure Bulb concept of the structure under dynamic loading
- To understand the fundamentals on Design approach for machine foundation
- To understand the concepts of engineering and Dynamic Soil Properties
- To enhance the ability to design an earthquake resistant structure by use of springs and damping materials

Pre-requisites

- Geotechnical Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the concepts of theory of vibrations and determine response of structures.	Remember
CO2	Illustrate the concepts of Natural Frequency of Foundation.	Remember
CO3	Recognize the concepts of Permissible amplitudes.	Analyze
CO4	Evaluate the Field and Laboratory methods of determination of soil properties.	Apply
CO5	Describe design guidelines for Passive and active isolation for Structures.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	1	1	2	-	1	-	-	-	3	3	-
CO2	3	2	3	1	1	2	-	1	-	-	-	3	3	-
CO3	3	2	2	1	1	1	-	1	-	-	-	3	3	-
CO4	3	2	3	1	1	1	-	1	-	-	-	3	3	-
CO5	3	2	3	1	1	2	-	2	-	-	-	3	3	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	30	30	40
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E53 – Machine Foundation

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Theory of Vibration Introduction – Nature of dynamic loads – Basic definitions – Simple harmonic motion – Fundamentals of vibration – Single degree and multi degree of freedom systems – Free vibrations of spring – Mass systems – Forced vibrations – Resonance – Viscous damping – Principles of vibrations measuring systems – Effect of transient and pulsating loads.	[9]
Frequency of Foundation* Natural Frequency of Foundation – Soil System: Barkan's and IS Methods – Pressure Bulb concept – Pauw's Analogy - Transient response and Steady state response	[9]
Machine Foundations Introduction – Types of machine foundations – General requirements for design of machine foundations – Design approach for machine foundation – Vibration analysis – Elastic Half-Space theory – Mass-spring-dashpot model – Permissible amplitudes – Permissible bearing pressures.	[9]
Dynamic Soil Properties* Dynamic Soil Properties: Field and Laboratory methods of determination – uphole, Down hole and cross hole methods – cyclic plate load test – Block vibration test – Determination of Damping Factor.	[9]
Vibration Isolation* Vibration isolation – Types of isolation – Transmissibility – Passive and active isolation – Methods of isolation – Use of springs and damping materials – Properties of isolating materials – Vibration control of existing machine foundation.	[9]
Total Hours:	**45**
Text Book(s):	

1.	Kameswara Rao N.S.V., "Dynamics Soil Tests and Applications", Wheeler Publishing, New Delhi, 2020.
2.	Vaidyanathan C.V., and Srinivasalu P., "Handbook of Machine Foundations", McGraw Hill, 2021.
Reference(s):	
1.	Major, A., "Vibration Analysis and Design of Foundations for Machines and Turbines", Vol. I, II and III, Budapest, 2018.
2.	Das B.M., "Principles of Soil Dynamics", McGraw Hill, 2019.
3.	Swami Saran., "Soil Dynamics and Machine Foundation", Galgotia Publications Pvt. Ltd, New Delhi, 2020.
4.	Moore P.J., "Analysis and Design of Foundations for Vibrations", Oxford and IBH, 2016.

*SDG 9 – Industry Innovation and Infrastructure

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Theory of Vibration**	
1.1	Introduction – Nature of dynamic loads	1
1.2	Basic definitions	1
1.3	Simple harmonic motion	1
1.4	Fundamentals of vibration	1
1.5	Single degree and multi degree of freedom systems	1
1.6	Free vibrations of spring	1
1.7	Mass systems – Forced vibrations – Resonance	1
1.8	Viscous damping	1
1.9	Principles of vibrations measuring systems	1
2.0	**Frequency of Foundation**	
2.1	Frequency of Foundation	1
2.2	Natural Frequency of Foundation	1
2.3	Soil System: Barkan's methods	1
2.4	Soil System: IS Method	1
2.5	Pressure Bulb concept	1
2.6	Pauw's Analogy	1
2.7	Transient response	2
2.8	Steady state response	1
3.0	**Machine Foundations**	
3.1	Introduction	1
3.2	Types of machine foundations	1
3.3	General requirements for design of machine foundations	1
3.4	Design approach for machine foundation	1
3.5	Vibration analysis	1
3.6	Elastic Half-Space theory	1
3.7	Mass-spring-dashpot model	1
3.8	Permissible amplitudes	1
3.9	Permissible bearing pressures	1
4.0	**Dynamic Soil Properties**	
4.1	Dynamic Soil Properties	1
4.2	Field methods of determination	1
4.3	Laboratory methods of determination	1
4.4	Uphole, Down hole methods	1
4.5	Cross hole methods	1
4.6	Cyclic plate load test	1
4.7	Block vibration test	1
4.8	Determination of Damping Factor	2
5.0	**Vibration Isolation**	
5.1	Vibration isolation	1
5.2	Types of isolation	1
5.3	Transmissibility	1
5.4	Passive and active isolation	1
5.5	Methods of isolation	1
5.6	Use of springs and damping materials	1
5.7	Properties of isolating materials	1
5.8	Vibration control of existing machine foundation	2

Course Designer(s)

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE E54	Pavement Analysis and Design	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements
- To gain knowledge to assess quality and serviceability conditions of roads
- To gain the knowledge of maintenance of pavements
- To develop on pavement design
- To gain knowledge on stabilization of rural roads

Pre-requisites

- Transportation Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Get knowledge about types of rigid and flexible pavements	Remember
CO2	Able to design of rigid pavements	Analyse
CO3	Able to design of flexible pavements	Analyse
CO4	Determine the causes of distress in rigid and flexible pavements	Remember
CO5	Understand stabilization of pavements, testing and field control	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	3	-	-	3	3	-	-	-	3
CO2	3	2			3	3	-	2	-	-	-	-	-	3
CO3	3	3	3	3	-	3	-	-	3	2	-	-	-	3
CO4	3	2	2	2	-	2	-	-	-	-	-	-	2	-
CO5	3	3	2	-	-	-	-	-	2	3	-	2	-	-
3 - Strong; 2 - Medium; 1 - Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	20
Understand	10	10	20
Apply	10	10	20
Analyse	20	20	40
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
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TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E54 - Pavement Analysis and Design

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Type of Pavement and Stress Distribution on Layered System* Introduction – Pavement as layered structure – Pavement types rigid and flexible – Resilient modulus -Stress and deflections in pavements under repeated loading	[9]
Design of Flexible Pavements** Flexible pavement design – Empirical – Semi empirical and theoretical methods – Design procedure as per IRC 37 guidelines – Design and specification of rural roads.	[9]
Design of Rigid Pavements** Methods of construction of Cement concrete pavement layers – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India	[9]
Performance Evaluation and Maintenance** Pavement Evaluation - Causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index, - Pavement maintenance (IRC 58 Recommendations only).	[9]
Stabilization of Pavements** Stabilization with special reference to highway pavements – Choice of stabilizers – Testing and field control - Stabilization for rural roads in India – Use of Geosynthetics in roads	[9]
Total Hours:	**45**

Text Book(s):	
1.	Khanna S. K., and Justo C. G., .and Veeraragavan A., "Highway Engineering", New Chand and Brothers, Revised 10th Edition, 2019.
2.	Kadiyali L. R., "Principles and Practice of Highway Engineering", Khanna tech. Publications, New Delhi, 2018.
Reference(s):	
1.	Yoder R. J., and Witchak M. W., "Principles of Pavement Design", John Wiley,2020.
2.	"Guidelines for the Design of Flexible Pavements", IRC-37 - 2001, The Indian roads Congress, New Delhi, 2017
3.	"Guideline for the Design of Rigid Pavements for Highways", IRC 58-1998, The Indian Road Congress, New Delhi, 2017
4.	Wright P.H., "Highway Engineers", John Wiley and Sons, Inc., New York, 2019.

***SDG:4 Quality Education, **SDG:9: Industry, innovation and infrastructure**

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Type of Pavement and Stress Distribution on Layered System**	
1.1	Pavement as layered structure	1
1.2	Pavement types rigid and flexible	1
1.3	Resilient modulus	1
1.4	Stress and deflections in pavements under repeated loading.	2
1.5	Problems in Flexible Pavement	2
1.6	Problems in Rigid Pavement	2
2.0	**Design of Flexible Pavements**	
2.1	Flexible pavement design	2
2.2	Empirical design	1
2.3	Semi empirical and theoretical methods	2
2.4	Design procedure as per IRC guidelines	2
2.5	Design and specification of rural roads.	2
3.0	**Design of Rigid Pavements**	
3.1	Methods of construction of Cement concrete pavement layers	2
3.2	Design principles of Flexible and Rigid Pavements, factors affecting design of pavements – ESWL	2
3.3	Modified Westergaard approach	1
3.4	Design procedure as per IRC guidelines	1
3.5	Concrete roads and their scope in India.	1
3.6	Sub grade soil and traffic	1
3.7	Design practice for Flexible Pavements	1
4.0	**Traffic Control**	
4.1	Pavement Evaluation	2
4.2	Causes of distress in rigid and flexible pavements	2
4.3	Evaluation based on Surface Appearance	1
4.4	Cracks, Patches and Pot Holes, Undulations	1
4.5	Raveling & Roughness	1
4.6	Skid Resistance	1
4.7	Structural Evaluation by Deflection Measurements	1
5.0	**Stabilization of Pavements**	
5.1	Pavement Serviceability index	2
5.2	Stabilization with special reference to highway pavements	1
5.3	Choice of stabilizers	1
5.4	Testing and field control	2
5.5	Stabilization for rural roads in India	1
5.6	Use of Geosynthetics in roads	1
5.7	Pavement maintenance (IRC Recommendations only).	2

