

Curriculum & Syllabus

for

B.Tech., Biotechnology Department (For the batch admitted in 2023– 2027)

R2022

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

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

VISION

Department of B.Tech., Biotechnology

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Passed in BoS Meeting held on 12/05/2023 Approved in Academic Council Meeting held on 03/06/2023

To produce competent Scientists, Technologists, Entrepreneurs and Researchers in Biotechnology through quality education.

MISSION

- To be recognized as a place of excellence in teaching-learning through continual improvement process (Place of excellence and continual improvement)
- To work in close liaison with the industry to achieve socio-economic development through biotechnological ventures (Socio-economic development)
- To facilitate students to perform as competent professional Biotechnologists (Professional Competence)

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- **PEO1: Fundamentals:** Graduates are professionally competent in Biotechnology to solve problems in environmental, food, biochemical and biomedical engineering and technology.
- **PEO2: Career Growth:** Graduates demonstrate proficiency in theory and practice of biotechniques through life-long learning.
- **PEO3: Professional Practices:** Graduates perform as an individual and / or member of a team with professional and ethical behaviour.

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.

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- PO9: **Individual and teamwork**: 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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

- **PSO1:** Design and execute industry-oriented experiments in biotechnology using modern tools and techniques.
- **PSO2:** Apply the knowledge of bioengineering and Technology to demonstrate research skills and develop technology for commercialization

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

The B.Tech Biotechnology Programme outcomes leading to the achievement of the objectives are summarized in the following Table.

Programme			Prog	ramme	Outco	mes						
Educational	PO1	PO2	PO3	PO4	PO5	PO6	P07	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

MAPPING-UG-BIOTECHNOLOGY- COURSE WITH PROGRAMMEOUTCOMES (POs)

Year Sem Course	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
									0	ffici	~			

		Professional English- I								2	3	3	2	3	1	3
		Matrices and	3	3	2.8	2.4	2.4					0		2	3	
		Calculus Basic Electrical and Electronics Engineering	2.6	2.8	1.6	1.6	2	2	2.3	1.5	2	2	2	2.2	3	
		Physics for Biotechnology	3	2.8	2.8	2.8	2.6	2.6	2.4	2	2.2	2.2	2.2	2.2	1	3
		Chemistry for Life science	3	3	3	3	2	2.8	2.8	2	2.6	2.8	3	3	3	3
		Environmental Studies and Climate Change	2.8	2.8	3	2.8	2.7	2.6	3	3	2.2	2.2	1.8	2.8	2	2
		Heritage of Tamils								3	3		2			
		Applied Physics Laboratory	3	2.8	2.8	2.6	2.4	2.4	2.4	1.4	2	1.9	2	2.2	1	3
I		Applied Chemistry Laboratory	3	3	2.8	2.8	2	2.8	2.6	2.6	2.2	2	1.4	2.4	3	3
		Professional English- II								2	3	3	2	3	1	3
		Integrals, Partial Differential Equations and Laplace Transform	3	3	2.6	2.4	2.6							2	3	
		C Programming	3	3	3		3				2	2	2	2	3	3
		Engineering Graphics	3	2.6	3	3	3	1	1	1	-	3	1.4	2	1	3
	11	Engineering Mechanics	3	2	2	3								2	3	1
		Tamils and Technology							3	3		2		3		
		Fabrication and Reverse Engineering Laboratory	3	2.6	2.8	1.6	3	2		2.2	3	2	1.6	3		
		C Programming	3	3	3		3				3	3	2	2	2	1
		Career Skill Development-I								2	3	3	2	3		
		Internship	2	3	3	3	2	2	1	1	2	2	2	3		
		Fourier Transform and Numerical Methods	3	3	2	2	2		-					3	3	
		Biochemistry	1	2	3	2	1	1	1		2	1		1	2.4	2.6
		Microbiology	3	2	2	2	1	2	2	1	2	2	1	2	2.8	2.6
		Cell Biology and Genetics	3	3	2		1	_	_					2	2.4	3
		Principles of Chemical Engineering	2	3	1	2	1		2				1	2	3	3
		Molecular Biology	3	3	2	2	2	3	3	3	3	3	2	1	2.8	2.6
		Biochemistry Laboratory	1	2	1	2	3	1		1	2	1	1	1	2.6	2.6
		Microbiology Laboratory	3	2	2	3	2	2	1	1	2	2	2	3	2.6	2.6
		Career Skill Development-II	1	1	1	1	1	2	1	2	3	3	2	3		
		Internship	2	3	3	3	2	2	1	1	2	2	2	3		
П	IV	Probability and Statistics	3	3	3	3	3							3	2	2.2

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		1														<u> </u>
		Genetic Engineering	3	2	2	1				1	1			1	3	2.4
		Protein and Enzyme Engineering	2	3	3	3	2	2	1	1	3	1	2	2	3	3
		Biochemical Thermodynamics	3	2	2	3	3	3	2	1	1	2	3	2	2.6	2.4
		Universal Human Values (UHV)*						3	3	3	2.8	3	2	3	2.4	2.6
		Molecular Biology and Genetic Engineering Laboratory	3	2	2	1				1	1			1	2.6	2.6
		Protein and Enzyme Engineering Laboratory	2	3	3	3	3	2	1	1	2	2	2	3	3.0	3.0
		Career Skill Development - III	2	2	1	1	1	2	1	1	2	3	2	3		
		Internship	2	3	3	3	2	2	1	1	2	2	2	3		
		Plant and Animal Biotechnology	3	2	1	1				1	1			1	3	3
		Bioinformatics	3	3	3	2	3	1	1			1	1	3	3.0	2.6
		Bioprocess Technology	2	3	3	3	3	3	3	1	1	3	3	3	3.0	3.0
		Heat and Mass Transfer Operations	3	3	3	3	2	3	2	1	1	3	2	3	2.8	2.8
	V	Start-ups and Entrepreneurship	2.8	2.6	3	2.4	2.4	2.5	2.5	2.3	2.7	2	2.3	2.4	2.4	2.8
		NCC/NSS/NSO/YRC/R RC/ Fine arts	3	2	1	1	3	3	3	3	3	3	3	3		
111		Plant and Animal Biotechnology Laboratory	3	2	2	2				1	1			2	3	3
		Bioprocess Technology Laboratory	3	3	2	2	3	2	2	1	1	2	3	3	3	3
		Career Skill Development – IV	2	1	2	2	1	1	1	1	2	3	2	3		
		Internship	2	3	3	3	2	2	1	1	2	2	2	3		
		Biopharmaceutical Technology	3	2	2	2				1	1			1	3	3
		Chemical Reaction Engineering	3	2	1	2	1		1						2.6	2.6
	VI	Computer-Aided Drug Design														
		Bioinformatics and Molecular Modeling Laboratory	3	2	2	2	3	2	1	1	1	2	2	3	2.4	2.8
		Chemical Engineering Laboratory	3	2	1	2	1		2						3	3

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		Mini project														
		Comprehension Test														
		Internship	2	3	3	3	2	2	1	1	2	2	2	3		
		Engineering Economics and Financial Accounting	3	2	3	2	1	3	2	1	2	2	3	1		
		Immunology	3	3	3	2	2	2	2	1	2	1	2	3	3	3
		Downstream Processing	2	3	3	3	2	2	2	1	2	2	2	3	2.8	2.8
	VII	Research Skill Development -I	3	3	2	2	2	2	1	2	1	3	2	1	3	3
IV		Biological data analysis Laboratory	3	2	3	3	2	2	2	1	1	2	2	2	2.4	3
		Downstream Processing Laboratory	2	2	3	3	3	2	1	1	2	1	2	2	2.8	2.8
		Project Work - Phase I	3	3	3	3	2	2	1	1	2	1	2	3	3	3
		Internship	2	3	3	3	2	2	1	1	2	2	2	3	3	3
		Research Skill Development -II	3	3	3	2	2	2	1	1	1	2	2	1	3	3
	VIII	Project Work - Phase II	3	3	3	3	2	2	1	1	2	1	2	3	3	3
		Internship	2	3	3	3	2	2	1	1	2	2	2	3	3	3

PROFESSIONAL ELECTIVES (PE)3

Yea	Semeste	Course	PO	PO2		РО		PO6	PO7	РО	PO	PO1	PO1	PO1	PSO1	
•	r		1		3	4	5			8	9	0	1	2		2
						E	LECT	IVE	- 1							
		Environmental Biotechnology	3	3	3	2	3	2	3	1				3	3	3
		Biodiversity and its conservation	3	3	3	2	3	2	3	1				3	3	3
III	V	Environmental Hazards and Management	1	2	3	1	3	1	3	1	1	1	1	1	3	3
		Food Biotechnology		3	3	3	3	2	2	3	2		3	3	3	3
		Fermentation Technology	2	3	3	3	3	3	3	1		2	3	3	3	3
				•		E	LEC	ΓΙΥΕ	– II				•			
		Cancer Biotechnology		3	2	3	3			1			2	3	3	3
		Clinical Immunology		3		3	3						2	3	3	3
111	VI	Stem Cell Technology		3	2	3	3			2			2	3	3	3
		Tissue Engineering		3	2	3	3			2			2	3	3	3
		Biomedical Instrumentatio n	3	3	2	3	3						2	3	3	3
	1				1	F	LEC	TIVF	- 111		. <u> </u>					

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		Bioresource Technology	3	3	2	3	3						3	3	3	3
		Biophysics	3	3	3	2	2	2	2	2	2	1	2	2	3	3
ш	VI	Metabolic Engineering	2	3	2	2	3			1			2	3	3	3
		Bioreactor Design	3	3	3	3	3	3	3	1	1	3	3	3	3	3
		Bioprocess Modelingand Simulation	2	3	3	3	3	3	3	1	1	3	3	3	3	3
						E	ELEC	TIVE	5 – IV	1						
		Nanobiotechnolo gy	3	2	3	3	3	2					2	3	3	3
		Bioinstrumentatio	3	3	3	3	3			1			2	3	3	3
IV	VII	Toxicology		3	2	3	3			2			2	3	3	3
		Genomics and Proteomics	3	3	3	3	3			1			3	3	3	3
		Agricultural Biotechnology	3	3	3	2	3	2	3	1				3	3	3
							ELEC	TIVE	E – V						•	
		Research Design and Analysis	3	2	3	3	3	2		2			2	3	3	3
	VIII	Marine Biotechnology		3	3	2	3			1			2	3	3	3
		Bioethics and Biosafety		3		3	3			1			2	3	3	3
		Biofuel Technology		2		3	2			1			2	3	3	3
		Systems Biology	3	3	3	3	3							3	3	3

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K.S. RANGASAMY COLLEGE OF TECHNOLOGY Credit Distribution for B.TECH (BT) Programme – 2023 –2024 Batch

					(Credits Per	Semes	ter		Total	Percentage
S.No.	Category	I	Ш	III	IV	V	VI	VII	VIII	Credits	%
1	HS	2	2	-	-	-	-	3	-	07	4.32
2	BS	17	4	04	04	-	-	-	-	29	17.90
3	ES	-	15	-	-	-	-	-	-	18	11.11
4	PC	-	-	20	14	18	11	12		74	45.67
5	PE	-	-	-	-	3	6	3	3	15	9.25
6	OE	-	-	-	3	3	3	3	-	12	7.40
7	CGC	-	-	-	-	-	-	2	8	10	6.17
8	MC	MC I	-	-	MC II	MC III	-	-	-		-
9	AC	-				-	-	AC I	AC II	-	-
10	GE		GE I	GE II						-	-
	Total	19	21	24	21	24	20	23	11	163	100

- **HS HUMANITIES AND SOCIAL SCIENCES**
- **BS BASIC SCIENCE**
- **ES ENGINEERING SCIENCES**
- **PC PROFESSIONAL CORE**
- **PE PROFESSIONAL ELECTIVES**
- **MC MANDATORY COURSES**
- **OE OPEN ELECTIVES**
- **CGC CAREER GUIDANCE COURSES**
- **AC AUDIT COURSES**
- **GE GENERAL ELECTIVE 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.

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215 (An Autonomous Institution affiliated to Anna University) HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT COURSES

S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С	Prerequisite
1.	60 EN 001	Professional English-I	HS	3	1	0	2	2	Basic knowledge of reading and writing in English
2.	60 EN 002	Professional English-II	HS	3	1	0	2	2	Basic knowledge of reading and writing in English and should have completed Professional English I.
3.	60 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3	Nil
4.	60 AB 001	National Cadet Corps (Air wing)	HS	4	2	0	2	3*	Nil
5.	60 AB 002	National Cadet Corps (Army wing)	HS	4	2	0	2	3*	Nil

BASIC SCIENCE COURSES

S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С	Prerequisite
1.	60 MA 001	Matrices and Calculus	BS	4	3	1	0	4	Nil
2.	60 EE 001	Basic Electrical and Electronics Engineering	BS	4	3	1	0	4	Nil
3.	60 PH 005	Physics for Biotechnology	BS	3	3	0	0	3	Nil
4.	60 PH 0P2	Applied Physics Laboratory	BS	4	0	0	4	2	Nil
5.	60 CH 0P1	Applied Chemistry Laboratory	BS	4	0	0	4	2	Nil
6.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	4	3	1	0	4	Nil
7.	60 MA 012	Fourier Transform and Numerical Methods	BS	4	3	1	0	4	Nil
8.	60 MA 021	Probability and Statistics	BS	4	3	1	0	4	Nil

ENGINEERING SCIENCE COURSES

S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С	Prerequisite
1.	60 ME 001	Engineering Drawing	ES	3	3	0	0	3	Nil
2.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2	Nil
3.	60 EE 002	Basic Electrical, Electronics and Instrumentation	ES	3	3	0	0	3	Nil
4.	60 ME 004	Engineering Mechanics	ES	4	3	1	0	4	Nil
5.	60 CS 001	C Programming	ES	3	3	0	0	3	Nil
6.	60 EE 0P2	Basic Electrical, Electronics and Instrumentation Laboratory	ES	4	0	0	4	2	Nil
7.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2	Nil

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	1	PROF	ESSIONAL (IRSES	5		T	
S.No.	Course Code	Course Title	Categor y	Contact Periods	L	т	Ρ	С	Prerequisite
1.	60 BT 301	Biochemistry	PC	3	3	0	0	3	Basics of Bioorganic chemistry
2.	60 BT 302	Microbiology	PC	3	3	0	0	3	Basic Biology
3.	60 BT 303	Cell Biology and Genetics	PC	3	3	0	0	3	Basic Biology
4.	60 BT 304	Principles of Chemical Engineering	PC	4	3	1	0	4	Basic knowledge in Chemistry and Mathematics
5.	60 BT 305	Molecular Biology	PC	3	3	0	0	3	Chemistry, Biochemistry, Cell Biology
6.	60 BT 3P1	Biochemistry Laboratory	PC	4	0	0	4	2	Basic Biology and Biochemistry
7.	60 BT 3P2	Microbiology Laboratory	PC	4	0	0	4	2	Introductory Biology and Microbiology
8.	60 BT 401	Genetic Engineering	PC	3	3	0	0	3	Molecular Biology and Biochemistry
9.	60 BT 402	Protein and Enzyme Engineering	PC	3	3	0	0	3	Basic knowledge on Chemistry, Cell Biology and Biochemistry
10.	60 BT 403	Biochemical Thermodynamics	PC	4	3	1	0	4	Basic knowledge of Engineering Mathematics ,Physics and Principles of Chemical Engineering.
11.	60 BT 4P1	Molecular Biology and Genetic Engineering Laboratory	PC	4	0	0	4	2	Molecular Biology, Genetic Engineering and Cell Biology
12.	60 BT 4P2	Protein and Enzyme Engineering Laboratory	PC	4	0	0	4	2	Basic knowledge of extraction and purification is needed
13.	60 BT 501	Plant and Animal Biotechnology	PC	3	3	0	0	3	Basics of Biology ,Cell biology and Genetics
14.	60 BT 502	Bioinformatics	PC	3	3	0	0	3	Biochemistry and Molecular Biology
15.	60 BT 503	Bioprocess Technology	PC	4	3	1	0	3	Fermentation Technology
16.	60 BT 504	Heat and Mass Transfer Operations	PC	4	3	1	0	4	Basic knowledge in Fluid mechanics, Thermodynamics and Unit operations
17.	60 BT 5P1	Plant and Animal Biotechnology Laboratory	PC	4	0	0	4	2	Basics of Biology ,Cell biology and Genetics,plant Biotechnology
18.	60 BT 5P2	Bioprocess Technology Laboratory	PC	4	0	0	4	2	Fermentation Technology



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19.	60 BT 601	Biopharmaceutical Technology	PC	3	3	0	0	3	Basic knowledge on bioorganic chemistry and cell structure
20.	60 BT 602	Chemical Reaction Engineering	PC	4	3	1	0	4	Basic knowledge in Fluid flow, Thermodynamics and Heat and Mass transfer operations
21.	60 BT 603	Computer-Aided Drug Design	PC	3	3	0	0	4	Biochemistry, Molecular Biology and Bioinformatics concepts
22.	60 BT 6P1	Bioinformatics and Molecular Modelling Laboratory	PC	4	0	0	4	2	Nil
23.	60 BT 6P2	Chemical Engineering Laboratory	PC	4	0	0	4	2	Basic knowledge in Fluid flow, Thermodynamics and Heat and Mass transfer operations
24.	60 BT 701	Immunology	PC	4	3	0	1	4	Biochemistry and Immunology
25.	60 BT 702	Downstream Processing	PC	4	3	1	0	4	Chemical Engineering and Process Engineering
26.	60 BT 7P1	Biological data analysis Laboratory	PC	4	0	0	4	2	Biochemistry and Immunology
27.	60 BT 7P2	Downstream Processing Laboratory	PC	4	0	0	4	2	Chemical Engineering and Process Engineering

_	PROFESSIONAL ELECTIVE COURSES SEMESTER V, ELECTIVE I											
S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С				
1.	60 BT E11	Environmental Biotechnology	PE	3	3	0	0	3				
2.	60 BT E12	Biodiversity and its conservation	PE	3	3	0	0	3				
3.	60 BT E13	Environmental Hazards and Management	PE	3	3	0	0	3				
4.	60 BT E14	Food Biotechnology	PE	3	3	0	0	3				
5.	60 BT E15	Fermentation Technology	PE	3	3	0	0	3				

SEMESTER VI, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	60 BT E21	Cancer Biotechnology	PE	3	3	0	0	3
2.	60 BT E22	Clinical Immunology	PE	3	3	0	0	3
3.	60 BT E23	Stem Cell Technology	PE	3	3	0	0	3
4.	60 BT E24	Tissue Engineering	PE	3	3	0	0	3
5.	60 BT E25	Biomedical Instrumentation	PE	3	3	0	0	3

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SEMESTER VI, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	60 BT E31	Bioresource Technology	PE	3	3	0	0	3
2.	60 BT E32	Biophysics	PE	3	3	0	0	3
3.	60 BT E33	Metabolic Engineering	PE	3	3	0	0	3
4.	60 BT E34	Bioreactor Design	PE	3	3	0	0	3
5.	60 BT E35	Bioprocess Modelling and Simulation	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	60 BT E41	Nanobiotechnology	PE	4	2	0	2	3
2.	60 BT E42	Bioinstrumentation	PE	4	2	0	2	3
3.	60 BT E43	Toxicology	PE	4	2	0	2	3
4.	60 BT E44	Genomics and Proteomics	PE	4	2	0	2	3
5.	60 BT E45	Agricultural Biotechnology	PE	4	2	0	2	3

SEMESTER VII, ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	60 BT E51	Research Design and Analysis	PE	3	3	0	0	3
2.	60 BT E52	Marine Biotechnology	PE	3	3	0	0	3
3.	60 BT E53	Bioethics and Biosafety	PE	3	3	0	0	3
4.	60 BT E54	Biofuel Technology	PE	3	3	0	0	3
5.	60 BT E55	Systems Biology	PE	3	3	0	0	3

MANDATORY COURSES (MC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0
2.	60 MY 002	Universal Human Values	MC	1	2	1	0	3
3.	60 MY 003	Start-ups and Entrepreneurship	MC	2	2	0	0	0

SEMESTER VII & SEMESTER VIII, AUDIT COURSES (AC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Р	С
1.	60 AC 001	Research Skill Development- I	AC	1	1	0	0	0
2.	60 AC 002	Research Skill Development-II	AC	1	1	0	0	0

	GENERAL ELECTIVE COURSES (GE)											
S.No.	Course	Course Title	Category	Contact	L	Т	Ρ	С				
	Code			Periods								
1.	60 GE 001	Heritage of Tamils /தமிழர் மரபு	AC	1	1	0	0	1				
2.		Tamils and Technology / தமிழரும்	AC	1	1	0	0	1				
		தொழில்நுட்பமும்										

OPEN ELECTIVE COURSES I / II / III (OE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	60 BT L01	Agricultural Engineering	OE	3	3	0	0	3
2.	60 BT L02	Animal Studies in Research	OE	3	3	0	0	3
3.	60 BT L03	Production Technology of Agricultural and Food Processing Machinery	OE	3	3	0	0	3

5.60 BT L05Organic farming for sustainable agricultureOE330036.60 BT L06Basics of BioinformaticsOE33003	4.	60 BT L04	Pollution and its management	OE	3	3	0	0	3
6. 60 BT L06 Basics of Bioinformatics OE 3 3 0 0 3	5.	60 BT L05		OE	3	3	0	0	3
	6.	60 BT L06	Basics of Bioinformatics	OE	3	3	0	0	3

CAREER GUIDANCE COURSES (CGC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С	Prerequisite
1.	60 CG 0P1	Career Skill Development I	CGC	2	2	0	0	0	-
2.	60 CG 0P2	Career Skill Development II	CGC	2	2	0	0	0	-
3.	60 CG 0P3	Career Skill Development III	CGC	2	2	0	0	0	-
4.	60 CG 0P4	Career Skill Development IV	CGC	2	2	0	0	0	-
5.	60 CG 0P5	Comprehension Test	CGC	2	0	0	2	0	-
6.	60 CG 0P6	Internship	CGC	0	0	0	0	1/2/3* *	-
7.	60 BT 7P3	Project Work I	CGC	4	0	0	4	2	-
8.	60 BT 8P1	Project Work II	CGC	16	0	0	16	8	-

ONE CREDIT/ SKIL BASED/ VALUE ADDED COURSE

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	60 BT SE01	Medical Coding and Pharmacovigilance	OC	3	3	0	0	1
2.	60 BT SE02	Phytochemical and Natural products	OC	3	3	0	0	1
3.	60 BT SE03	Quality Control in Biotechnology	OC	3	3	0	0	1
4.	60 BT SE04	Biobusiness Development	OC	3	3	0	0	1
5.	60 BT SE05	Molecular Diagnostics	OC	3	3	0	0	1

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S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
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	4	3	1	0	4
3.	60 CS 001	C Programming	ES	3	3	0	0	3
4.	60 ME 002	Engineering Graphics	ES	6	2	0	4	4
5.	60 ME 004	Engineering Mechanics	ES	4	3	1	0	4
6.	60 GE 002	Tamils and Technology / தமிழரும் தொழில்நுட்பமும்	AC	1	1	0	0	1
		PRACTICALS						
7.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2
8.	60 CS 0P2	C Programming Laboratory	ES	4	0	0	4	2
9.	60 CG 0P1	Career Skill Development I	CGC	2	0	0	2	0
			Total	30	12	2	16	21

COURSES OF STUDY

(For the candidates admitted from 2023-2024 onwards)

SEMESTER I

*Heritage of Tamils / தமிழ் மரபு -extra credit is offered

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
	-	Induction Programme		-	-	-	-	-
	THEORY							
1.	60 EN 001	Professional English-I	HS	3	1	0	2	2
2.	60 MA 001	Matrices and Calculus	BS	4	3	1	0	4
3.	60 EE 001	Basic Electrical and Electronics Engineering	BS	3	3	0	0	3
4.	60 PH 005	Physics for Biotechnology	BS	3	3	0	0	3
5.	60 CH 005	Chemistry for Life Sciences	ES	3	3	0	0	3
6.	60 MY 001	Environmental Science and Climate Changes	MC	2	2	0	0	0
7.	60 GE 001	Heritage of Tamils / தமிழ் மரபு	GE	1	1	0	0	1
PRACTICALS								
8.	60 PH 0P2	Applied Physics Laboratory	BS	4	0	0	4	2
9.	60 CH 0P1	Applied Chemistry Laboratory	BS	4	0	0	4	2
			Total	26	17	1	10	19

Tamils and Technology / தமிழரும் தொழில் நுட்பமும் - extra credit is offered

S.No.	Course Code	Course Title Category		Contact Periods	L	Т	Р	С
1.	60 MA 012	Fourier Transform and Numerical Methods	BS	4	3	1	0	4
2.	60 BT 301	Biochemistry	PC	3	3	0	0	3
3.	60 BT 302	Microbiology	PC	3	3	0	0	3
4.	60 BT 303	Cell Biology and Genetics	PC	3	3	0	0	3
5.	60 BT 304	Principles of Chemical Engineering	PC	4	3	1	0	4
6.	60 BT 305	Molecular Biology	PC	3	3	0	0	3
7.	60 BT 3P1	Biochemistry Laboratory	PC	4	0	0	4	2
8.	60 BT 3P2	Microbiology Laboratory	PC	4	0	0	4	2
9.	60 CG 0P2	Career Skill Development – II	CGC	2	0	0	2	0
10.	60 CG 0P6	Internship	CGC	-	-	-	-	1/2/
		Total		30	18	2	10	3*** 24

SEMESTER III

SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
		THEORY						
1.	60 MA 021	Probability and Statistics	BS	4	3	1	0	4
2.	60 BT 401	Genetic Engineering	PC	3	3	0	0	3
3.	60 BT 402	Protein and Enzyme Engineering	PC	3	3	0	0	3
4.	60 BT 403	Biochemical Thermodynamics	PC	4	3	1	0	4
5.	60 BT L**	Open Elective – I	OE	3	3	0	0	3
6.	60 MY 002	Universal Human Values (UHV)	MC	3	3	0	0	3****
		PRACTICALS						
7.	60 BT 4P1	Molecular Biology and Genetic Engineering Laboratory	PC	4	0	0	4	2
8.	60 BT 4P2	Protein and Enzyme Engineering Laboratory	PC	4	0	0	4	2
9.	60 CG 0P3	Career Skill Development – III	CGC	2	0	0	2	0
10.	60 CG 0P6	Internship	CGC	-	-	-	-	1/2/3* **
	1		Total	30	18	2	10	21

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

*** Internship extra credits is offered based on duration

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		SEMESTER V						
S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С
		THEORY						
1.	60 BT 501	Plant and Animal Biotechnology	PC	3	3	0	0	3
2.	60 BT 502	Bioinformatics	PC	3	3	0	0	3
3.	60 BT 503	Bioprocess Technology	PC	4	3	1	0	4
4.	60 BT 504	Heat and Mass Transfer Operations	PC	4	3	1	0	4
5.	60 BT E1*	Elective – I	PE	3	3	0	0	3
6.	60 BT L**	Open Elective – II	OE	3	3	0	0	3
7.	60 MY003	Start-ups and Entrepreneurship	MC	2	2	0	0	0
8.	60 AB 00*	NCC/NSS/NSO/YRC/RRC/Fine Arts	-	2	2	0	2	3*
		PRACTICALS					•	
9.	60 BT 5P1	Plant and Animal Biotechnology Laboratory	PC	4	0	0	4	2
10.	60 BT 5P2	Bioprocess Technology Laboratory	PC	4	0	0	4	2
11.	60 CG 0P4	Career Skill Development – IV	CGC	2	0	0	2	0
12.	60 CG 0P6	Internship	CGC	-	-	-	-	1/2/3 ***
			Total	34	20	2	10	24

*NCC/NSS/NSO/YRC/RRC/Fine Arts - 3 credits can be waived in VII semester or offered as extra credits

*** Internship extra credits is offered based on duration

SEMESTER VI

S.No	Course Code	Course Title	Category	Contact Periods	L	Т	Р	С
	1	THEORY					•	
1.	60 BT 601	Biopharmaceutical Technology	PC	3	3	0	0	3
2.	60 BT 602	Chemical Reaction Engineering	PC	4	3	1	0	4
3.	60 BT 603	Computer-Aided Drug Design	PC	3	3	0	0	3
4.	60 BT E2*	Elective – II	PE	3	3	0	0	3
5.	60 BT** L**	Open Elective – III	OE	3	3	0	0	3
		PRACTICALS						
6.	60 BT 6P1	Bioinformatics and Molecular Modelling Laboratory	PC	4	0	0	4	2
7.	60 BT 6P2	Chemical Engineering Laboratory	PC	4	0	0	4	2
8.	60 BT 6P3	Mini project	PC	2	0	0	2	1 ^{&}
9.	60 CG 0P5	Comprehension Test	CGC	2	2	0	0	1\$
10.	60 CG 0P6	Internship	CGC	-	-	-	-	1/2/ 3***
			Total	28	17	1	10	20

[&] Miniproject - 1 additional credit is offered and not accounted for CGPA calculation

^{\$} Comprehension Test-one additional credit is offered and not accounted for CGPA calculation

*** Internship extra credits is offered based on duration

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		JEIWIEJTER VII						
S. No.	Course Code	Course Title	Category	Contact Periods	L	т	Р	С
		THEORY						
1.	60 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
2.	60 BT 701	Immunology	PC	4	3	0	1	4
3.	60 BT 702	Downstream Processing	PC	4	3	1	0	4
	60 BT E3*	Elective – III	PE	3	3	0	0	3
4.	60 BT E4*	Elective – IV	PE	4	2	0	2	3
6.	60 AC 001	Research Skill Development – I	AC	1	1	0	0	0
		PRACTICALS						
7.	60 BT 7P1	Biological data analysis Laboratory	PC	4	0	0	4	2
8.	60 BT 7P2	Downstream Processing Laboratory	PC	4	0	0	4	2
9.	60 BT 7 P3	Project Work - Phase I	CGC	4	0	0	4	2
10.	60 CG 0P6	Internship	CGC	-	-	-	-	1/2/3\$
			Total	31	15	1	15	23

SEMESTER VII

\$ Internship extra credits is offered based on duration

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С
		THEOR	Y					
1.	60 BT E5*	Elective – V	OE	3	3	0	0	3
2.	60 AC 002	Research Skill Development – II	AC	1	1	0	0	0
		PRACTICAL	.S					
3.	60 BT 8 P1	Project Work - Phase II	EEC	16	0	0	16	8
	60 CG 0P6	Internship	CGC	-	-	-	-	1/2/
								3\$
			Total	20	4	0	16	11

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 163

Note: HS- Humanities and Social Sciences including Management Courses, BS- Basic Science Courses, ES-Engineering Science Courses, PE-Professional Core Courses, PE-Professional Elective Courses, OE- Open Elective Courses, EEC-Employability Enhancement Courses, MC- Mandatory Courses, AC – Audit Courses& GE – General Elective

Note:

1 Hour Lecture is equivalent to 1 credit

2 Hours Tutorial is equivalent to 1credit

2 Hours Practical is equivalent to1credit

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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 2022-2023 onwards)

	Course		Duration of	Weighta	age of Marks	5	Minimun for Pass Seme Exa	s in End ester	
S.No.	Code	Name of the Course	Internal Exam	Continuous Assessment *	Assessment Semester Exam		End Semester Exam	Total	
			1	HEORY					
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 EE 001	Basic Electrical and Electronics Engineering	2	40	60	100	45	100	
4	60 PH 005	Physics for Biotechnology	2	40	60	100	45	100	
5	60 CH 005	Chemistry for Life Sciences	2	40	60	100	45	100	
6	60 MY 001	Environmental Studies and Climate Change	2	100	-	100	-	-	
7	60 GE 001	Heritage of Tamils /தமிழர் மரபு	2	100	-	100	-	-	
			PR	ACTICAL					
8	60 PH 0P2	Applied Physics Laboratory	3	60	40	100	45	100	
9	60 CH 0P1	Applied Chemistry Laboratory	3	60	40	100	45	100	

FIRST SEMESTER

* 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 60 marks for the award of terminal examination marks

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PROFESSIONAL ENGLISH I

Category	L	Т	Ρ	Credit
EN	1	0	2	2

Objective

- 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

Prerequisite

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	Express their opinions effectively in both oral and written medium of communication	Analyze

Mapping with Programme Outcomes

COs	PO	PO	PO	PO	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	1	2	3	4										
CO1								2	3	3	2	3		
CO2								2	3	3	2	3		
CO3								2	3	3	2	3	1	2
CO4								2	3	3	2	3	3	3
CO5								2	3	3	2	3	1	1
3- Str	ong; 2	-Mediu	im; 1-8	Some										

Assessment Pattern

Bloom's Category		Assessment Tests Marks)	End Sem Examination
bloom s category	1	2	(Marks)
Knowledge (Kn)	10	10	10
Apply (Ap)	20	20	40
Analyse (An)	30	30	50
Create (Cr)	0	0	0

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				echnology – ofessional En				
				o All Branche	-			
	Hours	/Week			Credit	N	Aaximum M	arks
Semester	L	Т	Р	Total hrs	C	CA	ES	Total
1	1	0	2	45	2	40	60	100
ntroductio	on to Fundamentals	s of Comn	nunicatio	n				[9]
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Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023

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BoS Chairman Signature

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, ' <i>English Vocabulary in Use: Upper Intermediate'</i> , Cambridge University Press, N.York, 2012
4.	Lakshmi Narayanan, 'A Course Book on Technical English' Scitech Publications (India) Pvt. Ltd. 2020

Course Contents and Lecture Schedule

S.No	Торіс	No.of Hours
1	Introduction to Fundamentals of Communication	I
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	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	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	Classification and Recommendations	
4.1	Listening to TED Talks and educational videos	2
4.2	Listening to scientific lectures	1
4.3	Small Talk and mini presentations	2
4.4	Reading newspaper articles and journal reports	2
4.5	Note-making / Note-taking	1

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4.6	Recommendations	1
4.7	Transferring information from non-verbal	1
4.8	Articles and Pronouns	2
4.9	Subject-verb agreement and collocations	
5	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
	Total	60

Course Designers

1. Dr.A.Palaniappan

- palaniappan@ksrct.ac.in

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60 MA 001	MATRICES AND CALCULUS	Category	L	Т	Ρ	Credit
		BS	3	1	0	4

Objective

- To familiarize the basic concepts in Cayley-Hamilton theorem and orthogonal transformation.
- To get exposed to the fundamentals of differentiation.
- 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.