Course Designer(s)

1. Dr.K. Vijaya Sundravel - vijayasundravel@ksrct.ac.in

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60 CE E55	Safety in Construction	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- Analyze how building and fire codes interact with building construction and fire protection.
- Describe the causes of the most common workplace injuries.
- To learn about safety related challenges in construction industry.
- To study the various types of construction accident.
- To study the fire control technology in construction industry

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Analyze the concept of safety management	Analyse
CO2	Describe the various hazardous of construction sector	Understand
CO3	Explain the various types of building with their prevention of hazardous of construction	Remember
CO4	Discuss with different fire situations and firefighting using extinguishers	Remember
CO5	Describe the safe construction, specification and cost of safety	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	-	3	-	-	3	3	-	-	-	3
CO2	3	2			3	3	-	2	-	-	-	-	-	3
CO3	3	3	3	3	-	3	-	-	3	2	-	-	-	3
CO4	3	2	2	2	-	2	-	-	-	-	-	-	2	-
CO5	3	3	2	-	-	-	-	-	2	3	-	2	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	20	20	30
Apply	20	20	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022							
B.E. Civil Engineering							
60 CE E55 - Safety in construction							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction to Health, Safety and Environment * Introduction to Safety Management - Need for Safety in Indian Construction Sites - Industrial Safety - Health Management - Environment Management - Health and Safety Commission - IS Safety Codes - General Requirements & Legislation for Protective Clothing and Safety Equipment - Fire Fighting Arrangement	[9]
Hazards of Construction and their Prevention Introduction - Physical Injury Hazards – Chemical Hazards - Physical Hazards - Biological Hazards - Excavation – Scaffolding –Structural Framework and Roof work - Cranes and Heavy Lifting - Transport and Mobile Plants – Highways - Sewers and Confined Spaces.	[9]
Accidents and First Aid* Types of Accidents in construction industry - Site Arrangements for Health, Safety and Welfare - First-aid Facilities - Reporting Injuries - Accident Investigation.	[9]
Fire Control Technology* Hose - Types of hose – Characteristic - Types of hose fittings –Ladders- Introduction - Hook ladder - escape ladder - turn table - extension ladder - Hook ladder belts - Water relay system - Open circuit system - Closed circuit system – Pumps - Testing of pumps – Types of Pumps.	[9]
Management Systems for Safe Construction & Safety Costs Pre-contract Activities - Survey and Investigation- Design and Specification, Design Aids for Safe Construction - Management of Construction - Costs of Safety	[9]
Total Hours:	**45**

Text Book(s):	
1.	Ganguly D. S., & Changeriya C. S.," Safety Management, Chetan Prakashan publishes , 2018
2.	Steve Rowlinson ," Construction Safety Management Systems," New Delhi , 2019.
Reference(s):	
1.	Levitt R. E., and Samelson N. M., "Construction Safety Management", Mc.Graw Hill Book Company, Inc., N.Y. 2019
2.	Mishra R. K., "Construction Safety" AITBS Publishers, India, 2019.
3.	Jimmy W. Hinze, "Construction Safety ", Prentice Hall Inc., 2018
4.	Richard J. Coble, Jimmie Hinze and Theo C. Haupt, "Construction Safety and Health Management ", Prentice Hall Inc., 2019.

***SDG:9: Industry, innovation and infrastructure**

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Health, Safety and Environment**	
1.1	Introduction to Safety Management	1
1.2	Need for Safety in Indian Construction Sites	1
1.3	Industrial Safety	1
1.4	Health Management	1
1.5	Environment Management	1
1.6	Health and Safety Commission, IS Safety Codes	2
1.7	Legislation for Protective Clothing and Safety Equipment	1
1.8	Fire Fighting Arrangement	1
2.0	**Hazards of Construction and their Prevention**	
2.1	Introduction	1
2.2	Physical Injury Hazards	1
2.3	Chemical Hazards , Physical Hazards	1
2.4	Biological Hazards, Excavation	1
2.5	Structural Framework and Roof work	1
2.6	Cranes and Heavy Lifting	1
2.7	Transport and Mobile Plants	2
2.8	Sewers and Confined Spaces.	1
3.0	**Accidents and First Aid**	
3.1	Types of Accidents in construction industry	2
3.2	Site Arrangements for Health, Safety and Welfare	2
3.3	First-aid Facilities	2
3.4	Reporting Injuries	2
3.5	Accident Investigation.	1
4.0	**Fire Control Technology**	
4.1	Types of hose	1
4.2	Types of hose fittings	2
4.3	Ladders	1
4.4	Water relay system	1
4.5	Open circuit system	1
4.6	Closed circuit system	1
4.7	Types of Pumps	2
5.0	Management Systems for Safe Construction & Safety Costs	
5.1	Pre-contract Activities	2
5.2	Survey and Investigation	1
5.3	Design and Specification	2
5.4	Design Aids for Safe Construction	2
5.5	Management of Construction	1
5.6	Costs of Safety	1

Course Designer(s)

1. Dr. R. Jagadeesan – jagadeesan@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE E56	Watershed Conservation and Management	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To provide the technical, economical and sociological understanding of a watershed.
- To provide a comprehensive discourse on the engineering practices of watershed management for realizing the higher benefits of watershed management.
- To solve erosion, water and wind erosion problems
- To examine Soil Conservation Measures: Agronomical and Mechanical
- To Design of Small Water Harvesting Structures and to Evaluate of Watershed Management

Pre-requisites

- Hydrology And Water Resources Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the knowledge of overall concepts of watershed	Remember
CO2	Analyse for technical measures for soil erosion	Analyse
CO3	Describe the water harvesting techniques	Understand
CO4	Assess watershed management for realizing the higher benefits of watershed management.	Remember
CO5	Explore potential applications of Remote sensing and GIS in watershed management	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	2	2	-	-	-	3	3	-	-	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	-	2	-	-	-	-	-	3	2	-	-	-	3
CO4	3	2	1	2	3	2	-	-	-	-	-	-	-	2
CO5	3	2	-	2	2	2	-	-	2	3	-	2	-	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	20	20	30
Apply	20	20	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
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TIRUCHENGODE - 637 215

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE E56 - Watershed Conservation and Management

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Watershed Concepts Watershed - Need for an Integrated Approach - Influencing Factors: Geology – Soil – Morphological Characteristics - Toposheet - Delineation – Codification – Prioritization of Watershed – Indian Scenario	[9]
Soil Conservation Measures Types of Erosion – Water and Wind Erosion: Causes, Factors, Effects and Control – Soil Conservation Measures: Agronomical and Mechanical - Estimation of Soil Loss - Sedimentation	[9]
Water Harvesting and Conservation * Water Harvesting Techniques – Micro-Catchments - Design of Small Water Harvesting Structures – Farm Ponds – Percolation Tanks – Yield from a Catchment	[9]
Watershed Management ** Project Proposal Formulation - Watershed Development Plan – Entry Point Activities – Estimation – Watershed Economics - Agroforestry – Grassland Management – Wasteland Management – Watershed Approach in Government Programmes – Developing Collaborative know how – People's Participation – Evaluation of Watershed Management	[9]
GIS For Watershed Management Applications of Remote Sensing and Geographical Information System - Role of Decision Support System – Conceptual Models and Case Studies	[9]
Total Hours:	**45**

Text Book(s):

1.	Murty J. V. S.,, "Watershed Management", 2ndEdition, New Age International Publishers, 2018.
2.	Wurbs R. A., and James W. P., "Water Resource Engineering", 3rd Edition Prentice Hall of India, 2019.

Reference(s):

1.	Murthy V. V. N., and Madan K., "Land and Water Management", 6th Edition, Kalyani Publishers, 2019.
2.	Majumdar D. K.,, "Irrigation Water Management", 3rd Edition, Prentice Hall of India, 2015.
3.	Sarbhukan MM, "Integrated Water Resources Management", CBS Publishers And Distributors, New Delhi, 2020.
4.	Georg Meran, Markus Siehlow & Christian von Hirschhausen, "Integrated Water Resource Management: Principles and Applications", Springer Water, 2020.

* SDG – 06 : Clean Water and Sanitation , ** SDG – 11 : Sustainable Cities and Communities,

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Watershed Concepts**	
1.1	Introduction to Watershed Concepts	1
1.2	Need for an Integrated Approach	1
1.3	Influencing Factors - Geology, soil, and morphological characteristics	1
1.4	Toposheet and Delineation - Understanding topographic maps Techniques for delineating watersheds	1
1.5	Codification and Prioritization - Methods for categorizing watersheds Importance of prioritizing watershed management	1
1.6	Indian Scenario - Overview of watershed management in India	1
1.7	Case Studies - Analysis of successful watershed management projects	1
1.8	Discussing real-world watershed management scenarios	1
1.9	Introduction to Watershed Concepts	1
2.0	**Soil Conservation Measures**	
2.1	Types of Erosion - Water and wind erosion, Causes and effects	1
2.2	Control Measures for Water Erosion - Agronomical approaches	1
2.3	Control Measures for Wind Erosion - Vegetative barriers	1
2.4	Estimation of Soil Loss	1
2.5	Sedimentation Control Techniques	1
2.6	Case Studies - Examination of successful soil conservation projects	1
2.7	Analyzing challenges and solutions in soil conservation	1
2.8	Recap of soil conservation strategies	1
2.9	Visit to sites implementing soil conservation measures	1
3.0	**Water Harvesting and Conservation**	
3.1	Introduction to Water Harvesting Techniques	1
3.2	Micro-Catchments - Design principles and applications	1
3.3	Design of Small Water Harvesting Structures	2
3.4	Farm Ponds and Percolation Tanks	1
3.5	Yield Estimation from a Catchment	1
3.6	Case Studies - Examination of successful water harvesting projects	1
3.7	Identifying opportunities and challenges in water harvesting	1
3.8	Recap of water harvesting techniques	1
4.0	**Watershed Management**	
4.1	Project Proposal Formulation	1
4.2	Watershed Development Plan	1
4.3	Entry Point Activities	1
4.4	Estimation – Watershed Economics	1
4.5	Agroforestry and Grassland Management	1
4.6	Wasteland Management	1
4.7	Role of government initiatives and stakeholder collaboration in watershed management	1
4.8	Importance of community involvement and methods for evaluating watershed projects	1
4.9	Recap of watershed management principles	1
5.0	**GIS For Watershed Management**	
5.1	Basics of GIS and its applications in watershed management	1
5.2	Mapping, analysis, and decision-making using GIS	1
5.3	Role of Decision Support (DSS) - Utilizing DSS for informed decision-making in watershed management	1
5.4	Conceptual models for watershed analysis and planning	1
5.5	Case Studies -Examination of GIS-based watershed management projects	1
5.6	Exploring potential applications of GIS in specific watershed scenarios	1
5.7	Hands-on training in GIS software for watershed analysis	1
5.8	Methods for collecting and analyzing spatial data for watershed management	1
5.9	Recap of GIS concepts in watershed management	1

Course Designer(s)

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TIRUCHENGODE - 637 215

60 CE L01	Waste Management Techniques	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To provide knowledge on various sources of wastes.
- To gain knowledge on various waste characterization techniques and its analysis methods.
- To know about various management concepts of wastes from various sources.
- To analyze different waste processing technologies.
- To learn about various disposal methods with its remediation techniques.

Pre-requisites

- Basic knowledge about types of waste and its basic properties.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Study the methods of waste management system and to analyze their draw backs comparing with statutory rules.	Understand
CO2	Understand the composition and characterization of various wastes.	Understand
CO3	Evaluate different elements of waste management concepts.	Apply
CO4	Analyze different processing technologies and to study the various methods of waste to energy conversion.	Analyse
CO5	Summarize the various disposal methods with its remediation techniques.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	3	-	2	2	2	2	2	3	2	-
CO2	3	3	3	2	3	1	-	2	2	2	2	3	2	-
CO3	1	1	1	1	2	-	1	2	2	2	2	3	2	-
CO4	-	2	-	-	3	3	-	3	3	3	3	3	2	-
CO5	2	2	2	3	1	-	3	3	3	3	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	20	20	30
Apply	10	10	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE L01 - Waste Management Techniques

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Introduction* Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management – Elements of integrated waste management and roles of stakeholders - Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, lead acid batteries, electronic wastes , plastics and fly ash – Financing waste management.	[09]
Waste Characterization and Source Reduction* Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Extended producer responsibility - Recycling and reuse Practical: Composition of MSW, Determination of Physical and Chemical Properties of MSW.	[09]
Storage, Collection and Transport of Wastes* Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport.	[09]
Waste Processing Technologies* Objectives of waste processing – material separation and processing technologies – biological &chemical conversion technologies – methods and controls of Composting - thermal conversion technologies, energy recovery – incineration – solidification & stabilization of hazardous wastes- treatment of biomedical wastes.	[09]
Waste Disposal* Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – Rehabilitation of open dumps – landfill remediation.	[09]
Total Hours	**45**

Text Book(s):

1.	George Tchobanoglous and Frank Kreith, “Handbook of Solid Waste Management”, McGraw-Hill, New York, 2012.
2.	Rao M N, Razia Sultana and Sri Harsha Kota, “Solid and Hazardous Waste Management”, Elsevier, 2016.
3	Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Housing and Urban affairs, Government of India, New Delhi, 2016.

Reference(s):

1.	Howard S Peavy, Donald R Rowe and George Tchobanoglous, “Environmental Engineering”, Tata Mcgraw Hill Publishing Co ltd., 2016.
2.	Ramachandra T.V., “Management of Municipal Solid Waste”, TERI press, New Delhi, 2014.
3.	Cheery PM, “Solid and Hazardous Waste Management”, CBS Publishers & Distributors, New Delhi, 2017.

*** SDG:4 Quality Education, SDG:11: Sustainable Cities and Communities**

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Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management	1
1.2	Elements of integrated waste management and roles of stakeholders	1
1.3	Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes	2
1.4	Salient features of Indian legislations on management and handling of biomedical wastes, lead acid batteries	2
1.5	Salient features of Indian legislations on management and handling of electronic wastes , plastics and fly ash	2
1.6	Financing waste management	1
2.0	**Waste Characterization and Source Reduction**	
2.1	Waste generation rates and variation	1
2.2	Composition, physical, chemical and biological properties of solid wastes and Hazardous Characteristics	2
2.3	TCLP tests	1
2.4	Waste sampling and characterization plan	1
2.5	Source reduction of wastes	1
2.6	Waste exchange - Extended producer responsibility	1
2.7	Recycling and reuse Practical: Composition of MSW, Determination of Physical and Chemical Properties of MSW.	2
3.0	**Storage, Collection and Transport of Wastes**	
3.1	Handling and segregation of wastes at source	1
3.2	Storage and collection of municipal solid wastes	1
3.3	Analysis of Collection systems	1
3.4	Need for transfer and transport	1
3.5	Transfer stations Optimizing waste allocation	2
3.6	Compatibility, storage, labeling and handling of hazardous wastes	2
3.7	Hazardous waste manifests and transport.	1
4.0	**Waste Processing Technologies**	
4.1	Objectives of waste processing	1
4.2	Material separation and processing technologies	1
4.3	Biological & chemical conversion technologies	1
4.4	Methods and controls of Composting	2
4.5	Thermal conversion technologies	1
4.6	Energy recovery – Incineration, solidification & stabilization of hazardous wastes	2
4.7	Treatment of biomedical wastes.	1
5.0	**Waste Disposal**	
5.1	Waste disposal options - Landfills - Landfill Classification, types and methods	2
5.2	Disposal in landfills - Site selection, design and operation of sanitary landfills, secure landfills and Landfill bioreactors	3
5.3	Leachate and landfill gas management	1
5.4	Landfill closure and environmental monitoring	1
5.5	Rehabilitation of open dumps – landfill remediation.	2

Course Designer(s)

1. Dr.S.Gunasekar - gunasekar@ksrct.ac.in

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE L02	Climatic Changes and Adaptation Measures	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To make them aware of the fundamental factors caused for global warming
- To provides clear picture of the atmosphere and its heat transfer through various atmospheric activities.
- To impart knowledge on climatic change impacts in various sectors and its influences scaling the life standard of the influenced human society.
- To understand the role of international bodies like WMO, UNFCCC and IPCC in and adaptation measures for the sustainable earth.
- To strongly emphasis the necessary of innovative technologies to adopt at various levels of each stage in economic growth

Pre-requisites

- Environmental science and engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Summarize the key concepts, definitions on key perspectives of all causes for global warming.	Remember
CO2	Evaluate the mechanisms of Atmosphere and its components connected with global warming	Understand
CO3	Analyze the impact of global warming in climatic change in various fields.	Apply
CO4	Explain various international conferences on carbon emission rate on different regions of world	Remember
CO5	Identify various mitigation and Adaptive measurement planes for climatic change	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	3	-	-	-	-	-	-	3	3	-	3
CO2	3	2	2	2	-	2	-	-	-	-	-	-	-	2
CO3	3	2	3	2	-	3	3	-	-	-	-	-	-	3
CO4	3	2	-	-	-	-	-	-	-	-	2	2	-	2
CO5	3	-	-	-	-	-	-	-	-	-	-	2	-	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	40
Understand	20	20	30
Apply	20	20	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE L02 - Climatic Changes and Adaptation Measures								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Earth's Climate System* Role of ozone in environment - ozone layer-ozone depleting gases - Green House Effect, Radioactive Effects of Greenhouse Gases - The Hydrological Cycle - Green House Gases and Global Warming – Carbon Cycle	[9]
Atmosphere and its Components* Importance of Atmosphere - Physical Chemical Characteristics of Atmosphere - Vertical structure of the atmosphere Composition of the atmosphere - Atmospheric stability- Temperature profile of the atmosphere - Lapse rates- Temperature inversion - effects of inversion on pollution dispersion	[9]
Impacts of Climate Change** Causes of Climate change: Change of Temperature in the environment - Melting of ice Pole - sea level rise - Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of limit Change – Risk of Irreversible Changes.	[9]
Observed Changes and its Causes** Climate change and Carbon credits – CDM - Initiatives in India - Kyoto Protocol- Intergovernmental Panel on Climate change Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC –Evidences of Changes in Climate and Environment – on a Global Scale and in India	[9]
Climate Change Mitigation and Adaptation Measures** Difference between climate change mitigation and adaptation: Mitigation: Clean Development Mechanism –Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India. Adaptation measures include: using scarce water resources more efficiently; adapting building codes to future climate conditions and extreme weather events; building flood defences and raising the levels of dykes; developing drought-tolerant crops; choosing tree species and forestry practices etc.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2018.
2.	A report on "Adaptation and mitigation of climate change-Scientific Technical Analysis", Cambridge University Press, Cambridge, 2019.
Reference(s):	
1.	Wallace J. M., and Hobbs P. V., "Atmospheric Science", Elsevier - Academic Press, 2019
2.	Van Dam C., "Impacts of Climate Change and Climate Variability on Hydrological Regimes", Cambridge University Press, 2018.
3.	Uitto , "Evaluating Climate Change Action for Sustainable Development", Open access Book, Springer link, 2019
4.	Thomas E., Kristin and Dowin, "The atlas of Climatic change, mapping the world's greatest challenge", University of California press, Berkeley, 2019.