Prerequisite

NIL

Course Outcomes

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

CO1	Apply the concepts of Cayley-hamilton theorem and orthogonal transformation to the matrix.	Remember Understand Apply
CO2	Apply the concepts of differentiation in solving various Engineering problems.	Remember Understand Apply
CO3	Obtain Jacobians and maxima and minima of functions of two variables.	Remember Understand Apply
CO4	Employ various methods in solving differential equations.	Remember Understand Apply
CO5	Apply different techniques to evaluate definite and indefinite integrals.	Remember Understand Apply

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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 - Str	3 - Strong; 2 - Medium; 1 – Some													

Assessment Pattern

Bloom's Category	Continuous A Tests (Ma		Model Exam	End Sem Examination (Marks)
	1 2		(Marks)	(Walks)
Remember (Re)	10	10	10	10
Understand (Un)	10	10	20	20
Apply (Ap)	40	40	70	70
Analyze (An)	0	0	0	0
Evaluate (Ev)	0	0	0	0
Create (Cr)	0	0	0	0
Total	60	60	100	100

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		K. S. Ran		ollege of Tech			R 2022)		
	<u> </u>	mmon to M		001 - Matrices , EEE, CSE, M				18.MI	
		Hours / We		Total Hours	Cr, CIVIL, I Credit		Maximum Ma		
0		Hours / we	Р		Credit	CA	ES	Tot	hal .
Semester	3	1	0	60	4	40	60	10	
Matrices			-					_	
and Eigen v form - Redu	vectors - Cay	ley-Hamilto dratic form	n theorem - to canonica	en vectors of a Orthogonal tra Il form by an O mbrane.	ansformation	of a symmet	ric matrix to o	diagonal	[0]
Differentia	tion								IG
quotient, ch		uccessive l		- Continuity - D on - Leibnitz's t					[0]
Functions	of Several V	ariables							[9]
Partial difference of two varial	rentiation - Ho bles - Applic	omogeneou ations: Ma	xima and m	and Euler's the hinima of funct mined Multipli	ions of two				
	Equations	3 Method	of officien		013 .				[9]
i inear dittei									
$e^{\alpha x}$, sin α x, form of lines	$\cos \alpha x, x^n,$ ar equations	n > 0 - Dif	ferential equ	ner order with c uations with van f parameters.					[9]
$e^{\alpha x}$, $\sin \alpha x$, form of lines Integration Definite and of rational f	$\cos \alpha x, x^n,$ ar equations I Indefinite intunctions by p	n > 0 - Diff - Method of regrals - Sub partial fracti	ferential equ variation o bstitution ru on, Integrat	uations with var f parameters. le - Techniques tion of irrationa	riable coeffic s of Integratic I functions -	ients: Cauch	y's and Leger	ndre's	[9]
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e ^{ax} , sin α x, form of lines Integration Definite and of rational f Hydrostatic Text Book	$\cos \alpha x, x^n,$ ar equations I Indefinite infunctions by p force and pro	n > 0 - Diff - Method of tegrals - Sul partial fracti essure, mot	ferential equivariation of bestitution ru on, Integration and contents	uations with var f parameters. le - Techniques tion of irrationa centres of mass	riable coeffic s of Integratio I functions - s.	ients: Cauchy on: Integratior Improper inte Total Hou	y's and Leger h by parts, Int egrals - Appli r s: 45 + 15 (1	ndre's egration ications:	
e ^{αx} , sin α x, form of linea Integration Definite and of rational f Hydrostatic Text Book 1. Grew	$\cos \alpha x, x^n,$ ar equations I Indefinite infunctions by p force and pro- (s): al B.S, "High	n > 0 - Diff - Method of tegrals - Sul partial fracti essure, mon	ferential equivariation o bstitution ru on, Integrat ments and o	uations with var f parameters. le - Techniques tion of irrationa centres of mass natics", 44 th Ed	riable coeffic s of Integratio I functions - s. ition, Khanna	ients: Cauchy on: Integration Improper inte Total Hou a Publishers,	y's and Leger n by parts, Int egrals - Appli rs: 45 + 15 (1 Delhi, 2017.	ndre's egration ications: Futorial)	6
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Course Contents and Lecture Schedule

	Торіс	Number of Hours	Mode of Content Delivery
1	Matrices		
1.1	Characteristic equation	1	Black Board
1.2	Eigen values and Eigen vectors of a real matrix	1	Black Board
1.3	Properties of Eigen values and Eigen vectors	1	Black Board
1.4	Cayley-Hamilton theorem	1	Black Board
1.5	Tutorial	2	
1.6	Orthogonal transformation of a symmetric matrix to diagonal Form	1	Black Board
1.7	Reduction of quadratic form to canonical form by Orthogonal Transformation	1	Black Board
1.8	Nature of quadratic form	1	Flipped Class
1.9	Stretching of an elastic membrane	1	Black Board
1.10	Tutorial	2	
2	Differentiation		
2.1	Representation of functions	1	Black Board
2.2	Limit of a function and Continuity	1	Black Board
2.3	Differentiation rules (sum, product, quotient, chain rules)	2	Flipped Class
2.4	Successive differentiation	1	Black Board
2.5	Tutorial	2	
2.6	Leibnitz's theorem	1	Black Board
2.7	Maxima and minima of functions of one variable	2	Black Board
2.8	Tutorial	2	
3	Functions of Several Variables		
3.1	Partial differentiation	1	Black Board
3.2	Homogeneous functions and Euler's theorem	1	Flipped Class
3.3	Jacobians	2	Black Board
3.4	Tutorial	2	
3.5	Taylor's series for functions of two variables	1	Black Board
3.6	Maxima and minima of functions of two variables	1	Black Board
3.7	Lagrange's Method of Undetermined Multipliers	2	Black Board
3.8	Tutorial	2	

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4	Differential Equations		
4.1	Linear differential equations of second and higher order with constant co-efficient	1	Flipped Class
4.2	R.H.S is of the form $e^{\alpha x}$, $\sin \alpha x$, $\cos \alpha x$, x^n , $n > 0$	2	Black Board
4.3	Tutorial	2	
4.4	Differential equations with variable coefficients: Cauchy's form of linear equations	2	Black Board
4.5	Differential equations with variable coefficients: Legendre's form of linear equations	2	Black Board
4.6	Method of variation of parameters	1	Black Board
4.7	Tutorial	2	
5	Integration		
5.1	Definite and Indefinite integrals	1	Black Board
5.2	Substitution rule	1	Black Board
5.3	Techniques of Integration: Integration by parts	1	Black Board
5.4	Integration of rational functions by partial fraction	1	Black Board
5.5	Tutorial	2	
5.6	Integration of irrational functions	1	Black Board
5.7	Improper integrals	1	Black Board
5.8	Hydrostatic force.	1	Black Board
5.9	Pressure, moments and centres of mass.	1	Flipped Class
5.10	Tutorial	2	
	Total	60	

Course Designers

- 2. Dr.C.Chandran cchandran@ksrct.ac.in
- 3. Mr.G.Mohan mohang@ksrct.ac.in

List of MATLAB Programs:

- **1.** Introduction to MATLAB.
- 2. Matrix Operations Addition, Multiplication, Transpose, Inverse and Rank.
- 3. Solution of system of linear equations.
- 4. Compute of Eigen values and Eigen vectors of a Matrix.
- 5. Solve first and second order ordinary differential equations.
- 6. Compute Maxima and Minima of a function of one variable.



		Category	L	Т	Ρ	Credit
60 EE 001	Basic Electrical and Electronics Engineering	BS	3	0	0	3

Objective

- 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

Prerequisite

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, Understand and Apply
CO2	Acquire knowledge on different electrical machines and select suitable machines for industrial applications.	Remember, Understand and Analyze
CO3	Recognize the significance of various components of low voltage electrical installations and create awareness on electrical safety.	Remember, Understand
CO4	Realize the operation and characteristics of semiconductor devices.	Remember, Understand and Analyze
CO5	Understandthe operating principles of measuring instruments and choose suitable instrument for measuring the parameters.	Remember, Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO	PO	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2
			3	4										
CO1	3	3	-	-	2	-	-	-	-	2	3	-		3
CO2	3	3	1	1	-	-	2	-	2	-	2	1		3
CO3	3	3	-	2	-	2	-	-	-	-	2	2		3
CO4	2	2	3	-	2	-	2	1	-	2	1	3		3
CO5	2	3	1	2	-	-	3	2	-	-	2	3		3
3- Stro	ong;2- l	Medium	n;1-Soi	me										

Assessment Pattern

Bloom's	Continuous As	ssessment Tests (Marks)	End Sem
Category	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

		K.\$			e of Technologectrical and El			2	
		Commo			ML, MECH, M			anches	
			Hours/Wee	ek	Totalhrs	Credit	N	Maximum Ma	rks
0	nostor	L	Т	P		C	CA	ES	Total
Son	I/II	3	0	0	45	3	40	60	100
DC C proble Introd	Fircuits: Ci ems. luction to	AC Circuits	s and Para	imeters: Wa	ctor, Capacitor aveforms, Aver rent power, pov	age value a	and RMS Val	ue of Sinuso	idal
Cons and A Work Three	truction ar opplication ing princip Phase In	s. Working ble and Ap duction Mo	principle - Principle of plications of tor.	f DC motors	and Self excit , Torque Equat ner, Three ph	ion, Types a	and Application	ns. Construct	ion, and
Dome Break	estic wiring ker-Moulde		vires and c		ing,protective eakage Circuit				
Introd Applie	luction to cations – E		luctor Mate		Junction Dio g and Configura	-			
Funct and	tional elem Moving Tr	on meters,	instrument Operating	t, Standards g principles	and calibratio and Types o Data acquisitio	of Wattmete			
								Total H	ours 45
1.	Book(s): Kothari [Educatio		Nagrath, "I	Basic Electr	ical and Electr	onics Engin	eering", Secc	ond Edition, N	/IcGraw Hill
2		vhney, Pun Rai and Co		ney 'A Cour	se in Electrica	I & Electron	ic Measurem	ents & Instru	imentation',
	rence(s):								
1.	Kothari E	P and I.J N	Nagrath, "B	asic Electri	cal Engineering	g", Fourth Eo	dition, McGrav	w Hill Educati	on, 2019.
2.	Albert M	alvino, Dav	id Bates, 'E	Electronic P	rinciples, McGr	aw Hill Educ	cation; 7th ed	ition, 2017.	
3.	Mahmoo	d Nahvi an	d Joseph A	. Edministe	r, "Electric Circ	uits", Schau	ım' Outline Se	eries, McGrav	v Hill, 2002.
4.	H.S. Kal	si, 'Electron	nic Instrume	entation', Ta	ita McGraw-Hil	l, New Delh	i, 2010.		



Course Contents and Lecture Schedule

S.No	Торіс	No. of. Hours
	ECTRICAL CIRCUITS	
	rcuit Components: Resistor, Inductor, Capacitor	1
	nm's Law - Kirchhoff's Laws	1
	nm's Law - Kirchhoff's Laws – Problems	2
	roduction to AC Circuits and Parameters: Waveforms, Average value and	2
RI	AS Value of Sinusoidal Waveform	
	eal power, reactive power and apparent power, power factor	1
	eady state analysis of RLC series circuits	1
	C series circuits – Problems	1
	roduction to three phase system	1
	ECTRICAL MACHINES	
	onstruction and Working principle of DC Generator	1
	pes and Applications of Separately and Self excited DC Generators	1
	IF equation of DC Generator	1
	orking Principle of DC motors	1
	rque Equation	1
	pes and Applications	1
	onstruction, Working principle and Applications of Transformer	1
	onstruction, Working principle and Applications of Three phase Alternator	1
	onstruction, Working principle and Applications of Synchronous motor	1
2.10 Mc	onstruction, Working principle and Applications of Three Phase Induction otor	1
	ECTRICAL INSTALLATIONS	
	omestic wiring, types of wires and cables	1
	Irthing, protective devices	2
	vitch fuse unit- Miniature Circuit Breaker	1
	blded Case Circuit Breaker- Earth Leakage Circuit Breaker	1
	Itteries and types	2
3.6 UF		1
	fety precautions and First Aid	1
	NALOG ELECTRONICS	
	roduction to Semiconductor Materials	1
	naracteristics and Applications of PN Junction Diodes	1
	naracteristics and Applications of Zener Diode	1
	polar Junction Transistor	1
	asing & Configuration (NPN)	2
	egulated power supply unit	1
	vitched mode power supply	1
	EASUREMENTS AND INSTRUMENTATION	
	nctional elements of an instrument	1
	andards and calibration	1
	oving Coil meters - Operating Principle, types	1
	oving Iron meters - Operating Principle, types	1
	perating principles and Types of Wattmeter	1
	ergy Meter	1
	strument Transformers – CT& PT	1
5.9 DS	SO- Block diagram- Data acquisition	1
	Total	45

Course Designers

- Mr.S.Srinivasan <u>srinivasan@ksrct.ac.in</u>
 Ms.R.Radhamani -<u>radhamani@ksrct.ac.in</u>
 Ms.S.Jaividhya- <u>jaividhya@ksrct.ac.in</u>
 Dr.S.Gomathi- <u>gomathi@ksrct.ac.in 5.</u> Mr.T.Prabhu- <u>prabhut@ksrct.ac.in</u>

Objective

- 1. To analyze the crystal parameters to investigate crystal structures and to classify the type of the defect present in the crystal
- 2. To enable the students in understanding the importance of quantum physics and its applications.
- 3. To introduce the basics of laser, optical fiber and its applications in biomedical field.
- 4. To study the basic concept of ultrasonic waves, production of ultrasonic waves and its applications
- 5. To obtain fundamental concepts and current knowledge of biomaterials and nanotechnology for engineering applications.