*SDG 3 – Good Health and Well Being
**SDG 7 – Affordable and Clean Energy

R4/ w.e.f. 01.06.2024
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CHAIRMAN
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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Earth's Climate System**	
1.1	Introduction to earth climate system	1
1.2	Role of ozone in environment	1
1.3	ozone layer	1
1.4	ozone depleting gases	1
1.5	Green house Effect	1
1.6	Radioactive effects of greenhouse Gases	1
1.7	The hydrological cycle	1
1.8	Green house gases and global warming	1
1.9	Carbon cycle.	
2.0	**Atmosphere and its Components**	
2.1	Introduction about atmosphere and its components	1
2.2	Importance of Atmosphere	1
2.3	Physical Chemical Characteristics of Atmosphere	1
2.4	Vertical structure of the atmosphere	1
2.5	Composition of the atmosphere	1
2.6	Atmospheric stability	1
2.7	Temperature profile of the atmosphere	1
2.8	Lapse rates	1
2.9	Temperature inversion and effects of inversion on pollution dispersion.	1
3.0	**Impacts of Climate Change**	
3.1	Causes of climate change	1
3.2	Change of temperature in the environment	1
3.3	Melting of ice ole	1
3.4	Sea level rise and Impacts of climate change on various sectors	1
3.5	Agriculture, forestry and ecosystem	1
3.6	Water resources	1
3.7	Human health, Industry, Settlement and Society	1
3.8	Methods and scenarios and projected Impacts for different regions	1
3.9	Uncertainties in the projected Impacts and risk of irreversible changes.	1
4.0	**Observed Changes and its Causes**	
4.1	Climate change and Carbon credits	1
4.2	CDM- Initiatives in India	1
4.3	Kyoto protocol	1
4.4	Intergovernmental panel on climate change	1
4.5	Climate sensitivity and feedbacks	1
4.6	The montreal protocol	1
4.7	UNFCCC – IPCC	1
4.8	Evidences of changes in climate and environment	1
4.9	Global scale and in India	1
5.0	**Climate Change Mitigation and Adaptation Measures**	
5.1	Difference between climate change mitigation and adaptation and carbon trading	1
5.2	Biodiesel, natural compost and Eco- friendly plastic	1
5.3	Alternate energy – hydrogen ,bio-fuels, solar energy and wind energy	3
5.4	Mitigation efforts in India	1
5.5	Adaptation measures	1
5.6	Building flood defences and raising the levels of dykes	1
5.7	Choosing tree species and forestry practices etc.	1

Course Designer(s)

2. Dr. S. Ramesh - rameshs@ksrct.ac.in

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE L03	Application of Remote Sensing and GIS in Engineering	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To know the basic principles of Remote Sensing (RS) and sensors
- To understand the basic operations and data types in Geographical Information System (GIS)
- To acquire knowledge on the image processing and data analysis techniques
- To learn the applications of RS & GIS in urban planning
- To gain knowledge on the applications of RS & GIS in agriculture, forestry and earth sciences

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the earth surface features and sensor properties in Remote Sensing (RS)	Understand
CO2	Use different data types in Geographical Information System (GIS)	Understand
CO3	Relate the image processing techniques and data analysis using RS & GIS	Understand
CO4	Solve the problems related to urban planning using RS & GIS	Apply
CO5	Execute the projects in agriculture, forestry and earth sciences with the help of RS & GIS	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	3	3	3	3	-	-	-	3	2	2
CO2	3	3	3	2	3	3	3	3	-	-	-	3	2	2
CO3	3	3	3	2	3	3	3	3	-	-	-	3	2	2
CO4	3	3	3	3	3	3	3	3	2	2	3	3	2	2
CO5	3	3	3	3	3	3	3	3	2	2	3	3	2	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	40
Understand	30	30	40
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE L03 - Application of Remote Sensing and GIS in Engineering

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Principles of Remote Sensing * Definition – Components of remote sensing. EMR spectrum – EMR interaction with earth surface features. Platforms and sensors – Evolution of different types of satellites and their characteristics, Sensor types and properties – Resolution concepts.	[9]
Geographical Information System * Definition and components of GIS. GIS data types – Non-spatial data, Field and statistical data, Spatial data. Maps and map projections, aerial photographs and satellite data – Vector and raster data types, Merits and demerits – Open source software.	[9]
Image Processing and Data Analysis * Digital Image – Characteristics, Image pre-processing techniques, Image enhancement techniques. Classification methods – Database concepts – Image interpretation – Raster and raster data analysis. Modelling surfaces – Types of data products.	[9]
Applications in Urban Planning ** Urban area definition and characterization. Base map preparation – Land use classification, Land cover classification. Urban structure and patterns – Feature extraction techniques, Change detection. Sprawl detection and characterization – Mapping of urban morphology – Building typology.	[9]
Agriculture, Forestry and Earth Sciences *** Crop inventory mapping – Command area mapping – Estimation of soil erosion – Landslides – Forest types and density – Forest fire risk zones mapping – Geology – Geomorphology – Landforms – Targeting mineral resources – Pollution monitoring.	[9]
Total Hours:	**45**

Text Book(s):

1. Lillesand T, Kiefer R. & Chipman J, “Remote Sensing and Image Interpretation”, 7th Edition, John Wiley & Sons, Inc., New York, 2015.
2. Anji Reddy M, “Text Book of Remote Sensing and Geographical Information Systems”, 4th Edition, BS Publications, Hyderabad, 2022.

Reference(s):

1. Basudeb Bhatta, “Remote Sensing and GIS”, 3rd Edition, Oxford University Press, New York, 2021.
2. Kang-Tsung Chang, “Introduction to Geographical Information Systems”, 9th Edition, McGraw Hill Publishing, 2019.
3. Peter A Burrough, McDonnel RA & Lloyd CD, “Principles of GIS”, 3rd Edition, Oxford University Press, United Kingdom, 2015.
4. Morain Stanley A, Renslow Michael S, Budge Amelia M, “Manual of Remote Sensing”, 4th Edition, American Society for Photogrammetry and Remote Sensing, USA, 2019.

* SDG 4 – Quality Education

** SDG 11 – Sustainable Cities and Communities

*** SDG 15 – Life on Land

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Principles of Remote Sensing**	
1.1	Definition	1
1.2	Components of remote sensing	1
1.3	EMR spectrum	1
1.4	EMR interaction with earth surface features	1
1.5	Platforms and sensors	1
1.6	Evolution of different types of satellites and their characteristics	1
1.7	Sensor types and properties	1
1.8	Resolution concepts	1
2.0	**Geographical Information System**	
2.1	Definition and components of GIS	1
2.2	GIS data types	1
2.3	Non-spatial data	1
2.4	Field and statistical data	1
2.5	Spatial data	1
2.6	Maps and map projections	1
2.7	Aerial photographs and satellite data	1
2.8	Vector and raster data types – Merits and demerits	1
2.9	Open source software	1
3.0	**Image Processing and Data Analysis**	
3.1	Digital Image - Characteristics	1
3.2	Image pre-processing techniques	1
3.3	Image enhancement techniques	1
3.4	Classification methods	1
3.5	Database concepts	1
3.6	Image interpretation	1
3.7	Raster and raster data analysis	1
3.8	Modelling surfaces	1
3.9	Types of data products	1
4.0	**Applications in Urban Planning**	
4.1	Urban area definition and characterization	1
4.2	Base map preparation	1
4.3	Land use classification	1
4.4	Land cover classification	1
4.5	Urban structure and patterns	1
4.6	Feature extraction techniques	1
4.7	Change detection – Sprawl detection and characterization	1
4.8	Mapping of urban morphology	1
4.9	Building typology	1
5.0	**Agriculture, Forestry and Earth Sciences**	
5.1	Crop inventory mapping	1
5.2	Command area mapping	1
5.3	Estimation of soil erosion	1
5.4	Landslides	1
5.5	Forest types and density	1
5.6	Forest fire risk zones mapping	1
5.7	Geology, Geomorphology, Landforms	1
5.8	Targeting mineral resources	1
5.9	Pollution monitoring	1

Course Designer(s)

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE L04	Road Safety and Planning	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To understand fundamental of Traffic Engineering.
- To investigate & determine the collective factors & remedies of accident involved
- To design & planning various road geometrics.
- To Determine planning and management in road safety.
- To massage the traffic system from road safety point of view.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	State the fundamental of traffic engineering & some of the statistics methods to analysis the traffic safety.	Remember
CO2	Apply the concepts of accident interrogations risk involved with measures to identity the causes are dealt.	Apply
CO3	Classify the role of road safety in planning the urban infrastructures design is discussed.	Understand
CO4	Evaluate the various traffic management systems for safety & safety improvement strategies are dealt.	Analyse
CO5	Review the knowledge of Road Safety Audits in legal process	Understand