Prerequisite

NIL

Course Outcomes

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

CO1	Recognize the basics of crystallography, crystal imperfections and nucleation	Understand
CO2	Acquire the fundamentals of quantum mechanics and apply to one dimensional motion of particles.	Understand
CO3	Assess a strong foundational knowledge in lasers and fiber optics and its applications	Apply & Analyse
CO4	Comprehend the principle, production, properties and applications of ultrasonic waves	Apply
CO5	Assess the properties of bio materials and nano materials for potential applications ions	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2			2	3		2		2		
CO2	3	3	2	2			2	3		2		2		
CO3	3	3	2	2			3	3		2		2	2	2
CO4	3	3	2	2			3	3		2		2	2	2
CO5	3	3	2	2			3	3		2		2	2	3
3- Stron	ig; 2-Me	edium;	2-Low											

Assessment Pattern

Bloom'sCategory	Continuous Assessme	End Sem			
Bioom soalegory	1	2	Examination(Marks)		
Remember	10	10	30		
Understand	20	20	30		
Apply	30	30	30		
Analyse	0	0	10		
Evaluate	0	0	0		
Create	0	0	0		

Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

								R 2022)		
					5- PHYSICS FO	OR BIOTEC	HNOLOGY			
Seme	ester		Hours / We		Total Hours	Credit		laximum Marl		
		L	Т	Р		С	CA	ES	Tot	
		3	0	0	45	3	40	60	10	00
Lattic cubic and	ce - Unit lattice – elastic st	Packing fa	ctor for HCF y- surface i	P – Crystal i mperfectior	is lattice - Crys imperfections- e ns – grain and ous and heteroo	edge and scr twin bounda	ew dislocatior aries – Polym	ns, Burgers ve	ctor	[9]
Intro Time box	duction to -dependo (one din	ent and tim	mechanics e independe	ent Schrodi dimensiona	ture of Particle inger equation f I) - Uncertaint	for wave fund	ction- Applicat	tions: Particle	in a 🏻 🖡	[9]
Intro appli princ	duction - cations c iple - Cla	of Lasers ir assification	stics - Einst n therapy a	nd diagnos	icients - popula sis – Endoscop otance angle ar	y- blood flo	w measureme	ent. Optical fil	ore-	[0]
			perature an	nd Displace	ment sensors-					[9]
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*SDG 4 – Quality Education

**SDG 3 – Healthy life and promote wellbeing

Course Contents and Lecture Schedule

S. No.	Торіс	No. c hour
1.0	CRYSTALLOGRAPHY	
1.1	Lattice - Unit cell – crystal systems and Bravais lattice	2
1.2	Crystal planes and Miller indices	1
1.3	d spacing in cubic lattice	1
1.4	Packing factor for HCP	1
1.5	Crystal imperfections- edge and screw dislocations, Burgers vector and elastic strain energy	2
1.6	Surface imperfections – grain and twin boundaries – Polymorphism	1
1.7	Phase changes – nucleation and growth – homogeneous and heterogeneous nucleation.	1
2.0	QUANTUM MECHANICS	
2.1	Introduction to Quantum mechanics	1
2.2	Wave nature of Particles- de-Broglie hypothesis – Matter waves	2
2.3	Time-dependent and time independent Schrodinger equation for wave function	2
2.4	Applications: Particle in a box (one dimensional and three dimensional)	2
2.5	Uncertainty principle and its applications	1
2.6	Electron microscope: Scanning electron microscope.	1
3.0	LASER AND FIBER OPTICS	
3.1	Introduction – characteristics	1
3.2	Einstein's coefficients	1
3.3	Population inversion - Nd:YAG Laser	1
3.4	CO ₂ laser	1
3.5	Applications of Lasers in therapy and diagnosis – Endoscopy- blood flow measurement.	1
3.6	Optical fibre- principle - Classification - Expression for acceptance angle and numerical aperture	2
3.7	Fiber optic sensors: liquid level sensors, Temperature and Displacement sensors	1
3.8	Optical fibers in bio-sensing applications.	1
4.0	ULTRASONICS AND APPLICATIONS	
4.1	Introduction-Properties -	1
4.2	Production: Magnetostriction effect, Magnetostriction generator-	1
4.3	piezoelectric effect, piezoelectric generator	1
4.4	Ultrasonic detection- acoustical grating	1
4.5	Ultrasound application in medicine - Ultrasound interactions with the tissues (reflection, diffraction, refraction, absorption, scattering)	2
4.6	Safety Aspects of diagnostic and therapeutic ultrasound- cardiology, neurology	2
4.7	Ultrasonic imaging (A, B and TM-Scan)- Sonogram.	1
5.0	BIO MATERIALS AND NANOTECHNOLOGY	
5.1	Biocompatibility - Bio functionality- Classification of biomaterials and its application	2
5.2	Nanomaterials: Properties- Top-down process: Ball Milling method	1
5.3	Bottom-up process: Vapour Phase Deposition method	2
5.4	Carbon NanoTube (CNT): Properties, preparation (electric arc method)	1
5.5	CNT Applications: Anti- cancer treatment, Gene therapy, Bio molecule sensor, Drug delivery	2
5.6	Radioactive nano particles in biomedical applications.	1

Course Designers

- Dr. V. Vasudevan- <u>Vasudevan.vi@gmail.com</u>
 Mr.S. Vanchinathan <u>vanchinathan@ksrct.ac.in</u>
 Dr. M. Malarvizhi <u>malarvizhi@ksrct.ac.in</u>

Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023



Objective

- To help the learners, analyze the hardness of water and its removal.
- To endow an overview of solutions and its applications.
- To rationalize the significance of chemical kinetics and catalysis.
- To analyze the concepts, functions of electrochemistry.
- To recall the basics and application of chemical sensors.

Prerequisite

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.	Understand, Apply & Analyse
CO2	Understand the concept of solutions.	Understand & Apply
CO3	Interpret the kinetics of the reaction and its significance.	Apply
CO4	Analyze the applications of electro chemistry.	Apply & Analyse
CO5	Interpret the principles of sensors in various applications.	Understand, Apply & Analyse

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			3			3		3	3	3		3
CO2	3	2			3		2			3		2	3	2
CO3	3	2			2				3		3	2	2	
CO4	3	3		2	3				3				3	2
CO5 3 3 2 3 3 3 3 3 3									3	3	3			
3- Strong; 2-Medium; 2-Low														

Assessment Pattern

Bloom's Category	Continuo	us Assessmen	Terminal Examination		
Bioonin's Calegory	1	2	3		
Remember	20	20	20	20	
Understand	40	40	40	40	
Apply	40	40	40	40	
Analyze	-	-	-	-	
Evaluate	-	-	-	-	
Create	-	-	-	-	

BoS Chairman Signature

Syllabus

L T P C CA ES Total I 3 0 0 45 3 40 60 100 ATER TECHNOLOGY* ntroduction - Commercial and industrial uses of water - hardness - types – estimation of hardness by EDTA method- Internal conditioning (Colloidal, phosphate, Calgon and carbonate conditioning methods) – stremal conditioning (Zeolite process, demineralization process) - Desalination methods (Reverse Samosis and Electro dialysis). Flash evaporation. [1] DUTIONS** Jono membrane equilibrium. Definition of osmotic pressure, isotonic, hypotonic & giurosis. Colloids - Definition and Types, Gold Number, Preparation and Properties of colloids – beinition and Types, Gold Number, Preparation and Properties of colloids – beinition and Types, Gold Number, Preparation & enulsifying agents. HEMICAL KINETICS AND CATALYSIS*** Transition state theory - Catalyst- Auto catalyst poisons – Active center, introduction – determination of rate constant of hydrolysis of ester - factors influencing rate of reaction – tra molecularity – derivation and problems - reversible and irreversible cells - Types f de Electrode potential - Nemst Equation - derivation and problems - reversible and irreversible cells - Types f de Electrode potential - Nemst Equation - derivation and problems - reversible and irreversible cells - Types f de Electrode paratic s - reference electrochemical Methods – Electrochemical Biosensors – Samosr – Characteristics – Elements and Characterization - Potentiometric Sensors Amperometric Ensors - Sensors Based on Electrochemical Methods – Electrochemical Biosensors – Spitcal Biosensors - Indicato	L T P C CA ES Total 1 3 0 0 45 3 40 60 100 ATER TECHNOLOGY Introduction - Commercial and industrial uses of water - hardness - types – estimation of hardness by DTA method- Internal conditioning (colloidal, phosphate, Calgon and carbonate conditioning methods) – stremation (fee toro case). Desalination methods (Reverse barnosis and Electro dialysis). Flash evaporation. [1] Durotions (fee toro case). Desalination methods (Reverse barnosis and Electro dialysis). Flash evaporation. DUTONS** Outrons - there are available of the toro on the process. Durotions: - bonon membrane equilibrium. Definition of somotic pressure, Biogical importance of smosis. Colloids - Definition and Types, Gold Number, Preparation and Properties of colloids - lyophilic and lyophobic sols. Brownian movements and Tyndall Effect. Emulsion & emulsifying agents. HEMICAL KINETICS AND CATALYSIS*** Tata of reaction, order and molecularity- derivation of first order rate equation - half-life period of First rate reaction, ender and molecularity: – Coenzymes – Proton transfer – metal ions – transmiton state theory. Catalyst– Auto catalyst – Earty coensors – Catalytic poisons – Active centor – advistion and tris togin/tic Promoters – Catalytic poisons – Active centore – advist polications – corvalent catalysis – Inclu					HEMISTRY FO	K LIFE SCIEI				
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BoS Chairman Signature

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1.3	Estimation of Hardness of ater by EDTA method	1		
1.4	Internal conditioning (Colloidal, Phosphate, Calgon and Carbonate)	1		
1.5	External conditioning (Zoelite process & Demineralization process)	1		
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2.2	Buffer solutions – types - applications-	1		
2.3	Henderson-Hasselbach equation	1		
2.4	Membrane permeability - Principle of diffusion & osmosis - Donon membrane equilibrium	1		
2.5	Definition of osmotic pressure, isotonic, hypotonic & hypertonic solutions.	1		
2.6	Relationship of osmotic pressure to gas laws.	1		
2.7	The general equation for dilute solutions, the influence of ionization & molecular size on osmotic pressure.	1		
2.8	Biological importance of osmosis.	1		
2.9	Colloids - Definition and Types, Gold Number, Preparation and Properties of colloids – lyophilic and lyophobic sols.	1		
2.10	Brownian movements and Tyndall Effect. Emulsion & emulsifying agents.	1		
3.0	CHEMICAL KINETICS AND CATALYSIS			
3.1	Rate of reaction, order and molecularity	1		
3.2	Derivation of first order rate equation – half life period of First order reaction	1		
3.3	Determination of rate constant of hydrolysis of ester	1		
3.4	Factors influencing rate of reaction	1		
3.5	Activation energy -Arrhenius equation	1		
3.6	Transition state theory	1		
3.7	Catalyst– Auto catalyst	1		
3.8	Enzyme catalyst – Michaelis–Menten equation and its significance	1		
3.9	Catalytic Promoters – Catalytic poisons	1		
3.10	Active center, homogeneous and heterogeneous catalysis	1		
3.11	Reactivity – Coenzymes – Proton transfer – metal ions – Intra molecular reactions	1		
3.12	Covalent catalysis – Inclusion complexation - Industrial application of catalysts.	1		
4.0	ELECTROCHEMISTRY			
4.1	Electrode potential - Nernst Equation - derivation and problems	1		
4.2	reversible and irreversible cells	1		
4.3	Types of Electrodes and its applications	2		
4.4	reference electrodes – measurement of pH	1		

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4.5	conductometric and Potentiometric titrations.	1
5.0	CHEMICAL SENSORS	
5.1	Sensors – Chemical Sensors - Characteristics	1
5.2	Elements and Characterization	1
5.3	Potentiometric Sensors, Amperometric Sensors	1
5.4	Sensors Based on Electrochemical Methods	1
5.5	Electrochemical Biosensors	1
5.6	Optical Biosensors : Enzyme Sensors – Bio affinity Sensors	1
5.7	DNA Sensors. Chemical Sensors as Detectors and Indicators	1
5.8	Indicators for Titration Processes	1
5.9	Separation Methods. Nano technology in chemical sensors.	2

- Dr.T.A.Sukantha <u>tasukantha@gmail.com</u>
 Dr.K.Prabha <u>prabhak@ksrct.ac.in</u>
 Dr.S.Meenachi <u>meenachi@ksrct.ac.in</u>

Category	L	Т	Ρ	Credit
MC	2	0	0	0

- 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

Prerequisite

-		-	

Cours	Course Outcomes								
On the	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							

Марр	ing wit	h Prog	Irammo	e Outc	omes									
Cos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	2				2	3					2	2	
CO 2	3	2	2	2	2	3	3	2				2	2	3
CO 3	3	2	3	2	2	3	3	2				2	2	3
CO 4	3	2	1	2		2	2					2		
CO 5	3	2	2		3		2					2	2	3
0.04		Madium												

3- Strong; 2-Medium; 1-Some

Assessment Pattern										
Bloom's	Contir	nuous Assessm	ent Tests	Terminal Examination						
Category	1	2	3	Terminal Examination						
Remember	10	10	10	-						
Understand	20	20	20							
Apply	30	30	30							
Analyze	30	30	30	-						
Evaluate	-	-	-	-						
Create	-	-	-	-						

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				ollege of Tech					
				onmental Stud		-			
	Со	mmon to M	ECH, ECE	, EEE, CSE, N	CT, CIVIL, I	T, TXT, BT, F	T, AI&DS, AI&	ML	
Hours / Week Total Hours Credit Maximum Marks									
Semester	L	Т	Р		С	CA	ES	Total	
I 3 0 0 20 0									
Pollution and	its impact	on climate	change *						
				greenhouse e					
				orint - Climate					
						plan on clima	ate change. IP	CC,	
JNFCCC, Ky		, Montreal F	rotocol on	Climatic Chan	ges.			[*	
Integrated Wa	aste Manac	ement **							
•	-								
				waste manage omestic waste,					
							reatment- ASP		
-								[-	
Sustainable o	levelopme	nt practices	S***						
Sustainable de	evelonment	noals (SDG	s) – Greei	n computing- C	arbon tradin	a - Green bui	lding – Eco- frie	endly	
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				e and rainwate	•	•			
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** SDG 4 - Clean water and sanitation

***SDG 6 – Affordable and clean energy

****SDG 3 - Good health and wellbeing



Course Contents and Lecture Schedule	
S.No Topic	No. of hours
1.0 Pollution and its impact on climate change	
1.1 Pollution: Sources and impacts of air pollution – greenhouse effect- Global warming-	2
climate change - ozone layer depletion - acid rain	
1.2 Climate change on various sectors: Agriculture, forestry and ecosystem climate	1
change mitigation and adaptation	
1.3 Action plan on climate change - IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on	1
Climatic Changes	
2.0 Integrated Waste Management	
2.1 Waste - Types and classification. Principles of waste management (5R approach) -	1
Swachh Bharat Abhiyan	
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	1
building – Eco- friendly plastic	
3.2 Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – Hydroelectric power	2
3.3 Water scarcity- Watershed management, ground water recharge and rainwater	1
harvesting	
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	2
forecasting	
5.2 GPS, Remote Sensing and Geographical Information System (GIS)	1
5.3 World wide web (www), Environmental information system (ENVIS)	1
Total	20

- Dr.T.A.Sukantha <u>tasukantha@gmail.com</u>
 Dr.S.Meenachi <u>meenachi@ksrct.ac.in</u>
 Mr.K.Tamilarasu <u>tamilarasu@ksrct.ac.in</u>



60 GE 001	Heritage of Tamils	(Category	L	т	Р	Credit
	(Common to all Branches)		GE	1	0	0	1

Objectives:

- To learn the extensive literature of classical Tamil
- To review the fine arts heritage of Tamil culture
- To realize the contribution of Tamils in Indian freedom struggle

Prerequisite:

Nil

Course Outcomes:

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

CO1	Recognize the extensive literature of Tamil and its classical nature.	Understand
CO2	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.	Understand
CO3	Review on folk and martial arts of Tamil people.	Understand
CO4	Insight thinai concepts, trade and victory of Chozha dynasty.	Understand
CO5	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3	3		2		3	3	3
CO2							3	3		2		3	2	2
CO3							3	3		2		3	3	3
CO4							3	3		2		3	2	2
CO5							3	3		2		3	3	3
3- Strong; 2-Medi	ium; 1-Lov	V					1	1		1	1	1		

ASSESSMENT PATTERN

Bloom's Category	Continuous Asse	essment Tests(Marks)	End Sem
Bioon s category	1	2	Examination(Marks)
Remember	10	10	20
Understand	20	20	40
Apply	20	20	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-

SYLLABUS

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SemesterHours/WeekCreditMaximum MarksSemesterLTPTotal hrsCCAESTotalII100151100-100anguage and LiteratureLanguage 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.3Heritage - Rock Art Paintings to Modern Art – Sculpture Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making or - 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.3Folk and Martial Arts Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.3Floria and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept 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				60 G	llege of Tech E 001 – Herit				
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BoS Chairman Signature

பாடத்தின் நோக்கங்கள்:

- தமிழ் மொழியின் இலக்கணச் செறிவைக் கற்றுணர்தல்.
- தமிழர் பண்பாட்டின் நுண்கலைகள் பற்றிய ஒரு மீள்பார்வை.
- இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பை உணருதல்.