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	1	2	3	2	3	3	2	3	3	2	-
CO2	3	2	3	2	2	3	3	3	3	2	3	3	2	-
CO3	3	1	3	2	2	3	3	3	3	2	2	3	2	-
CO4	3	3	3	3	2	3	3	3	3	2	3	3	2	-
CO5	3	3	3	1	2	3	3	3	3	2	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	05	05	15
Understand	05	05	15
Apply	35	30	50
Analyse	15	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE L04 – Road safety and Planning

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Fundamentals of Traffic Engineering* Basic Characteristics of Motor-Vehicle Traffic, Highway Capacity, Applications of Traffic Control Devices, Traffic Design of Parking Facilities, Traffic Engineering Studies; Statistical Methods in Traffic Safety Analysis – Regression Methods, Poisson Distribution, Chi-Squared Distribution, Statistical Comparisons	[09]
Accident Investigations and Risk Management* Collection and Analysis of Accident Data, Condition and Collision Diagram, Causes and Remedies, Traffic Management Measures and Their Influence on Accident Prevention, Assessment of Road Safety, Methods to Identify and Prioritize Hazardous Locations and Elements, Determine Possible Causes of Crashes, Crash Reduction Capabilities and Countermeasures, Effectiveness of Safety Design Features, Accident Reconstruction	[09]
Road Safety in Planning and Geometric Design** Vehicle And Human Characteristics, Road Design and Road Equipment, Redesigning Junctions, Cross Section Improvements, Reconstruction and Rehabilitation of Roads, Road Maintenance, Traffic Control, Vehicle Design and Protective Devices, Post Accident Care.	[09]
Role of Urban infrastructure design in safety** Geometric Design of Roads; Design of Horizontal and Vertical Elements, Junctions, At Grade and Grade Separated Intersections, Road Safety in Urban Transport, Sustainable Modes and their Safety	[09]
Traffic Management Systems** Management for Safety, Road Safety Audits and Tools for Safety Management Systems, Road Safety Audit Process, Approach to Safety, Road Safety Improvement Strategies, ITS and Safety.**[09]**	[09]
Total Hours:	**45**
Text Book(s):	
1. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers	
2. Transportation Engineering – An Introduction, C.Jotinkhisty, B. Kent Lall	
Reference(s):	
1. Handbook of Road Safety measures, second Edition, Rune Elvik, Alena Hoye, TrulsVaa, Michael Sorenson	
2. Road Safety by NCHRP	

***SGD 4 – Quality Education**

****SDG 9 – Industry Innovation and infrastructures**

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Fundamentals of Traffic Engineering**	
1.1	Definition of Basic Characteristics of Motor	1
1.2	Vehicle Traffic, Highway Capacity	1
1.3	Applications of Traffic Control Devices	2
1.4	Traffic Design of Parking Facilities, Traffic Engineering Studies	1
1.5	Statistical Methods in Traffic Safety Analysis	1
1.6	Regression Methods, Poisson Distribution	2
1.7	Chi- Squared Distribution, Statistical Comparisons	1
2.0	**Accident Investigations and Risk Management**	
2.1	Collection and Analysis of Accident Data,	1
2.2	Condition and Collision Diagram, Causes and Remedies,	1
2.3	Traffic Management Measures and Their Influence on Accident Prevention,	1
2.4	Assessment of Road Safety, Methods to Identify,	1
2.5	Prioritize Hazardous Locations and Elements,	2
2.6	Determine Possible Causes of Crashes, Crash Reduction Capabilities	1
2.7	Countermeasures, Effectiveness of Safety Design Features	1
2.8	Accident Reconstruction	1
3.0	**Road Safety in Planning and Geometric Design**	
3.1	Vehicle And Human Characteristics	1
3.2	Road Design and Road Equipment	1
3.3	Redesigning Junctions, Cross Section Improvements	1
3.4	Reconstruction and Rehabilitation of Roads	1
3.5	Road Maintenance, Traffic Control,	1
3.6	Vehicle Design and Protective Devices	2
3.7	Post Accident Care	2
4.0	**Role of Urban infrastructure design in safety**	
4.1	Geometric Design of Roads	1
4.2	Design of Horizontal Elements	1
4.3	Design of Vertical Elements	1
4.4	Junctions, At Grade.	1
4.5	Grade Separated Intersections,	1
4.6	Road Safety in Urban Transport	2
4.7	Sustainable Modes and their Safety.	2
5.0	**Traffic Management Systems**	
5.1	Management for Safety,	1
5.2	Road Safety Audits Management Systems,	1
5.3	Road Safety Tools for Safety Management Systems,	1
5.4	Road Safety Audit Process,	1
5.5	Approach to Safety	1
5.6	Road Safety Improvement Strategies	2
5.7	ITS and Safety	2

Course Designer(s)

1. Dr. D.Sivakumar - sivakumard@ksrct.ac.in

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Machine Operations –Vehicle Traffic, Highway Capacity.
3. Solution of system of linear equations for Effectiveness of Safety Design Features.
4. Computation of Road Safety in Urban Transport
5. Finding ordinary and partial Safety Tools for Safety Management Systems.

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE L05	Environment and Ecology	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- Understand the scope and multidisciplinary nature of environmental studies.
- Evaluate the role of biodiversity in shaping ecosystems.
- Identify endangered and endemic species and understand their conservation importance.
- Understand the role of biomonitoring in assessing aquatic ecosystem health.
- Evaluate integrated ecological engineering systems through case studies.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate an understanding of the multidisciplinary nature of environmental studies.	Understand
CO2	Describe the structure and function of various ecosystems.	Understand
CO3	Identify and analyze endangered and endemic species, understanding their conservation significance.	Apply
CO4	Apply ecological principles to propose rehabilitation strategies for damaged ecosystems.	Apply
CO5	Recognize the role of engineers in promoting public awareness, education, and participation for ecosystem protection.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	3	2	2	2	2	2	2	3	2	-
CO2	3	2	2	2	3	2	2	2	2	2	2	3	2	-
CO3	3	2	2	2	3	2	3	2	2	2	2	3	2	-
CO4	3	2	2	3	3	2	3	3	3	3	3	3	2	-
CO5	3	2	2	3	3	2	3	3	3	3	3	3	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	10	10	20
Apply	30	30	30
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

R4/ w.e.f. 01.06.2024
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Approved in Academic Council Meeting held on 25.05.2024

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE L05 - Environment and Ecology

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Environmental Studies, Ecosystem And Biodiversity* Environment - Segment - Environmental studies - Scope and multidisciplinary nature - Need for public awareness - Environmental ethics- Ecosystem - Structure and function - Ecological succession. Biodiversity - Values of biodiversity - Endangered and endemic species - Hot spots - India a mega biodiversity nation - Threats - Impact of biodiversity loss - Conservation - In-situ and ex-situ - Case studies	**[09]**
Ecosystem Functions ** Energy flow and nutrient cycling – Food chain and food webs – Biological magnification, diversity and stability, immature and mature systems. Primary productivity – Biochemical cycling of nitrogen, phosphorous, sulphur an dcarbon dioxide; Habitat ecology - Terrestrial, fresh water, estuarine and marine habitats.	**[09]**
Ecological Engineering Methods ** Bio monitoring and its role in evaluation of aquatic ecosystem; Rehabilitation of ecosystems through ecological principles – step cropping, bio-wind screens, Wetlands, ponds, Root Zone Treatment for wastewater, Reuse of treated wastewater through ecological system. .	**[09]**
Ecological Effects Of Industrialisation ** Ecological effects of exploration, production, extraction, processing, manufacture and transport.	**[09]**
Case Studies And Public Awareness* Case studies of Integrated ecological engineering systems. Role of engineers – public awareness, education and participation to protect ecosystem.	**[09]**
Total Hours	**45**

Text Book(s):	
1.	Odum, E.P., “Fundamental of Ecology”, W.B.Sauders, 2004.
2.	Kormondy, E.J., “Concepts of Ecology”, Prentice Hall, New Delhi, 2012.
Reference(s):	
1.	Mitch, J.W. and Jorgensen, S.E., “Ecological Engineering – An Introduction to Ecotechnology”, John Wiley and Sons, 2001.
2.	Colinvaux, P., “Ecology”, John Wiley and Sons, 2001.
3.	Etnier, C & Guterstam, B., “Ecological Engineering for Wastewater Treatment”, 2nd Edition, Lewis Publications, London, 2000.
4.	Deeksha Dave and Katewa. S.S, “Environmental Studies” 2nd Edition, Cengage Publications, Delhi, 2013.

***SGD 4 – Quality Education**

**** SDG 9 – Industry Innovation and infrastructures**

R4/ w.e.f. 01.06.2024
Passed in the BOS Meeting Held on 22.05.2024
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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Environmental Studies, Ecosystem and Biodiversity**	
1.1	Definition of the environment and its segments.	1
1.2	Overview of environmental studies and its scope.	1
1.3	Multidisciplinary Nature and Public Awareness	1
1.4	Discussion on the multidisciplinary nature of environmental studies.	1
1.5	Importance of public awareness in environmental issues.	1
1.6	Environmental Ethics and Ecosystem Basics	2
1.7	Introduction to environmental ethics.	2
2.0	**Ecosystem Functions**	
2.1	Introduction to Biodiversity	1
2.2	Values of biodiversity.	1
2.3	Identification of endangered and endemic species.	1
2.4	Overview of biodiversity hotspots and India as a mega biodiversity nation.	2
2.5	Threats, Impact, and Conservation	2
2.6	Analysis of threats to biodiversity and the impact of biodiversity loss.	2
3.0	**Ecological Engineering Methods**	
3.1	Discussion on conservation methods (in-situ and ex-situ).	1
3.2	Introduction to case studies.	1
3.3	Ecosystem Functions	1
3.4	Energy Flow and Nutrient Cycling	1
3.5	Explanation of energy flow and nutrient cycling.	1
3.6	Analysis of food chains and food webs.	2
3.7	Diversity, Stability, and Productivity	1
3.8	Discussion on biodiversity and ecosystem stability.	1
4.0	**Ecological Effects of Industrialisation**	
4.1	Differentiation between immature and mature ecosystems.	1
4.2	Overview of primary productivity and biochemical cycling.	1
4.3	Habitat Ecology	1
4.4	Exploration of habitat ecology in different environments.	1
4.5	Ecological Engineering Methods	1
4.6	Understanding the role of biomonitoring in aquatic ecosystems.	2
4.7	Principles of ecosystem rehabilitation.	1
4.8	Detailed study of methods such as step cropping, bio-wind screens, wetlands, ponds, and Root Zone Treatment for wastewater.	1
5.0	**Case Studies and Public Awareness**	
5.1	Analysis of the reuse of treated wastewater through ecological systems.	2
5.2	Industrialisation and Ecological Effects	2
5.3	Examination of the ecological effects of exploration, production, extraction, processing, manufacture, and transport.	1
5.4	In-depth analysis of case studies on integrated ecological engineering systems.	2
5.5	Recognizing the role of engineers in promoting public awareness, education, and participation for ecosystem protection.	1

Course Designer(s)

1. Dr. N.Ramesh - rameshn@ksrct.ac.in

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE L06	Architectural Engineering	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To understand about principles and elements of architecture
- To know about various building types
- To learn the principles of orientation and planning of buildings
- To impart knowledge on Techniques in planning
- To get exposure in Development control rules

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the elements and principles of architecture	Understand
CO2	Classify the residential, industrial and public building.	Analyse
CO3	Know the principles of orientation & planning of buildings	Understand
CO4	Apply various techniques in planning	Apply
CO5	Plan the site based on Zoning regulations	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	2	3	2	2	2	2	2	2	2	2	-
CO2	3	2	3	2	2	2	2	2	2	2	2	2	2	-
CO3	3	2	3	3	3	2	2	2	2	2	2	2	2	-
CO4	3	2	3	2	2	2	2	2	2	2	2	2	2	-
CO5	3	2	3	2	2	2	2	2	2	2	2	2	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	30	20	50
Analyse	10	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE L06 - Architectural Engineering

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Introduction to Architecture** Definition and elements of architecture, principles of composition, qualities and factors in architectural design - Analysis integration of function and aesthetics. Factors influencing the character and style of building	[09]
Building Types** Building types – Classification of residential, industries and public building - Planning concepts - Residential, institutional, commercial and Industrial - Application of anthropometry and space standards - Building rules and regulations - Layout regulations	[10]
Principles of Orientation and Planning of Buildings* Factors affecting orientation – sun – wind – rain-orientation criteria for Indian conditions- Principles governing the theory of planning –planning of residential buildings	[07]
Techniques in Planning** Planning survey techniques - preparation of urban and regional structure plans, development plans, action plans - site planning - principles and design - statistical methods of data analysis - application of G.I.S and remote sensing techniques in urban and regional planning - decision making models	[10]
Development Control Rules** Zoning regulations –sub division regulations-building regulations-floor space index-minimum plot sizes and building frontage-open spaces-minimum standard dimensions of building elements- organization and administration of planning agencies at National, State,Regional, Local and Metropolitan levels.	[09]
Total Hours:	**45**

Text Book(s):	
1.	Saathappan VRA. and K. Yogeshwari, Principles of Architecture, Raamalingaa Publication, 2006
2.	Rangwala S C, Town Planning,Charotar Publishing House, 2021
Reference(s):	
1.	Muthu Shoba Mohan G.,Principles of Architecture, Oxford University Press,2006
2.	Francis DK Ching ,Architecture, Form, space & order ,John Wiley & Sons Publication, Inc
3.	Pratap Rao M., Urban Planning, CBS Publishers and Distributors, New Delhi, 2019
4.	Time Saver Standards for Housing & Residential Development , Tata McGraw Hill published by Education Private Limited

***SDG7 – Affordable and Clean Energy**

****SDG9 – Industry Innovation and Infrastructure**

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Architecture**	
1.1	Introduction to the course	1
1.2	Definition and elements of architecture	1
1.3	Principles of composition	1
1.4	Qualities and factors in architectural design	2
1.5	Analysis integration of function and aesthetics	2
1.6	Factors influencing the character and style of building	2
2.0	**Building Types**	
2.1	Classification of residential, industries and public building	2
2.2	Planning concepts – Residential and institutional	2
2.3	Planning concepts - Commercial and Industrial	2
2.4	Application of anthropometry and space standards	1
2.5	Building rules and regulations	2
2.6	Layout regulations	1
3.0	**Principles of Orientation and Planning of Buildings**	
3.1	General Principles in building orientation	1
3.2	Factors affecting orientation	1
3.3	Sun-wind-rain-orientation criteria for Indian conditions	2
3.4	Principles governing the theory of planning	1
3.5	Planning of residential buildings.	2
4.0	**Techniques in Planning**	
4.1	Planning survey techniques	2
4.2	Preparation of urban and regional structure plans	2
4.3	Development plans &action plans	1
4.4	Site planning - Principles and design	1
4.5	Statistical methods of data analysis	1
4.6	Application of G.I.S in urban and regional planning	1
4.7	Application of remote sensing techniques in urban and regional planning	1
4.8	Decision making models	1
5.0	**Development Control Rules**	
5.1	Zoning regulations -Sub division regulations	1
5.2	Building regulations	2
5.3	Floor space index- floor space index- minimum plot sizes and building frontage	1
5.4	Open spaces-minimum standard dimensions of building elements	1
5.5	Organization and administration of planning agencies at National, State and Regional	2
5.6	Organization and administration of planning agencies at Local and Metropolitan levels	2

Course Designer(s)

1. Mr.K.Angu Senthil - angusenthil@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE L07	Green Buildings	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To learn green building Material and Equipment.
- To assess the concept of Green building rating systems.
- To acquire knowledge on Water and Energy efficiency in buildings.
- To provide introduction to indoor environment quality.
- To give exposure on the Sustainability standards and codes

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the green building materials and key requisites for constructing a green building.	Remember
CO2	Outline the green building concepts, practices and benefits	Understand
CO3	Select the suitable HVAC equipment and water efficiency	Remember
CO4	Discuss the utilization of materials and Indoor environment quality	Understand
CO5	Summarize the standards and codes for sustainability.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	3	3	3	3	-	-	-	-	-	-	2	-
CO2	3	3	2	2	-	2	-	-	-	-	-	-	-	-
CO3	2	-	-	3	2	3	-	-	-	-	-	-	3	-
CO4	3	-	3	-	2	2	-	-	-	-	-	-	3	-
CO5	3	3	-	-	-	3	-	-	-	-	-	-	-	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	30	40
Understand	20	20	40
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE L07 – Green Buildings

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Introduction Definition: Green Buildings, Green Building Materials and Equipment in India, key Requisites for Constructing a Green Building, Important Sustainable features for Green Buildings.	[9]
Green Building Concepts and Practices* Green Building Moment in India, Benefits Experienced in Green Buildings, Various Green building rating system in the Globe & India (LEED, IGBC, GRIHA, Green Globe, Estidama – Pearl rating system), Components of green building.	[9]
Energy Efficiency & Water Efficiency* Selection of HVAC Equipments (Chiller, Pumps, Air Handling Units), lighting system& its controls, Transformer selection, Eco-friendly captive power generation, Solar Water Heating system and Building Energy Simulation. Water Conservation, Waste water Treatment, Reuse of treated water and water efficient Chillers	[12]
Material Selection & Indoor Environment Quality* Waste reduction during construction, Waste management during operation, Utilization of materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture. Tobacco smoke control, Fresh air requirements, Use of Low VOC Materials – Disinfectant of VOC Materials, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels and IAQ Management	[9]
Sustainability Standards and Codes* National Building Code (NBC) 2016 – part 11 Approach towards sustainability, Energy Conservation Building Code (ECBC) 2017, ASHRAE Standard 189.1-2014, Standard for the Design of High-Performance Green Buildings.	[6]
Total Hours:	**45**

Text Book(s):

1.	Jerry yudelson, “Green building A to Z and understanding the buildings”, New society publishers, Canada, 2019.
2.	Means R., S,” Green Building Project Planning and Cost Estimating”, Kingston, Massachusetts, 2018.