முன்கூட்டிய துறைசார் அறிவு:

தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்:

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

CO1	தமிழ் மொழியின் செந்தண்மை மற்றும் இலக்கியம் குறித்த தெரிதல்.	புரிதல்
CO2	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்த தெளிவு.	புரிதல்
CO3	தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு.	புரிதல்
CO4	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	புரிதல்
CO5	இந்திய தேசிய இயக்கம், சுயமரியாதையை இயக்கம் மற்றும் சித்த மருத்துவம் பற்றிய புரிதல்.	புரிதல்

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2
CO1							3	3		2		3	3	3
CO2							3	3		2		3	2	2
CO3							3	3		2		3	3	3
CO4							3	3		2		3	2	2
CO5							3	3		2		3	3	3
	3- Strong; 2	-Mediur	n; 1-Lo	w				•		•		•	•	

Assessment Pattern

Bloom's Category	Continuous Asses	End Sem	
Bloom s dategory	1	2	Examination(Marks)
Remember	10	10	20
Understand	20	20	40
Apply	20	20	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-

BoS Chairman Signature

Syllabus

		K. S. Rang	gasamy Co	ollege of Te	chnology	– Autonom	ous R2022	
				60 GE 001	– தமிழர் ம	ӯҶ		
		Hours/Wee	k		Credit		Maximum Marks	
Semester			P	Total hrs	C	CA	ES	Tota
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மொமி மற்று	ம் இலக்கியம்		-					
இந்திய மொ இலக்கியத்தில தமிழ்க் காட	ழிக் குடும்ப ன் சமயச் சார் ப்பியங்கள் - ர் - சிற்றிலக்§	ங்கள் – திரா பற்ற தன்மை தமிழகத்தில் கியங்கள் - த	் – சங்க இவ சமண பெ மிழில் நவீல	் ககியத்தில் ட ளத்த சமயங்க	கிர்தல் அற நளின் தாக்க	ம் – திருக்குறவ 5ம் – பக்தி இ	ிழ் செவ்விலக்கியங்கள் - சங்க ளில் மேலாண்மைக் கருத்துக்கள் லக்கியம், ஆழ்வார்கள் மற்றும் லக்கிய வளர்ச்சியில் பாரதியார்	3
5டுகல் முதல் பொருட்கள், திருவள்ளுவர் பொருளாதார	நவீன சிற்பா பொம்மைகன சிலை – வாழ்வில் சே	ங்கள் வரை – ள் - தேர் செட இசைக் கரு காவில்களின்	- ஐம்பொன் ப்யும் கலை - விகள் — மி 1 பங்கு.	– சுடுமண் சி ிருதங்கம், ப	பழங்குடியி ற்பங்கள் —	நாட்டுப்புறத்	வர்கள் தயாரிக்கும் கைவினைப் தெய்வங்கள் – குமரிமுனையில் ஸ்வரம் – தமிழர்களின் சமூக	3
நாட்டுப்புறக் தெருக்கூத்து, புலியாட்டம்,	கரகாட்டம்,	வில்லுப்பாட	<u>்</u> டு, கணியா		பிலாட்டம்,	தோல்பாவை	க் கூத்து, சிலம்பாட்டம், வளரி,	3
கோட்பாடுகள	்தாவரங்களு ர் - தமிழர்கவ	ம், விலங்கு ர் போற்றிய .	அறக்கோட்ட	பாடு - சங்ககா	ாலத்தில் தப		கியத்தில் அகம் மற்றும் புறக் த்தறிவும், கல்வியும் - சங்ககால	
	,	ுளும் சங்க	காலத்தில்	ஏற்றுமதி மற்	றும் இறக்	தமதி – கடல்	கடந்த நாடுகளில் சோழர்களின்	-
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eef BoS Chairman Signature

Category	L	Т	Ρ	Credit
BS	0	0	4	2

- 1. To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.
- 2. To demonstrate an ability to make physical measurements and understand the limits of precision in measurements
- 3. To introduce different experiments to test basic understanding of physics concepts applied in optics and electronics
- 4. To make ability to develop and fabricate engineering and technical equipment
- 5. To analyze the behavior and characteristics of various materials for its optimum utilization

Prerequisite

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	Recall the knowledge of properties of light and fiber optic cable	Apply
CO4	Assess the dielectric behavior of a given material	Apply
CO5	Apply the photovoltaic effect to demonstrate the working of solar cell	Apply

Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	3	3	2	3	2	2	3	3	3
CO2	3	3	3	2	2	2	2	2	1	3	2	1	3	3
CO3	3	2	3	3	3	2	3	-	2	2	-	2	3	3
CO4	3	3	3	3	2	2	2	1	2	1	2	3	3	3
CO5	3	3	2	2	3	3	2	2	2	1	2	2	3	3
3- Strong	g; 2-Me	edium;	2-Low											

List of Experiments

- 1. Uniform bending Determination of Young's modulus.
- 2. Non-Uniform bending Determination of Young's modulus.
- 3. Determination of rigidity modulus of a wire by torsional pendulum.
- 4. Determination of Planck's constant.
- 5. Determination of Stefan's Constant.
- 6. V-I characteristics of solar cell.
- 7. a) Laser- Determination of the wave length of the laser using grating.
 - b) Optical fibre -Determination of Numerical Aperture and acceptance angle.
- 8. Determination of wavelength of mercury spectral lines spectrometer grating.
- 9. Magnetic field along the axis of current carrying coil Stewart and Gee.
- 10. Determination of dielectric constant.

Course Designers

- 1. Dr. V. Vasudevan vasudevan.vi@gmail.com
- 2. Mr.S. Vanchinathan- vanchinathan@ksrct.ac.in
- 3. Dr. M. Malarvizhi- malarvizhi@ksrct.ac.in



60CH0P1	APPLIED CHEMISTRY LABORATORY	Category	L	Т	Ρ	Credit
	(B.Tech BT)	BS	0	0	4	2
Ohiective						

Jbjectiv

- Test the knowledge of theoretical concepts.
- To develop the experimental skills of the learners.
- To facilitate data interpretation.
- To expose the learners to various industrial and environmental applications

Prerequisite

NIL

Course Outcomes

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

CO1	Estimate the hardness in water sample by complexometric method.	Apply
CO2	Determine the amount of dissolved oxygen in given samples.	Apply
CO3	Estimate the amount of acid by pH meter, mixture of acids by	Apply
	conductivity meter and ferrous ion by potentiometer	
CO4	Determine the rate constant of ester.	Apply
CO5	Determine the adsorption of acetic acid	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
							7							
CO1	2	3			2				2	2			2	3
CO2	2	3			2				2	2			3	
CO3	3	3			2				3	2			3	2
CO4	3	3			2				2	2			2	
CO5	3	3			3				2	2			2	3
3- Strong	g; 2-Me	edium;	1-Low	/										

List of Experiments

- 1. Estimation of hardness of water sample by complexometric method.
- 2. Determination of Dissolved Oxygen in water sample by Winkler's method.
- 3. Estimation of HCI by pH meter.
- 4. Estimation of mixture of acids by conductivity meter.
- 5. Determination of ferrous ion by Potentiometric titration.
- 6. Determination of Rate constant of ester catalyzed by an acid.
- 7. Adsorption of acetic acid by Charcoal.

Course Designers

- 1. Dr.T.A.Sukantha tasukantha@gmail.com
- 2. Dr.B.Srividhya srividhyab@ksrct.ac.in
- 3. Dr.K.Prabha prabhak@ksrct.ac.in
- 4. Dr.S.Meenachi meenachi@ksrct.ac.in
- **SDG 3 Good health and wellbeing
- *SDG 6 Improve Clean water and sanitation
- * SDG 12 Responsible Consumption and Production
- **SDG 13 Climate action
- ***SDG 14 Life Below Water



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 2022-2023 onwards)

SECOND SEMESTER

S.No.	Course	Name of the Course	Duration of	Weight	age of Marl	ks	Minimum Marks for Pass in End Semester Exam		
0.110.	Code	Name of the Course	Internal Exam	Continuous Assessment *	End Semester Exam	Max. Marks	End Semester Exam	Total	
			THEOR	Y					
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 ME 002	Engineering Graphics	2	40	60	100	45	100	
5	60 ME 004	Engineering Mechanics	2	40	60	100	45	100	
6	60 GE 002	Tamils and Technology	2	100	-	100	-	-	
			PRACTIC	AL					
7	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	3	60	40	100	45	100	
8	60 CS 0P1 C Programming Laboratory		3	60	40	100	45	100	
9	60 CG 0P1	CG 0P1 Career Skill Development I		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 paper follow the declared pattern.

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

BoS Chairman Signature

Category	L	Т	Ρ	Credit
EN	1	0	2	2

- 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

Prerequisite

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	PO	PO	PO	PO	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2
	1	2	3	4										
CO1								2	3	3	2	3	3	3
CO2								2	3	3	2	3	3	3
CO3								2	3	3	2	3	3	3
CO4								2	3	3	2	3	2	2
CO5								2	3	3	2	3	2	2
3- Stro	3- Strong; 2-Medium; 1-Some													

Assessment Pattern

Bloom's Category		Assessment Tests Marks)	End Sem Examination
Bioom 5 Category	1	2	(Marks)
Remember (Re)	10	10	10
Apply (Ap)	20	20	40
Analyse (An)	30	30	50
Create (Cr)	0	0	0

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	N.J.Nd			of Technolog							
				to All Branche							
Semester	Hours	/Week		Total hrs	Credit	ľ	Maximum M	larks			
Semester	L	Т	Р	Total IIIS	С	CA	ES	Total			
II	1	0	2	45	2	40	60	100			
istening: gr Speaking: Reading: Vriting: Anguage istening: te ca Speaking: Reading: Vriting: Vriting: (N Problem So	Evaluative Listenin raphic organiser (ch Marketing a product Reading advertisem Professional emails, Focus: mixed tens Gausal Relations Listening to longer echnical information ause & effects. Describing and disc longer technical text Writing responses to Focus: Active Pass Noun-Verb-Adj-Adv), plving	oosing a p , persuasi ients, use Email etid es, prepos in Speak r technica from pod ussing the ts– cause o complain ive Voice , Adverbs.	product or ve speec r manuals quette - co sitional ph ing and V al talks a casts – L e reasons and effec ts transform	service by cor h techniques. and brochures ompare and co trases, same w Vriting nd completing istening to pro of accidents of t essays, and l nations, Infinitiv	nparison) s. ords used in ords used in ords used in r gap fillin ocess/event r disasters b letters / ema ve and Geru	y. n differen descriptio based on ails of con unds – W	t contexts a ses. Listen ons to iden news repor nplaint, ord Format	ind [9] tify ts. ion [9]			
Speaking: Speaking: Reading: Vriting: L Language Completion	Listening to / watch uggesting solutions. Group Discussion (Case Studies, excer Letter to the Editor, G Focus: Error corr	based on rpts from I Checklists rection; If	case stuc iterary tex , Problem	lies), - techniqu kts, news repor a solution essa	ues and Stra ts etc. y / Argumer	ategies. ntative Es	say	ice			
Listening: Speaking: Reading: N Writing: Re P	of Events and Reso Listening Comprehe Interviewing, presen lewspaper articles. ecommendations, T lagiarism Focus: Reported Sp	ension bas ating oral r ranscodin	eports, M g, Accide	ini presentation nt Report, Pre	ns on select	topics. and Sum	marising, a	[9] Ind			
The Ability to put Ideas or Information Coherently Listening: Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview berformance). 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.											
<u></u>							Total Hou	rs 45			
Text book	x(s):										
1. <i>'Engl</i> Unive 2. Norm	ish for Engineers & ersity, 2020 han Lewis, <i>'Word I</i> bulary Book', Pengu	Power Ma	ade Easy	· - The Com		-					

leeser &

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

S.No	Торіс	No.of Hours	Mode of content Delivery
1	Making Comparisons		· · · ·
1.1	Evaluative Listening	1	Activity Based
1.2	Product Descriptions and filling a graphic organiser	1	Activity Based
1.3	Marketing a product by using persuasive techniques	2	Activity Based
1.4	Reading advertisements, user manuals and brochures	1	Activity Based
1.5	Writing professional emails	1	Lecture
1.6	Compare and contrast essay	1	Lecture
1.7	mixed tenses and prepositional phrases	1	Lecture
1.8	Same words used in different contexts	1	Lecture
2	Expressing Causal Relations in Speaking and Writing		
2.1	Listening to longer technical talks	1	
2.2	Listening to process/event descriptions	1	Activity Based
2.3	Describing and discussing the reasons of accidents or disasters	1	Activity Based
2.4	Reading longer technical texts- cause and effect essays	1	Activity Based
2.5	Writing responses to complaints	1	Lecture
2.6	Active Passive Voice transformations	2	Lecture
2.7	Infinitive and Gerunds	1	Lecture
2.8	Word Formation (Noun-Verb-Adj-Adv), Adverbs.	1	Lecture
3	Problem Solving		
3.1	Listening to documentaries and suggesting solutions	1	Activity Based
3.2	Group Discussion (based on case studies)	2	Activity Based
3.3	Reading Case Studies, excerpts from literary texts and news reports	1	Activity Based
3.4	Letter to the Editor	1	Lecture
3.5	Checklists	1	Lecture
3.6	Problem solution and argumentative essays	1	Lecture
3.7	Error correction and Sentence Completion	1	Lecture
3.8	If conditional sentences	1	Lecture

Course Contents and Lecture Schedule

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Caeses &

4	Reporting of Events and Research		
4.1	Listening Comprehension	1	Activity
			Based
4.2	Interviewing and presenting oral reports	1	Activity
	•••••		Based
4.3	Mini presentations on select topics	1	Activity
4 4		1	Based
4.4	Reading newspaper articles	1	Activity Based
4.5	Recommendations	1	Lecture
4.6		•	
	Transcoding	1	Lecture
4.7	Precis writing, Summarising and Plagiarism	1	Lecture
4.8	Reported Speech, Modals	1	Lecture
4.9	Conjunctions	1	Lecture
5	The Ability to put Ideas or Information Coherently		
5.1	Listening to Formal job interviews	1	Activity
			Based
5.2	Role plays	2	Activity
			Based
5.3	Virtual interviews	1	Activity
			Based
5.4	Reading Company profiles	1	Lecture
5.5	Writing Statement of Purpose (SoPs)	1	Lecture
5.6	Writing Résumé	1	Lecture
5.7	Numerical Adjectives and Relative Clauses - Idioms	1	Lecture
5.8	question types: Wh/ Yes or No/ and Tags	1	Lecture
	Total	45	

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

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BoS Chairman Signature

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

- To acquire the knowledge about multiple integrals.
- To familiarize the basic concepts of vector calculus.
- To get exposed to the fundamentals of analytic functions.
- To solve various types of partial differential equations.
- To familiarize the concepts of Laplace transform.

Prerequisite

NIL

Course Outcomes

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

CO1	Understand the concepts of double and triple integrals.	Remember
•••		Understand Apply
CO2	Understand the basic concepts of vector calculus.	Remember
002		Understand Apply
CO3	Construct the analytic functions and avaluate complex integrals	Remember
003	Construct the analytic functions and evaluate complex integrals.	Understand Apply
CO4	Compute the solution of partial differential equations using different	Remember
CO4	methods.	Understand Apply
005	Apply Laplace transform techniques for solving differential equations.	Remember
CO5		Understand Apply
1		

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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 - Str	3 - Strong; 2 - Medium; 1 - Some													

Assessment Pattern

Bloom's Category	Asses	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)		
	1	2				
Remember (Re)	10	10	10	10		
Understand (Un)	10	10	20	20		
Apply (Ap)	40	40 40		70		
Analyze (An)	0	0	0	0		
Evaluate (Ev)	0	0 0		0		

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Create (Cr)	0	0	0	0
Total	60	60	100	100

		60 MA 0	03 – Integra	als. Partial	ege of Techno Differential Eq	uations and	d Laplace Tr	ansform	
					E, EEE, CSE, M				
			Hours / Wee			Credit		Maximum Mai	rks
Se	mester	L	Т	Р	Total hrs	С	CA	ES	Total
		3	1	0	60	4	40	60	100
Dou nteg	ble integra gral – Tripl	e integratio	esian and po	an co-ordina	nates – Change ates – Change tes.				le
Intro surf	aces – Div blication : (Gradient of vergence ar	nd curl (exclu	uding vecto	–Directional de r identities) – S uss divergence	olenoidal an	d irrotational	vectors -	101
ANA Anal Con	ALYTIC FU lytic function struction o	on – Neces of an analytic	c function – C	fficient con Cauchy's In	ditions (stateme tegral theorem uchy's residue t	(statement o			
					5				1 191
PAR	TIAL DIF	FERENTIAL	EQUATION	NS					1.1
Forr Non	nation of p -Linear pa	oartial differe	ential equation	ons by elim	inating arbitrary				[9]
Forr Non LAP Con of tra Con	nation of p -Linear pa LACE TR ditions for ansforms - volution th	oartial differen Irtial differen ANSFORM existence – Initial and	ential equation ntial equation - Transforms final value th luding proof)	ons by elim ns of first of classification of element eorem – Tr		e's linear equ Basic prope iodic function	uations – Apr rties - Deriva ns. Inverse Li	blication: itives and integ aplace transfor	[9] grals rm –
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Forr Non LAP Con of tra Con with	nation of p -Linear pa LACE TR ditions for ansforms - volution th constant o t Book(s) : Grewal 2017.	Anstal differer ANSFORM existence – Initial and t eorem (exc co-efficients B.S, "Highe	r Engineerin	ons by elim ns of first or el entropy s of element eorem – Tr) – Applicat g Mathema	rder – Lagrange tary functions – ransform of peri ion: Solution of atics", 44 th Editio	e's linear equ Basic prope iodic function second orde	uations – App rties - Deriva ns. Inverse La r ordinary dif Fotal Hours: Publishers, D	blication: htives and integ aplace transfor ferential equation 45 + 15 (Tuto belhi,	grals rm – ions prial) 60
Forr Non LAP Con of tra Con with	nation of p -Linear pa LACE TR ditions for ansforms - volution th constant of Book(s) Grewal 2017. Kreyszig	Anstal differer ANSFORM existence – Initial and t eorem (exc co-efficients B.S, "Highe	r Engineerin	ons by elim ns of first or el entropy s of element eorem – Tr) – Applicat g Mathema	rder – Lagrange tary functions – ransform of peri ion: Solution of	e's linear equ Basic prope iodic function second orde	uations – App rties - Deriva ns. Inverse La r ordinary dif Fotal Hours: Publishers, D	blication: htives and integ aplace transfor ferential equation 45 + 15 (Tuto belhi,	grals rm – ions prial) 60
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Course Contents and Lecture Schedule

S.No	Торіс	No. of Hours	Mode of content Delivery
1	MULTIPLE INTEGRALS		
1.1	Double integration	1	Black Board
1.2	Cartesian and polar coordinates	1	Black Board
1.3	Change of order of integration	1	Black Board
1.4	Area as double integral	1	Black Board
1.5	Tutorial	2	
1.6	Triple integration in Cartesian coordinates	1	Black Board
1.7	Change of variables	1	Black Board
1.8	Cartesian to polar coordinates	1	Black Board
1.9	Cartesian to Cylindrical coordinates	1	Flipped class
1.10	Tutorial	2	
2	VECTOR CALCULUS		
2.1	Introduction: Gradient of a scalar point function	1	Black Board
2.2	Directional derivative	1	Black Board
2.3	Angle of intersection of two surfaces	1	Black Board
2.4	Divergence and curl (excluding vector identities)	1	Black Board
2.5	Tutorial	2	
2.6	Solenoidal and irrotational vectors	1	Black Board
2.7	Application: Green's theorem in the plane	1	TPS
2.8	Gauss divergence theorem	1	Black Board
2.9	Stokes' theorem (statement only)	1	Black Board
2.10	Tutorial	2	
3	ANALYTIC FUNCTIONS AND INTEGRALS		
3.1	Analytic function	1	Black Board
3.2	Necessary and Sufficient conditions (statement only)	1	Black Board
3.3	Properties	1	Black Board
3.4	Harmonic function	1	Black Board
3.5	Tutorial	2	
3.6	Construction of an analytic function	1	Black Board
3.7	Cauchy's Integral theorem (statement only), Cauchy's integral formula	1	Black Board
3.8	Classification of singularities	1	Black Board
3.9	Applications : Cauchy's residue theorem.	1	TPS
3.10	Tutorial	2	
4	PARTIAL DIFFERENTIAL EQUATIONS		
4.1	Formation of partial differential equations by eliminating arbitrary constants	1	Black Board
4.2	Formation of partial differential equations by eliminating arbitrary functions	2	Black Board
4.3	Tutorial	2	
4.4	Non- linear partial differential equations of first order	2	PPT



4.5	Lagrange's linear equations	1	Black Board
4.6	Application : Homogeneous Linear partial differential equations with constant coefficients.	2	TPS
4.7	Tutorial	2	
5	LAPLACE TRANSFORM		
5.1	Conditions for existence	1	Black Board
5.2	Transforms of elementary functions	1	Black Board
5.3	Basic properties	1	PPT
5.5	Derivatives and integrals of transforms, Initial and final value theorem	1	Black Board
5.6	Tutorial	1	
5.7	Transform of periodic functions	2	Black Board
5.8	Inverse Laplace transform	1	Black Board
5.9	Convolution theorem (excluding proof)	1	Black Board
5.10	Application: Solution of second order ordinary differential equation with constant co-efficient.	1	TPS
5.11	Tutorial	2	
	Total	60	

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

2. Dr.K.Prabakaran - prabakaran@ksrct.ac.in

List of MATLAB Programs:

- 1. Evaluating double and triple integrals.
- 2. Area as double integral.
- **3.** Volume as triple integral.
- 4. Plotting and visualizing single variable functions.
- 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

eeer & BoS Chairman Signature

		Category	L	Т	Ρ	Credit
60 CS 001	C PROGRAMMING	CSE	3	0	0	3

- 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 **Prerequisite**

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	Ρ	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO12	PSO1	PSO2
	0	2	3	4	5	6	7	8	9	0	1			
	1													
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- Stron	g;2-	Mediu	ım;1-S	Some										

Assessment Pattern

Cognitive	Continuous Assessm	ent Tests	End Semester
Levels	1	2	Examination(Marks)
Remember	10	10	20
Understand	10	10	20
Apply	40	40	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

BoS Chairman Signature

Syllabus

			K. S. Rang		llege of Techn		tonomous R	2022	
			Common		01 – C Progra SBS, AI&ML,				
			Hours / We		505, AIQIVIL,	Credit	N	Aaximum Marks	
	amaatar	L		P	Total bra	Credit	CA	ES	Total
2	Semester II	3	0	0	Total hrs 45	3	40	60	100
Sti Op Co	erators-exp nditional Bra	C Program pressions an anching and	 Data type nd precede 	es – Keywo nce- Consc	rds - Variables le I/O– Unform /aluation of cor	atted and Fo	ormatted Con	sole I/O -	[9]
Ar		mensional			onal Arrays – M ing Handling F		ulation - Char	acter arrays –	[9]
Fu Ca Re Intro Ger	II by value a cursion and oduction to F	ppe of a Fui and Call by application Pointer Vari	nction – Lib reference - n - Passing ables - The	- Function C Arrays to F Pointer Op	ons and User d Categorization- unctions– Stora perators - Point ers– Function a	Arguments age class Sp er Expressio	to main functi becifiers. bns - Pointers	and Arrays -	[11]
Sti Ne	ructures - Intested Structu	roduction t ires - Passi	o Structure ng Structur	s and Initial es to Funct	and Preproces ization - Arrays ions - Structure commands.	s of Structure			[9]
Fil		-Reading a	-		- Reading and Access Files –	-	• •	em functions – s.	[9]
	al Hours								45
	xt Book(s):								
1.	Herbert Sc	hildt, "The	Complete F	Reference C	C", Fourth Edition	on, Tata Mc	Graw Hill Editi	on, 2010.	
2.	Byron Gott	fried, "Proo	gramming w	vith C", Thir	d Edition, McG	raw Hill Edu	cation, 2014.		
Re	ference(s):								
1.	E. Balagur	usamy, "Pr	ogramming	in ANSI C'	', Seventh Editi	ion, Tata Mc	Graw Hill Edi	tion, New Delhi,	2016.
2.	Brian W. K	ernighan a	nd Dennis	M. Ritchie,	"C Programmir	ng Language	e", Prentice-Ha	all.	
3.	ReemaTha Education,		puter Fund	amentals a	nd Programmir	ng in C", Seo	cond Edition, (Oxford Higher	
4.	K N King, '	'C Program	ming: A Mo	odern Appro	oach", Second	Edition, W.V	V.Norton, Nev	v York, 2008.	

*SDG 4- Quality Education

BoS Chairman Signature

Nodule	ntents and Lecture Schedule	No. of Hours
No	Торіс	
1	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	Arrays and Strings	
2.1	One Dimensional Array	1
2.2	Two-Dimensional Array and Matrix Manipulation	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	Functions and Pointers	
3.1	Scope of a Function – Library Functions,	1
	User defined functions and Function Prototypes	
3.2	Function Call by value and Function Call by reference,	2
	Function Categorization	
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	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	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
	Total Hours	45

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



60 ME 002		Category	L	Т	Ρ	Credit
00 m2 002	ENGINEERING GRAPHICS	ES	2	0	4	4

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- To acquire various concepts of dimensioning, conventions and standards.
 - To impart the graphic skills for converting pictorial views of solids in to orthographic views.
- To learn the concept in projection of solids, section of solids and development of different types of surfaces.
- To learn the concept of isometric projection.
- To learn the geometry and topology of engineered components

Prerequisite

NIL

Course Outcomes

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

CO1	Demonstrate the Impact of computer technologies on graphical communication	R/U/A
CO2	Convert the pictorial views in to orthographic views using drafting software	R/U/A
CO3	Draw the projection of simple solids, true shape of sections and development of surfaces	R/U/A
CO4	Construct the isometric projections of objects using drafting software.	R/U/A
CO5	Interpret a design project illustrating engineering graphical skills.	R/U/A

Mapping with Programme Outcomes

COs	PO1	PO2	PO	РО	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
			3	4										
CO1	3	2	3										1	2
CO2	3	3	3										2	2
CO3	3	3	3		3			3					2	2
CO4	3	3	3		3			3					2	2
CO5	3	3	3										2	2
3- Stro	ona: 2-	Mediu	m [.] 1-S	ome										

3- Strong; 2-Medium; 1-Some

Assessment Pattern

Bloom's Category	Continuous A (N	End Sem Examination	
	1	2	(Marks)
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0



		K. S. Ran		ollege of Tech				
	Cor	nmon to M		60 ME 002- EN				
Semester		Hours / We		Total Hours	Cr, CrviL, r Credit		T, AI&DS, AI&M Maximum Marks	L
Semester	1	T	P	Total Hours	Creat	CA	ES	Total
	2	0	4	90	4	40	60	100
Introduction	to Comput	ter Aided D	orafting (C	AD) software		I	1 1	
Dimension) – D – Shortcut mer Select and eras	Drawing Are nus (Buttor se objects.	ea (Backgro n Bars) – T	ound, Cross	shairs, Coordin	ate System)	- Dialog box	aw, Modify and es and windows hods of zoom –	[6+12]
Conversion of	ection – Te pictorial vie	rminology a ws into orth	ographic v		– first angle	e and third ar	ngle projection –	[6+12]
perpendicular t	simple so o other, ax er and con	olids: prism is inclined t e in simple	,pyramid, o one plan positions (o	e and parallel t cutting plane is	o other). Se	ctions of simp	one plane and le solids: prism, cipal planes and	[6+12]
Radial line dev	velopment- elopment –	Methods of		ent: Parallel line	e developme	ent-Cube, Pris	m and Cylinder.	[6+12]
Isometric Pro Principles of Is lines, Planes, S	ometric pr	•					ometric views of ometric view	[6+12]
presentation in and Tolerance doors, and fixtu	topology standard 2 – Use of so res such a ving practic	of engine 2D blueprint olid modelir s water clos ce – Drawin	eered com t form, 3D v ng software set (WC), b g sectional	wire-frame and for creating as ath sink, showe	shaded soli sociative mo er, etc. – App	ds – Geometi odels – Floor olying colour c	odels and their ric dimensioning plans: windows, coding according – Introduction to	[6+12]
		0 ()					Total Hours:	90
Text Book(s)								·
	.D., —Engi	neering Dra	wing, Cha	rotar Publishing	g House Pvt.	Ltd., 53rd Ed	lition, Gujarat, 20	19.
-		ngineering	GraphicsII,	New Age Inter	national (P)	Limited, 2014		
Reference(s)								
				Engineering	-			
-			-	• •			ers, Chennai, 201	4.
3. Agrawa	IB. & Agra	wal C. M., -	–Engineer	ing GraphicsII,	TMH Publica	ation, 2012.		
4. Narayar	na, K.L. & F	^o Kannaiah,	, —Text bo	ok on Engineei	ring Drawing	I, Scitech Pul	blishers, 2008.	

Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023

General

Course Contents and Lecture Schedule

S.No	Торіс	No. of Hours	Mode of content Delivery
1	Introduction to Computer Aided Drafting (CAD) software		PPT
1.1	Theory of CAD software	1	PPT
1.2	Menu System, Tool bars (Standard, Object Properties, Draw, Modify and Dimension)	2	PPT
1.3	Drawing Area (Background, Crosshairs, Coordinate System)	3	PPT
1.4	Dialog boxes and windows – Shortcut menus	3	PPT
1.5	The Command Line and Status Bar	1	PPT
1.6	Different methods of zoom – Select and erase objects.	2	PPT
2	Orthographic Projection		PPT
2.1	Introduction to orthographic projections	2	PPT
2.2	Planes of projection,	2	Demonstration
2.3	Projection of points	1	PPT
2.4	Projection of lines inclined to both planes.	2	Demonstration
2.5	Projection of planes	2	PPT
2.6	Projection of planes Inclined to both planes	1	PPT
2.7	Conversions of pictorial views to orthographic views.	3	PPT
2.8	Practice class for pictorial views to orthographic views.	2	PPT
2.9	Practice class for pictorial views to orthographic views.	1	PPT
3	Projection of Solids		PPT
3.1	Projections of simple solids: prism	2	Demonstration
3.2	Projections of simple solids: cylinder	3	Demonstration
3.3	Projections of simple solids: pyramid	2	Demonstration
3.4	Projections of simple solids: Cone	2	Demonstration
3.5	Practice class for Projection of Solids	2	PPT
3.6	Axis of solid inclined to both HP and VP	5	PPT
3,7	Section of solids for Prism,	2	PPT
3,8	Section of solids for Cylinder,	2	Demonstration
3,9	Section of solids for Pyramid,	2	Demonstration
3,10	Section of solids for Cone	2	PPT
3,11	Auxiliary Views - Draw the sectional orthographic views of geometrical solids.	3	PPT
3.12	Draw the sectional orthographic views of objects from industry.	3	PPT
3,13	Development of surfaces of Right solids Prism,	2	PPT
3.14	Development of surfaces of Right solids Pyramid	2	PPT
3.15	Development of surfaces of Right solids Cylinder and Cone	2	PPT
4	Isometric Projection and Introduction to AutoCAD		PPT
4.1	Principles of isometric projection	1	PPT
4.2	Isometric scale	2	PPT
4.3	Isometric projections of simple solids: Prism,	2	PPT
4.4	Isometric projections of simple solids: Pyramid,	2	PPT

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4.5	Isometric projections of simple solids: Cylinder	1	PPT
4.6	Isometric projections of simple solids: Cone	2	PPT
4.7	Isometric projections of frustum	2	PPT
4.8	Isometric projections of truncated solids	2	PPT
4.9	Combination of two solid objects in simple vertical positions.	3	PPT
5	Application of Engineering Graphics		PPT
5.1	Geometry and topology of engineered components:	2	PPT
5.2	Creation of engineering models and their presentation in standard 2D blueprint form,	3	PPT
5.3	3D wire-frame and shaded solids – Geometric dimensioning and Tolerance – Use of solid modeling software for creating associative models	3	Demonstration
5.4	Floor plans: windows, doors, and fixtures such as water closet (WC), bath sink, shower, etc.	3	Demonstration
5.5	Applying colour coding according to building drawing practice	2	PPT
5.6	Drawing sectional elevation showing foundation to ceiling	2	Demonstration
5.7	Introduction to Building Information Modelling (BIM).	2	PPT

1. Dr.K.Mohan- mohank@ksrct.ac.in

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		Category	L	Т	Р	Credit
60 ME 004	ENGINEERING MECHANICS	ES	3	1	0	4

- To learn a process for analysis of static objects, concepts of force, moment, and mechanical equilibrium in two and three dimensions.
- To learn the equilibrium of rigid bodies such as frames, trusses, beams.
- To identify the properties of surfaces and solids by using different theorem.
- To learn the principle of frictional forces at the contact surfaces and impart basic concept of dynamics of particles.
- To acquire the concept of elements of rigid body dynamics
- Prerequisite