Reference(s):

1.	Gajanan M Sabnis, “Green Building with Concrete and Sustainable Design and construction, CRC press, 2019
2.	Jerry yudelson, “Green building through integrated design”, McGraw Hill, New Delhi, 2020.
3.	Standard for the design for High Performance Green Buildings, Kent Peterson, 2019.
4.	Green Building Hand book, Volume I, 2020

*SDG 3 – Good Health and Well Being

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction**	
1.1	Definition Green Building	1
1.2	Green Building Materials	2
1.3	Green Building Equipment	2
1.4	Key Requisites for Constructing a Green Building	2
1.5	Important Sustainable features for Green Buildings.	2
2.0	**Green Building Concepts and Practices**	
2.1	Green Building Moment in India	1
2.2	Benefits Experienced in Green Buildings	1
2.3	Various Green building rating system in the Globe & Indian, LEED, IGBC and GRIHA	3
2.4	Various Green building rating system in the Globe & Indian, IGBC	1
2.5	Green Globe, Estidama, Pearl rating system	2
2.6	Components of green building.	1
3.0	**Energy Efficiency & Water Efficiency**	
3.1	Selection of HVAC Equipments (Chiller, Pumps, Air Handling Units)	3
3.2	lighting system& its controls	2
3.3	Transformer selection	1
3.4	Eco-friendly captive power generation	1
3.5	Solar Water Heating system and Building Energy Simulation	2
3.6	Water Conservation	1
3.7	Waste water Treatment	1
3.8	Reuse of treated water and water efficient Chillers	1
4.0	**Material Selection & Indoor Environment Quality**	
4.1	Waste reduction during construction and operation	1
4.2	Utilization of materials with recycled content	3
4.3	Tobacco smoke control	1
4.4	Use of Low VOC Materials	1
4.5	Disinfectant of VOC Materials,	1
4.6	Measure of IAQ and Reasons for poor IAQ	1
4.7	Measures to achieve Acceptable IAQ levels and IAQ Management	1
5.0	**Sustainability Standards and Codes**	
5.1	National Building Code (NBC) 2016 – part 11	2
5.2	Energy Conservation Building Code (ECBC) 2017	2
5.3	Ashrae Standard 189.1-2014	1
5.4	Standard for the Design of High-Performance Green Buildings.	1

Course Designer(s)

1. Dr.S. Ramesh - rameshs@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 CE L08	Sustainable Infrastructure	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To explain the importance of sustainable built environment
- To emphasis the significance of sustainable development and construction
- To introduce the techniques and for assessing environmental impact
- To perform the service life and life cycle assessments
- To develop strategies to improve infrastructure resilience and reduce vulnerability to various risks

Pre-requisites

- Fundamentals of reinforced concrete design

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the Concept of Infrastructure and Its Types.	Understand
CO2	Examine Regulatory Frameworks and Standards.	Understand
CO3	Explore Environmental Assessment Tools and Methodologies.	Apply
CO4	Understand the Impact of Climate Change on Infrastructure.	Analyse
CO5	Conduct Resilience and Vulnerability Assessments.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	2	-	-	2	1	-	-	-	-	-	1	-
CO2	3	-	-	-	1	-	1	-	-	-	-	-	1	-
CO3	2	-	-	-	2	-	3	-	-	-	-	-	2	2
CO4	3	1	1	2	-	1	3	-	-	-	-	-	2	2
CO5	3	2	1	-	-	-	1	-	-	-	-	-	3	3
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	25
Apply	20	20	25
Analyse	20	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. Civil Engineering								
60 CE L08 - Sustainable Infrastructure								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Introduction to Infrastructure and Sustainable Development* Definition - Types of infrastructure - Overview of building structures - Communication networks - Transport systems - Water and wastewater treatment - Energy production - The role of infrastructure in sustainable development - International perspectives on infrastructure development.	[9]
Regulations, Standards, and Sustainability** Regulatory frameworks for sustainable infrastructure - International standards for construction and management - Compliance and certification processes - Case studies on successful implementation of regulations.	[9]
Indicators of Sustainability and Environmental Assessment** Key indicators for evaluating the sustainability of infrastructure - Life cycle assessments (LCA) for infrastructure projects - Material flow analysis (MFA) in infrastructure - Environmental assessment tools and methodologies.	[9]
Climate Change and Infrastructure** Impact of climate change on infrastructure - Mitigation and adaptation strategies - Resilience and vulnerability assessments - Case studies on climate-resilient infrastructure projects.	[9]
Safety and Vulnerability of Infrastructure** Risk assessment and management for infrastructure - Vulnerability analysis and strategies for improvement - Emergency response planning - Case studies on safety and vulnerability in different types of infrastructure.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Xiaodi Wang and Tom Murphy, "Sustainable Infrastructure: Principles into Practice", 2nd Edition, Wiley, 2024.
2.	Paul Jowitt and Peter Head, "Sustainable Infrastructure: Principles into Practice", 1st Edition, ICE Publishing, 2020.
Reference(s):	
1.	Jim W. Hall, Robert J. Nicholls, and Zoe J. Davis, "The Future of National Infrastructure: A System of Systems Approach", Cambridge University Press, 2016.
2.	Fuso Nerini et al., "Mapping synergies and trade-offs between energy and the Sustainable Development Goals", Nature Energy, 2018.
3.	United Nations Economic and Social Commission for Asia and the Pacific, "Transport and Sustainable Development Goals", 2017.
4.	Bhaduri et al., "Achieving sustainable development goals from a water perspective", Frontiers in Environmental Science, 2016.

*SDG 4 – Quality Education

**SDG 9 – Industry, innovation and infrastructure

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Infrastructure and Sustainable Development**	
1.1	Present the definition of infrastructure and its significance	1
1.2	Discuss the broad categories of infrastructure (e.g., social, economic, environmental)	1
1.3	Group activity: Identify and categorize local examples of infrastructure	1
1.4	Provide an overview of various types of infrastructure	2
1.5	An the interdependence of different infrastructure components	2
1.6	The significance of communication networks and transportation systems	2
2.0	**Regulations, Standards, and Sustainability**	
2.1	Regulatory Frameworks for Sustainable Infrastructure	1
2.2	Importance of regulations and standards in sustainable infrastructure	1
2.3	Regulatory frameworks for sustainable infrastructure	2
2.4	The purpose, development, and evolution of regulations	1
2.5	Case studies demonstrating the impact of regulatory frameworks on infrastructure projects	1
2.6	International standards for construction and management	1
2.7	Compliance processes and certification requirements	1
2.8	The role of certification in ensuring adherence to standards	1
2.9	Group exercise: Analyze a hypothetical project and identify the international standards applicable	1
2.10	Various case studies showcasing successful implementation of regulations in sustainable infrastructure projects	1
3.0	**Indicators of Sustainability and Environmental Assessment**	
3.1	Overview of Sustainable Development Goals (SDGs)	2
3.2	Life cycle stages: cradle-to-grave analysis	2
3.3	Application of MFA in infrastructure planning and management	1
3.4	Introduction to various environmental assessment tools (e.g., LEED, BREEAM)	1
3.5	Green infrastructure and its benefits	1
3.6	Overview of global and local sustainability policies	1
3.7	Cost-benefit analysis for sustainable infrastructure	1
4.0	**Climate Change and Infrastructure**	
4.1	Overview of climate change and its impact on infrastructure	2
4.2	Understanding Vulnerability and Resilience	1
4.3	Climate Modeling and Impact Assessment	1
4.4	Reducing greenhouse gas emissions in infrastructure projects	1
4.5	Sustainable and low-carbon construction practices	1
4.6	Nature-based solutions for adaptation in infrastructure	1
4.7	Case studies of successful climate-resilient water projects	1
4.8	Student presentations on researched case studies	1
4.9	Overview of climate change and its impact on infrastructure	2
5.0	**Safety and Vulnerability of Infrastructure**	
5.1	Importance of risk assessment in project planning and management	2
5.2	Risk Identification and Classification	1
5.3	Risk Analysis and Quantification	1
5.4	Vulnerability Analysis and Improvement Strategies	1
5.5	Emergency Response Planning for Infrastructure	1
5.6	Crisis Communication and Stakeholder Engagement	1
5.7	In-depth analysis of selected case studies in various infrastructure sectors	1

Course Designer(s)

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE L09	Fundamentals of Civil Engineering	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To understand about principles and elements of various building
- To know about various building materials
- To learn the principles of building construction
- To impart knowledge on basic infrastructure services.
- To get exposure in urban engineering

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the elements and principles of various building	Remember/ Understand Analyse/ Apply
CO2	Classify the building materials and functional requirements	Remember/ Understand Analyse/ Apply
CO3	Know the principles of building construction	Remember/ Understand Analyse/ Apply
CO4	Apply various techniques in planning aspects of infrastructure services	Remember/ Understand Analyse/ Apply
CO5	Plan the site based on urban engineering	Remember/ Understand Analyse/ Apply

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	3	2	3	2	2	2	2	2	2	2	2	-
CO2	3	2	3	2	2	2	2	2	2	2	2	2	2	-
CO3	3	2	3	3	3	2	2	2	2	2	2	2	2	-
CO4	3	2	3	2	2	2	2	2	2	2	2	2	2	-
CO5	3	2	3	2	2	2	2	2	2	2	2	2	2	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	30	20	50
Analyse	10	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60CEL09- Fundamentals of Civil Engineering

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Introduction to civil engineering** Introduction to Civil Engineering – Various disciplines of Civil engineering, Importance of Civil engineering in infrastructure development of the country. Introduction to types of buildings as per NBC, Selection of site for buildings, Components of a residential building and their functions, Introduction to Industrial buildings and types. Building Planning – Basic requirements, elements, introduction to various building area terms, computation of plinth area, carpet area.	[09]
Surveying and Building Materials ** Surveying – Principle and objectives, Instruments used, Horizontal measurements, Ranging (direct ranging only), Instruments used for ranging, Leveling – Definition, Principles, Instruments, Preparation of level book, problems on leveling, Modern surveying instruments. Building Materials – Bricks, properties and specifications, Cement – Types, properties, grades, other types of cement and uses, Cement mortar – Constituents, Preparation, Concrete PCC and RCC, Grades, Steel – Use of steel in buildings, types.	[10]
Principles of Building Construction* Building Construction – Foundations, Classification, Bearing Capacity of Soil and related terms (definition only), Masonry Works – classifications, definition of different technical terms, Brick masonry – types, bonds, general principle, Roofs – functional requirements, basic technical terms, roof covering material, Floors – function, types, flooring materials (brief discussion), Plastering and Painting – objectives, types, preparation and procedure of application.	[07]
Techniques in infrastructure services** Basic Infrastructure services – air conditioning & purpose, fire protection & materials, Ventilation, necessity & functional requirements, Lifts, Escalators. Introduction to planning and design aspects of transportation engineering, Transportation modes, Highway engineering – historical development, highway planning, classification of highway, Railway Engineering – cross section of rail track, basic terminology, geometric design parameter (brief discussion only).	[10]
Airport and urban engineering** Airport engineering – development, types, definition, characteristics of aircraft, basic terminology, Traffic engineering – traffic characteristics, traffic studies, traffic operations (signals, signs, markings), Urban engineering – classification of urban road. Irrigation & Water Supply Engineering – Introduction, Types of Irrigation, different types of hydraulic structures, dam and weirs, types of dam, purpose and functions.	[09]
Total Hours	**45**

Text Book(s):

1.	Gopi, S., Basic Civil engineering, Pearson Publication-2020
2.	Bhavikatti, S. S., Basic Civil Engineering, New Age-2021

Reference(s):

1.	Chudley, R., Construction Technology, Longman Group, England-2014
2.	Kausik C.P., Basic Civil and Environmental Engineering, New Age.-2021
3.	American Society of Civil Engineers (2011) ASCE Code of Ethics – Principles Study and Application-2020

*** SDG7 – Affordable and Clean Energy**

**** SDG:09 Industry, innovation and infrastructure**

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to civil engineering**	
1.1	Various disciplines of Civil engineering	1
1.2	Introduction to types of buildings as per NBC	2
1.3	Selection of site for buildings	2
1.4	Introduction to Industrial buildings	2
1.5	Classification of Building Planning	2
1.6	Introduction to various building area	2
2.0	**Surveying and Building Materials**	
2.1	Principle and objectives Surveying	2
2.2	Preparation of level book	2
2.3	Types of cement and uses	2
2.4	Application of building materials	1
2.5	Types of cement and uses	2
2.6	Use of steel in buildings	2
3.0	**Principles of Building Construction**	
3.1	General Principles in building construction	1
3.2	Factors affecting Bearing capacity of soil	2
3.3	Different technical terms of brick masonry	2
3.4	Principles governing the theory of flooring materials	2
3.5	Planning of Plastering and Painting.	2
4.0	**Techniques in infrastructure services**	
4.1	Basic Infrastructure services	2
4.2	Functional requirements of lifts and escalators	1
4.3	Planning and design aspects of transportation engineering	2
4.4	Classification of highway	2
5.0	**Airport and urban engineering**	
5.1	Characteristics of aircraft	1
5.2	Traffic characteristics and operations	2
5.3	Classification of urban road	2
5.4	Different types of hydraulic structures	2

Course Designer(s)

1. Dr.M.Velumani - velumani@ksrct.ac.in

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60 CE L10	Disaster Management	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To learn about various types of natural and man-made disasters.
- To impart the knowledge of pre- and post-disaster management for some of the disasters.
- To demonstrate various information and organizations in disaster management in India.
- To get exposed to technological tools and their role in disaster management.
- To understand the basics of Hazard and Vulnerability of structures

Pre-requisites

- Repair and Rehabilitation of Structures

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Outline the basic information and precautions regarding various disasters.	Remember
CO2	Decide first action to be taken under various disasters.	Analyse
CO3	Identify the organizations in India which are dealing with disasters.	Understand
CO4	Select IT tools to help in disaster management.	Apply
CO5	Increase the understanding of financial management of disaster risks.	Remember

Mapping with Programme Outcomes

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	2	2	2	2	2	2	2	2	-	2
CO2	3	3	3	2	2	2	2	2	3	2	2	2	-	2
CO3	3	3	2	2	2	2	2	2	3	2	2	2	-	2
CO4	3	3	3	2	2	2	2	2	3	2	2	2	-	2
CO5	3	3	3	3	2	2	2	2	3	2	2	2	-	2
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	30	20	50
Analyse	10	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. Civil Engineering

60 CE L10 - Disaster Management

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
-	3	0	0	45	3	40	60	100

Concepts of Disaster* Hazard, Vulnerability, Risk, Capacity Disaster and Development - disaster management. Types, Trends, Causes, Consequences and Control of Disasters Geological Disasters (earthquakes, landslides, tsunami, vibration and collapse due to mining); Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building and other structural collapse, rural and urban fire, road ,rail and Airplane accidents, nuclear, radiological, chemical and biological disasters, water pollution , Food poisoning) Global Disaster Trends - Emerging Risks of Disasters - Climate Change and Urban Disasters.	[9]
Disaster Management Cycle and Framework* Disaster Management Cycle - Paradigm Shift in Disaster Management. Pre-Disaster - Risk Assessment and Analysis, Risk Mapping, zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness. During Disaster - Evacuation - Disaster Communication - Search and Rescue – Emergency Operation Centre - Incident Command System.	[9]
Disaster Management in India* Disaster Profile of India – Major Disasters happened in of India - Bhuj, Lathur earthquakes, Kerala flood (2018), flood in Kedarnath, Tsunami, and Plague in Gujarat hand Lessons Learnt. Disaster Management Act 2005 - Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter Governmental Agencies-Role of public and youth	[9]
Applications of Science and Technology for Disaster Management* Geo-informatics in Disaster Management (Remote Sensing, GIS, GPS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters. Role of Science &Technology Institutions for Disaster Management-NIDM, ILDM, AIDMI.	[9]
Financial Management of Disaster Risks* Information on Natural Hazards and Disaster Reduction, Financial management of disaster risks, Assessment of disaster risks, Financial vulnerabilities and the impact of disasters. Insurance Policies for Disaster Management: Evaluation of risk funding and risk transfer policies, Catastrophe insurance pool, Reserve funds and contingent credit policies, Role of Government and market participants, Insurance policy design, Fiscal cost of relief and reconstruction, Grants and low interest loan for reconstruction.	[9]
Total Hours:	**45**

Text Book(s):

1.	Tushar Bhattacharya, " Disaster Science and Management", McGraw Hill Education (India) Pvt. Ltd, 2017.
2.	Jagbir Singh, "Disaster Management: Future Challenges and Opportunities", K W Publishers Pvt. Ltd. 2013.

Reference(s):

1.	Singhal J.P, "Disaster Management", Laxmi Publications, 2019. Martin W, Stockel and Martin T Stockle, "Automotive Mechanics Fundamentals", The Good Heart – Will Cox Company Inc, USA, 2012.
2.	Shailesh Shukla, Shamna Hussain, "Biodiversity, Environment and Disaster Management", Unique Publications, 2013.
3.	Murthy D.B.N, "Disaster Management", Deep and Deep Publication PVT. Ltd, New Delhi, 2012.
4.	Mrinalini Pandey, "Disaster Management", Wiley India Pvt. Ltd, 2014.

*SDG 9 – Industry Innovation and Infrastructure

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TIRUCHENGODE - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Concepts of Disaster**	
1.1	Hazard, Vulnerability, Risk, Capacity Disaster and Development	1
1.2	Hydro-Meteorological Disasters	1
1.3	Biological Disasters	1
1.4	Technological Disasters	1
1.5	Manmade Disasters	1
1.6	Global Disaster	2
1.7	Emerging Risks of Disasters	1
1.8	Climate Change and Urban Disasters	1
2.0	**Disaster Management Cycle and Framework**	
2.1	Disaster Management Cycle.	1
2.2	Risk Assessment and Analysis	1
2.3	Prevention and Mitigation of Disasters	1
2.4	Emergency Operation Centre	2
2.5	Damage and Needs Assessment	1
2.6	Reconstruction and Redevelopment	2
2.7	Early Recovery	1
3.0	**Disaster Management in India**	
3.1	Disaster Profile of India	1
3.2	Major Disasters happened in of India	1
3.3	Institutional and Financial Mechanism	2
3.4	National Policy on Disaster	2
3.5	Government and Inter Governmental Agencies	2
3.6	Role of public and youth	1
4.0	**Applications of Science and Technology for Disaster Management**	
4.1	Geo-informatics in Disaster Management	2
4.2	Disaster Communication System	2
4.3	Land Use Planning and Development Regulations	1
4.4	Disaster Safe Designs and Constructions	1
4.5	Structural and Non-Structural Mitigation of Disasters	1
4.6	Role of Science &Technology	2
5.0	**Financial Management of Disaster Risks**	
5.1	Natural Hazards and Disaster Reduction	1
5.2	Financial vulnerabilities and the impact of disasters	1
5.3	Reserve funds and contingent credit policies	2
5.4	Role of Government and market participants	2
5.5	Fiscal cost of relief and reconstruction	2

Course Designer(s)

1. Dr.M.Velumani - velumani@ksrct.ac.in

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