NIL

Course Outcomes

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

CO1	Use scalar and vector analytical techniques for analysing forces in statically determinate structures.	Understand & Apply
CO2	Apply basic knowledge of scientific concepts to solve real-world problems.	Understand & Apply
CO3	Calculate the properties of surfaces and solids using various theorems.	Understand & Apply
CO4	Determine the effect of frictional forces and the dynamic forces exerted in the particle	Understand & Apply
CO5	Analysis of rigid body dynamics and calculation of member forces in the rigid body	Understand & Apply

Mapping with Programme Outcomes

COs	P01	PO2	PO 3	PO 4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	3	3	-										3	3
CO2	3	3	3											3	3
CO3	3	3	3		3			3						3	3
CO4	3	3	3		3			3						3	3
CO5	3	3	2											3	3
	•			•	3	- Stron	g;2-Me	edium;	1-Some	e					

Assessment Pattern

Bloom'sCategory	Continuous Assessme	End Sem Examination	
Biooni scalegory	1	2	(Marks)
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0

BoS Chairman Signature

Syllabus

					Ilege of Techn ENGINEERING			,			
Semes	tor		Hours / We		Total Hours	Credit		Aavimum Ma	rke		
Semes		I				Credit	Maximum Marks				
		3	1	0	60	4	40	60	100		
Basics	and Sta	atics of Pa	rticles	-		1					
Parallel	logram a	and triangul			Mechanics–Prin ors–Vectorial re				em, [12]		
Additic Equilib	orium of	action, dot			-Coplanar Force orium of a partic						
quilib	rium of	Rigid Bod	ies								
determi	inacy, N	Ioments ar	nd Couples	Moment	eir reactions–re of a force abo n's theorem-Equ	ut a point an	d about an	axis-Vector	ial [12]		
roper	ties of S	Surfaces a	nd Solids								
using Paralle	Integrati el axis th	on Method	; T section, perpendic	, I section,	Moment of Inerti Angle section, l eorem- Polar m	Hollow section	n using stand	lard formula	- [12]		
riction	n										
Friction	al force.	-Laws of Co	oloumh frict	ion_Simple	contact friction-	_l adder frictio	n-Rolling res	istanco_Rati	0.0f [4.0]		
	in belt.			lon-Simple	Contact metion		II-Ruiling les	Islance-nali	o of [12]		
		articles									
-											
					ationship-Relat		ojectile motic	on in horizon	^{tal} [12]		
			0,	quation – In	npulse and Mon	nentum.					
Elemer	nts of R	igid Body I	Dynamics								
		d Rotation mechanisn	-	odies: Velo	city and accele	eration-Gener	al Plane mo	tion: Crank	and [12]		
							Т	otal Hours:	45 60		
	Book(s)										
			nkarasubra Edition, 201		, Fundamentals	of Engineerin	g Mechanics	, Vikas Publi	shing		
	,		son Jr. E.R, lition, 2016		echanics for Eng	ineers", Statio	s and Dynan	nics, McGrav	v-Hill		
Refere	ence(s)										
			Kumar, M,	"Engineerii	ng Mechanics",	PHI Learning	Private Ltd, N	lew Delhi, 20)12		
2.	Hibbelle	er, R.C., "En	igineering N	lechanics",	Vol. 1 Statics, V	ol. 2 Dynamic	s, Pearson E	ducation Asi	a Pvt. Ltd.		
~	Bansal	R.K," Engin	eering Mec	hanics" La	mi Publications	(P) Ltd, 2011					
3.	Invina L										
4.		 Shames, on, 2003. 	Engineeri	ng Mechan	ics: Statics and	d Dynamics",	Pearson Ed	ucation Asia	a Pvt. Ltd		

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Jesses J.

Course Contents and Lecture Schedule

S.No	Торіс	No. of Hours
1	BASICS AND STATICS OF PARTICLES	
1.1	Introduction, Units and Dimensions, Laws of Mechanics	1
1.2	Principle of transmissibility, Lame's theorem,	1
1.3	Parallelogram and triangular Law of forces	1
1.4	Tutorial	2
1.5	Vectors, Vectorial representation of forces and moments	1
1.6	Vector operations, Coplanar Forces–Resolution and Composition of forces	2
1.7	Equilibrium of a particle, Forces in space	1
1.8	Equivalent systems of forces-Single equivalent force.	1
1.9	Tutorial	2
2	EQUILIBRIUM OF RIGID BODIES	
2.1	Free body diagram, Types of supports and their reactions	1
2.2	Requirements of stable equilibrium, Static determinacy	1
2.3	Moments and Couples–Moment of a force about a point and about an axis	2
2.4	Vectorial representation of moments and couples	1
2.5	Tutorial	2
2.6	Varignon's theorem	1
2.7	Equilibrium of Rigid bodies in two dimensions	2
2.8	Tutorial	2
3	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)	2
3.3	Tutorial	2
3.4	Moment of Inertia of plane area(T section, I section, Angle section)	1
3.5	Moment of Inertia of plane area(Hollow section)	1
3.6	Parallel axis theorem and perpendicular axis theorem	1
3.7	Polar moment of inertia	1
3.8	Mass moment of inertia of thin rectangular section.	1
3.9	Tutorial	2
4	FRICTION & DYNAMICS OF PARTICLES	
4.1	Frictional force, Laws of Coloumb friction, Simple contact friction	1
4.2	Ladder friction	1
4.3	Rolling resistance–Ratio of tension in belt	1
4.4	Tutorial	2
4.5	Displacement, Velocity, acceleration and their relationship, Relative motion	1
4.6	Projectile motion in horizontal plane	1
4.7	Newton's law	1
4.8	Work Energy Equation	1
4.9	Impulse and Momentum	1

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MENTS OF RIGID BODY DYNAMICS Instation and Rotation of Rigid Bodies Instation and Rotation of Rigid Bodies - Velocity	1
nslation and Rotation of Rigid Bodies - Velocity	1
	2
slation and Rotation of Rigid Bodies - acceleration	2
orial	2
eral Plane motion	1
eral Plane motion - Crank and Connecting rod mechanism	2
orial	2
	60
	eral Plane motion - Crank and Connecting rod mechanism orial

4. Mr.S.KARTHICK -<u>skarthick@ksrct.ac.in</u>

60 GE 002	Tamils and Technology	Category	L	т	Ρ	Credit
	(Common to all Branches)	GE	1	0	0	1

Objectives:

- To learn weaving, ceramic and construction technology of Tamils.
- To understand the agriculture, irrigation and manufacturing technology of Tamils.
- To realize the development of scientific Tamil and Tamil computing.

Prerequisite:

Nil

Course Outcomes:

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

CO1	Understand the weaving and ceramic technology of ancient Tamil people nature.	Understand
CO2	Comprehend the construction technology, building materials in sangam period and case studies.	Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence.	Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving.	Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3	3		2		3	3	3
CO2							3	3		2		3	3	3
CO3							3	3		2		3	3	2
CO4							3	3		2		3	2	3
CO5							3	3		2		3	3	3
3- Strong; 2-	-Medium	; 1-Lov	V											

BoS Chairman Signature

Assessment Pattern

Bloom's Category	Continuous Ass (Ma		Model Examination (Marks)
	1	2	(IVIALKS)
Remember	10	10	10
Understand	20	20	20
Apply	20	20	40
Analyze	10	10	30
Evaluate	-	-	-
Create	-	-	-

Syllabus

		n. S. Kang			echnology ·		110US K202	.2	
					ils and Tec all Branche				
) Hours/Wee		all Branche	Credit	Mo	ximum Ma	arko
Seme	ester			к Р	Total hrs	Credit	CA	ES	Total
		 1	0	Р 0	15	1	100	E5	100
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Weaving	Industry	during Sa			ic Technolo	gy – Blao	ck and Red	d Ware	3
Designing Sangam / Constructi Temples o	and Str Age – Bu ions in S of Cholas	ructural co uilding ma Silappathika s and othe	terials and aram – Sc r worship j	House & Hero stor ulptures a places – T	Designs in nes of Sang nd Temples emples of N r Mahal – C	jam age - s of Mama Nayaka Pe	 Details of allapuram - period - Type 	f Stage - Great e Study	3
Art of Ship gold coins	Building		gical studie		lustry – Iron				3
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AGRICUL Dam, Tank Husbandr of Sea- F SCIENTIF Developm Developm Dictionaria	As describ TURE AI (,Ponds,S y – Wells Fisheries FIC TAMII aent of S aent of Ta ((s): தமிழக கல்வியி கணினித்	rracotta be Ded in Silar ND IRRIGA Sluice, Signi designed – Pearl – L & TAMIL Scientific T mil Softwa பன் பனிகள் வரலாறு - யல் பணிகள்	eads – Shel <u>ATION TEC</u> ificance o for cattle u Conche d COMPUT amil – Tar re – Tamil \ மக்களும் ப ர் கழகம்). னைவர் இல	l beads/bor CHNOLOG f Kumizhi se – Agricu iving -Anci ING mil Compu /irtual Acac ண்பாடும் ே . சுந்தரம். (எ	he beats – A Y i Thoompu ulture and A ent Knowle nting – Digi demy- Tamil க. கே . பிள்	rcheologic of Cho gro Proce dge of Oc talization Digital Lib നെ (ചെം	al evidence bla Period ssing – Kno cean – Kno of Tamil B rary – Onlin Total ரியீடு: தமிழ்	s -Gem ,Animal owledge owledge ooks – e Tamil Hours	3 3 15
AGRICUL Dam,Tank Husbandr of Sea- F SCIENTIF Developm Developm Dictionaria Text Book	As describ TURE AI (Ponds,S y – Wells isheries iC TAMII ent of S ent of Ta தமிழக கல்வியி கணினித் தீழடி – (Prracotta be Ded in Silar ND IRRIGA Sluice, Signi designed – Pearl – L & TAMIL Scientific T mil Softwar வரலாறு - யல் பணிகள் தமிழ் – முல வைகை நதி	eads – Shel <u>Ation TEC</u> ificance o for cattle u Conche d COMPUT amil – Tar re – Tamil \ மக்களும் ப ர கழகம்). னைவர் இல க்கரையில் ச	l beads/bor CHNOLOG f Kumizhi se – Agricu iving -Anci iving -Anci ing mil Compu /irtual Acad ராரும் ே . சுந்தரம். (எ ங்ககால நகர	he beats – A Y i Thoompu ulture and A ent Knowle tting – Digi demy- Tamil க. கே . பிள் க. கே . பிள்	rcheologic of Cho gro Proce dge of Oc talization Digital Lib நான் (வெ	al evidence bla Period ssing – Kno cean – Kno of Tamil B rary – Onlin Total ரியீடு: தமிழ்	s -Gem ,Animal owledge owledge ooks – e Tamil Hours	3 3 15

Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023

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6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference

60 GE 002	தமிழரும் தொழில்நுட்பமும் (Category	L	Т	Р	Credit
	(அனைத்து துறைகளுக்கும் பொதுவானது)	GE	1	0	0	1

பாடத்தின் நோக்கங்கள்:

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

முன்கூட்டிய துறைசார் அறிவு:

தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்:

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

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

Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3	3		2		3	3	3
CO2							3	3		2		3	3	3
CO3							3	3		2		3	3	2
CO4							3	3		2		3	2	3
CO5							3	3		2		3	3	3
	3- Strong	; 2-Meo	dium; 1	-Low										

BoS Chairman Signature

Assessment Pattern

Bloom's Category	Continuous Ass (Mar		Model Examination (Marks)
	1	2	(WIALKS)
Remember	10	10	10
Understand	20	20	20
Apply	20	20	40
Analyze	10	10	30
Evaluate	-	-	-
Create	-	-	-

Syllabus

	K. S	. Rangasa	my College	of Technolo	ogy – Auto	nomous (R2	2022)	
				- தமிழரும் தெ				
		Hours/Wee			Credit	-	aximum Marks	
Semester	L	Т	Р	Total hrs	С	CA	ES	Total
	1	0	0	15	1	100	-	100
நெசவு மற்று	ம் பானைத் தெ	ாழில்நுட்பம்	:					
சங்க காலத்தி	ல் நெசவுத் தெ	ாழில் - பா	னைத் தொழி	ல்நுட்பம் - கரு	ப்பு சிவப்பு	பாண்டங்கள் -	· பாண்டங்களில்	3
கீறல் குறியீடு	கள்.							
வடிவமைப்பு	மற்றும் கட்டிட	த் தொழில்	தட்பம்:					
சங்க காலத்தி	ல் வடிவமைப்	பு மற்றும் க	ட்டுமானங்கள	ர் & சங்க காலத	ந்தில் வீட்டும	ப் பொருட்களி	ல் வடிவமைப்பு -	
சங்க காலத்	ல் கட்டுமான	ாப் பொருட	களும் நடுக	ல்லும் - சில	ப்பதிகாரத்தி	ில் மேடை அ	அமைப்பு பற்றிய	
விவரங்கள் –	மாமல்லபுரச்	சிற்பங்களு	ம், கோவில்க	ளும் - சோழர்	காலத்துப்	பெருங்கோயில்	ல்கள் மற்றும் பிற	3
வழிபாட்டுத்	தலங்கல் - நாய	பக்கர் காலக்	கோயில்கள்	– மாதிரி கட்ட	_மைப்புகள்	பற்றி அறிதல்,	மதுரை மீனாட்சி	
அம்மன் ஆ	லயம் மற்றும்	திருமலை	நாயக்கர் ம	ஹால் - செட்	.டிநாட்டு வ	ீடுகள் - பிரிப	்டிஷ் காலத்தில்	
சென்னையில்	இந்தோ - சா	ரோசெனிக் க	கட்டிடக் கனை	w.				
உற்பத்தித் தெ	எழில் நுட்பம்:							
கப்பல் கட்டு	ம் கலை – உே	லாகவியல் -	இரும்புத் தெ	தாழிற்சாலை -	இரும்பை	உருக்குதல், எ	ஃகு - வரலாற்றுச்	
சான்றுகளாக	செம்பு மற்றும்	தங்க நாணய	 பங்கள் - நாண	ாயங்கள் அச்சடி	.த்தல் - மணி	ி உருவாக்கும் சே	தொழிற்சாலைகள்	3
- கல்மணிகள்	, கண்ணாடி ப	மணிக <mark>ள் -</mark> சு	டுமன் மனி	கள் - சங்கு ம	ணிகள் - எலு	<u>ர</u> ம்புத் துண்டுக	ள் - தொல்லியல்	
சான்றுகள் –	சிலப்பதிகாரத்த	நில் மணிகள்	ின் வகைகள்.	-				
வேளாண்மை	மற்றும் நீர்பாச	னத் தொழி	ல் நுட்பம்:					
அணை, ஏரி,	குளங்கள், ம	தகு - சோப	ற ர் காலக் குமு	ழித் தூம்பின்	முக்கியத்து	வம் - கால்நன	டை பராமரிப்பு -	
கால்நடைகஞ	, நக்கான வடிவ	பமைக்கப்ப	்ட கிணறுக	கள் – வேவ	ான்மை ப	மற்றும் வே ள	ாண்மை சார்ந்த	3
செயல்பாடுக	ள் - கடல்சார் <u>அ</u>	டிறிவு - மீன்	வளம் - முத்து	மற்றும் முத்து	க்குளித்தல் -	பெருங்கடல் கு	தறித்த பண்டைய	
அறிவு - அறில	வுசார் சமூகம்.				-		_	
••	ிழ் மற்றும் கன							
							செய்தல் - தமிழ்	3
மென்பொரும	் கள் உருவாக்க	கம் - தமிழ்	இணையக் க	ல்விக்கழகம் -	தமிழ் மின்	நூலகம் - இன	ணையத்தில் தமிழ்	3
அகராதிகள் -	சொற்குவைத்	திட்டம்.						
Total Hours	i							15
Text Book(1							
1. ^{தமிழச}	வரலாறு - ப	க்களும் பல	ன்பாடும் கே.	கே . பிள்ளை	r (வெளியீடு	: தமிழ்நாடு ப	ாடநூல் மற்றும் க	ல்வியியல்
் பணிக	ள் கழகம்).							
	ித்தமிழ் – முன	னைவர் இல.	சுந்தரம். (விச	கடன் பிரசுரம்)				
3. கீழடி	- வைகை நதிக்	கரையில் சா	பக்கால நகர ந	எகரீகம் (தொ	ல்லியல் து	ற வெளியீடு).		
4. பொரு	நை - ஆற்றங்க	ரை நாகரீகப	் (தொல்லிய	ல் துறை வெள்	ியீடு).			

Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023

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5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print).
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute
0.	of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by:
1.	International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute
0.	of Tamil Studies.)
0	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
	Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
9. 10.	Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author). Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and
	Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).

General

BoS Chairman Signature

60 ME 0P1	FABRICATION AND REVERSE ENGINEERING LABOTORY	$\left[\right]$	Category	L	т	Ρ	Credit
	(COMMON TO ALL BRANCHCES)		ES	0	0	4	2
Objective							

- To acquire skills in operating hand tools and instruments. •
- To provide hands-on training on Carpentry, Sheet metal, Fitting and Welding. •
- To provide hands-on training on household wiring and electronic circuits. •
- To offer real time activity on plumbing connections in domestic applications.
- To provide hands-on activities on dismantling, and assembling the Home Appliance, Center lathe operations, ٠ computer's internal components and peripherals.

Prerequisite

Nil

Course Outcomes

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

CO1	Per	Perform power tools operations.											Appl	у
CO2	2 Mał	Make a wooden model using carpentry Process											Apply	
CO3	3 Mał	Make a model using sheet metal, filing and joining a MS Plate											Apply	
CO4	Rep	Repair and Maintenances of water lines for home applications											Apply	
CO5	Trouble shoots the electrical and electronic circuits, Electrical Machines and realizes the reputation of house wiring, home Appliance, computer internal components and peripherals.											Apply		
Mapping with Programme Outcomes														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3		2		3		3	2	3		2	3	3	2

003	FUI	FUZ	FUJ	F04	FUJ	FUU	FUI	FUO	F O 3	FUIU	FUII	FUIZ	1 001	1002
CO1	3		2		3		3	2	3		2	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	2	3	3	2
CO4	3	3	3	2	3	3	2	3	3			3	3	2
CO5	3	3	3	3	3	2	2	2	3	2	2	3	3	2
3- Strong; 2-Medium; 1-Low														

Syllabus

Performs of Power Tools

Drilling in different Walls and Materials Fitting of Hand shower mount, Shirt hanger, Towel hanger and Pipe with clamps.

Carpentry Process

Design and Development of Wooden Model using the Carpentry Process T / Cross Joint / different joints

Sheet Metal and Filling Process

Design and Development of Metal Model - Make a Tray Components using Sheet Metal Process and Mating of Square joint in MS Plate using the Filling Process

BoS Chairman Signature

Welding Process

Fabrication of Models with MS Plate using Arc Welding- Lap Joint, Butt Joint, T Joint

Plumbing Process

Repair and Maintenances of Pipe Fitting for Home Applications Study of plumbing tools, assembly of G.I. pipes/ PVC and pipe fittings, cutting of threads in G.I. Pipes by thread cutting dies.

Residential house wiring

Design and Excusion of Residential house wiring With and Without UPS- 1 BHK - 2 BHK. Design and fabrication of domestic LED lamps - Circuit designing (calculation of components)

Electronic Circuit wiring

PCB fabrication - Soldering - Assembling of Audio Amplifiers- Connecting USB/Bluetooth MP3 player board -

Connecting Volume controllers - Connecting bass & treble filter boards - Connecting Surround and sub-woofer filter board

Assembling and dismantling of Electronics Machines

Iron box, Induction stove, Water heater, Mixer, Table fan, Ceiling fan

Study Exercises

Demonstration of Centre Lathe operations Facing, Turning, and drilling and its components.

Assemble and dismantle of Vacuum Cleaner / Refrigerator and its components

Computer Hardware Study Exercises

Identify internal components of computer - Assemble and dismantle desktop computer systems

List of Experiments

1. Fitting of Wall mounting Parts using Power Tools

- a) Drilling in different Walls and Materials
- b) Fitting of Hand shower mount, Shirt hanger, Towel hanger and Pipe with Clamps.

2. Making of Wooden model using the Carpentry Process

- a) T / Cross Joint
- b) Mortise and Tenon Joint / different joints

3. Making of Metal Model

- a) Making of Components using Sheet Metal Process
- b) Mating of Components using the Filling Process

4. Fabrication of Welded model

5. Repair and Maintenance of Pipe Fitting for Home Applications

- a) Assembly of GI pipes/PVC and Pipe Fitting
- b) Cutting of Threads in GI pipes by thread Cutting Dies

6. Assembling and dismantling of

a) Iron box

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- b) Induction stove
- c) Water heater
- d) Mixer
- e) Table fan
- f) Ceiling fan

7. Design and Execution of Residential house wiring

- a) 1 BHK
- b) 2 BHK

8. Design and Execution of Residential house wiring with UPS.

- a) 1 BHK
- b) 2 BHK

9. Design and fabrication of domestic LED lamps

- a) Circuit designing (calculation of components)
- b) PCB fabrication
- c) Soldering

10. Assembling of Audio Amplifiers

- a) Connecting USB/Bluetooth MP3 player board
- b) Connecting Volume controllers
- c) Connecting bass & treble filter boards
- d) Connecting Surround and sub-woofer filter board

Study Exercises

- 1. Demonstration of Centre Lathe and its operations like Facing, Turning, and drilling.
- 2. Dismantle and Assemble of Vacuum Cleaner / Refrigerator.
- 3. Study of components of computer. Dismantle and assemble of desktop computer systems

Course Designers

- 1. Mr.S Sakthivel <u>sakthivel_s@ksrct.ac.in</u>
- 2. Dr. D Sri Vidya srividhya@ksrct.ac.in
- 3. Mr. K. Raguvaran raguvaran@ksrct.ac.in

60	cs	0P1
00	60	UF I

Category	L	Т	Ρ	Credit
ES	0	0	4	2

- 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

Prerequisite

NIL

Course Outcomes

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

CO1	Read, display basic information and use 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	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02
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-Low														

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 1D Array manipulation.
- 5. Implementation of 2D Array manipulation.
- 6. Implementation of String operations.

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- 7. Implementation of Simple 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.

Course Designers

1. Dr.P.Kaladevi

- kaladevi@ksrct.ac.in

Category	L	Т	Ρ	Credit
CGC	0	0	2	0

- 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

Prerequisite

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	PO1	PO2	PO 3	РО 4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								2	3	3	2	3	3	3
CO2								2	3	3	2	3	2	2
CO3								2	3	3	2	3	3	3
CO4								2	3	3	2	3	2	2
CO5								2	3	3	2	3	3	3
3- Stro	3- Strong; 2-Medium; 1-Some													

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Syllabus

		K.S.Ranga			echnology –		us R2022				
					er Skill Develo						
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Semeste	er —	Hours	/Week	_	Total hrs	Credit		Maximum Ma			
		<u>L</u>	Т 0	P 2	45	C 0	CA 100	ES 00		<u>Total</u> 100	
.istenin	a –	0	0	2	40	0	100	00		100	
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experien podcasts	oductio nces / e s/interv	n; Introducing a events; Intervie views - Picture d ini presentation	wing a cel escription;	lebrity; re giving ins	porting / and struction to use	summarizin the product	ig of doci	umentarie	es /	[5]	
context), ravelogi	ading v , socia ues, ne	s Silent reading I media mess wspaper report Newspaper arti	ages relevs s and trave	ant to teel & techni	echnical conte cal blogs - Adv	exts and e /ertisement	emails - s, gadget	Biograph reviews a	ies,	[5]	
on an eve	ent (fiel king; re	informal and for d trip etc.) - Defi ecommendation exting	initions; ins	structions;	and product /p	orocess des	cription - I	Note-mak	king	[5]	
	Comp	rehension (MC0 rror Detection –						narizing a	and	[5]	
								Total Ho	urs	25	
Referer	nce(s):										
		or Engineers & y, 2020	Technolog	gists' Orie	nt Blackswan	Private Ltd.	Departm	ent of En	ıglisł	n, Anna	
2. No	orman	Lewis, 'Word ary Book', Pengi				lete Handt	book for	Building	a S	uperio	
		McCarthy and F y Press, N.York		ell, 'Engli	sh Vocabulary	in Use: Up	oper Interi	mediate',	Can	nbridge	
		Narayanan, 'A C		ok on Tech	nnical English'	Scitech Put	olications	(India) Pv	/t. Lt	d. 2020	
Co	urse C	ontents and Le	ecture Sch	nedule							
	S.No			Тор	Dic			No.o Hour			
F.	1							nour	5		
	1									1	
	1.1	Listening for a	eneral info	ormation a	ind Specific de	tails		1			

1.	Listening for general information and Specific details	1
1.	Listening to podcasts, documentaries and interviews with celebrities	1
1.	Narrating personal experiences	1

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1.4	Reading relevant to technical contexts and emails	1
1.5	Listen to a product and process descriptions	1
2	Speaking	
2.1	Self-introduction	1
2.2	Summarizing of documentaries & Picture Narration	1
2.3	Small Talk; Mini presentations	1
2.4	Group discussions, debates & role plays.	1
2.5	Group discussions	1
3	Reading	
3.1	Loud reading vs Silent reading, Skimming & Scanning of passages	1
3.2	Reading social media messages relevant to technical contexts	1
3.3	Reading newspaper reports and travel & technical blogs	1
3.4	Reading advertisements, gadget reviews and user manuals	1
3.5	Reading newspaper articles and journal reports	1
4	Writing	
4.1	Writing letters – informal and formal	1
4.2	Paragraph Texting	1
4.3	Definitions and instructions	1
4.4	Note-making / Note-taking	1
4.5	Essay texting	1
5	Verbal Ability	
5.1	Reading Comprehension (MCQs) and Cloze Test	1
5.2	Sequencing of sentences	1
5.3	Paraphrasing and Summarizing	1
5.4	Error Detection and Spelling Test	1
5.5	Prepositions	1
	Total	25

Course Designer

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

		Category	L	Т	Ρ	Credit
60 CG 0P6	INTERNSHIP	CGC	0	0	0	1/2/3

- To expose the students to understand the processes at industry and R&D
- To identify the existing and evolving problems at industry
- To solve the problems at industry and environment need
- To prepare the report of solved problems for further action
- To summarize the data in a presentation mode

Prerequisite

Nil

Course Outcomes

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

CO1	Identify the root causes and problem-solving process	Understand
CO2	design the experiment from literature survey	Analyze
CO3	execute and trouble shoot through pilot study	Apply
CO4	interpret the raw and calculated data to conclude the problem	Apply
CO5	writing the reports and documenting the data for publication	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO	PO	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
			3	4										
CO1	3	3	2	3	3	2			3			3	3	3
CO2	3	3	3	3	3	2						3	2	2
CO3	3	3	2	3	3	2						3	3	3
CO4	3	3	2	3	2	2						3	2	2
CO5	2	3	2	3	2	2		3		3	3	3	3	3
3- Stro	3- Strong; 2-Medium; 1-Some													

1. Students undergo internship during second semester summer vacation (minimum of two weeks)

- 2. Students should submit an internship / innovation project report along with observation note book in the beginning of semester
- 3. The observation note book of the students after the training with their personal comments / suggestions and attestedby the trainer at industry or R&D
- 4.A technical presentation to be done by the students to the committee, immediately after submission of the report at the beginning of semester
- 5.A committee constitute a senior faculty, HoD and along with industry person

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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 2022-2023 onwards)

THIRD SEMESTER

	0		Duration	-	ige of Mar	'ks	Minimum Mark for Pass in End Semester Exam	
S.No.	Course Code	Name of the Course	of Internal Exam	Continuous Assessment *	End Semeste r Exam **	Max. Marks	End Semester Exam	Total
	1 1		THEOF	RY				
1	60 MA 012	2 Fourier Transform and Numerica Methods	al 2	40	60	100	45	100
2	60 BT 301	Biochemistry	2	40	60	100	45	100
3	60 BT 302	2 Microbiology	2	40	60	100	45	100
4	60 BT 303	3 Cell Biology and Genetics	2	40	60	100	45	100
5	60 BT 304	Principles of Chemical Engineering	2	40	60	100	45	100
6	60 BT 305	5 Molecular Biology	2	40	60	100	45	100
			PRACTIO	CAL				
7	60 BT 3P	Biochemistry Laboratory	3	60	40	100	45	100
8	60 BT 3P2	2 Microbiology Laboratory	3	60	40	100	45	100
9	60 CG 0P:	2 Career Competency 2 Development – II	3	100	-	100	-	-
10	60 CG 0P	6 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 60 marks for the award of terminal examination marks

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60 MA 012	FOURIER TRANSFORM AND NUMERICAL METHODS	Category	L	Т	Ρ	Credit
00 WA 012	NOMERICAL METHODS	BS	3	<mark>1</mark>	0	4

- To provide exposure and ability to use Fourier series.
- To familiarize the basic concepts of Fourier transform.
- To get exposed to various techniques to solve equations numerically.
- To know the concepts of interpolation and numerical integration.
- To learn the basics concepts of initial value problems.

Prerequisite

Nil

Course Outcomes

At the end of the course, the students will be able to

CO1	Obtain the Fourier series expansion for the periodic functions.	Remember Understand Apply
CO2	Apply Fourier transform techniques for the continuous functions.	Remember Understand Apply
CO3	Employ various iteration techniques for solving algebraic, transcendental and system of linear equations.	Remember Understand Apply
CO4	Apply different techniques to find the intermediate values and to evaluate single definite integrals.	Remember Understand Apply
CO5	Compute the solution for initial value problems using single and multi-step methods.	Remember Understand Apply
Mappii	ng with Programme Outcomes	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2							3	2		
CO2	3	3	2	2	2							3	2		
CO3	3	3	3	3	2							3	2		
CO4	3	3	3	3	2							3	2		
CO5	3	3	3	3	2							3	2		
3 – Stro	3 – Strong; 2 – Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous / Tests (M		Model Exam (Marks)	End Semester Examination (Marks)		
	1 2			(Marks)		
Remember (Re)	10	10	10	10		
Understand (Un)	10	10	20	20		
Apply (Ap)	40	40	70	70		
Analyze (An)	0	0	0	0		
Evaluate (Ev)	0	0	0	0		
Create (Cr)	0	0	0	0		
Total	60	60	100	100		

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		L	T	Р		С	CA	ES	Total
	III	3	1	0	60	4	40	60	100
Diric		ries conditions - Fourier re value of a functi					e Fourier s	series - Ro	ot [9
Fou Prop	rier trar perties	ansform nsform pair - Fourie - Convolution theor	em - Parse	eval's ide	ntity.	ourier sine	and cosin	e transform	_ [9
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1040									
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Laguand Trap Num Sing Dorder and c Tex 1. 2. Refe	range's backw bezoida nerical le step Runge correcto t book Grewa Faires 2012. erence Kreys New [Grewa	and Newton's divi ard interpolation (e il, Simpson's 1/3 a Solution of Ordin methods: Taylor's e-Kutta method for or method - Adam's (s): al B.S, "Higher Eng s, J D and Burden F (s):	ded differe equal interv and 3/8 ru ary Differe series me solving firs predictor a ineering M R L, "Nume Engineering J.S, "Nume	nce inter vals)* - Tv le (single ential Equ thod - Eu at order er and corre athemation rical Methemation	vo point and the integral). Jations Iler's method - quations - Mult ctor method. cs", 43 rd Edition nods", Thomso natics", 10 th Ed	Modified E Modified E ti step meth Total Hou n, Khanna F n publicatic	Gaussian o uler's me nods: Mil urs: 45 + Publishers ons, Fourth Wiley & So	quadrature thod - Fou Ine's predic 15 (Tutoria , Delhi, 201 n Edition, N	[9] ttor [9] 1) 60 8. ew Dell _imited,
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*SDG 4 – Quality Education

S.No.	Торіс	Number of Hours	Mode of Content Delivery
1.	Fourier Series		
1.1	Dirichlet's conditions	1	Black Board
1.2	Fourier series - Even functions	2	Black Board
1.3	Fourier series - Odd functions	1	Flipped Class
1.4	Half range Fourier series	1	Black Board
1.5	Tutorial	2	
1.6	Root mean square value of a function	1	Black Board
1.7	Parseval's identity	1	Black Board
1.8	Harmonic analysis	1	Black Board
1.9	Tutorial	2	
2.	Fourier Transform		
2.1	Fourier transform pair	1	Black Board
2.2	Fourier transform of simple functions	1	Black Board
2.3	Fourier sine transform	1	Black Board
2.4	Fourier cosine transform	1	Black Board
2.5	Tutorial	2	
2.6	Properties of Fourier transform	1	Flipped Class
2.7	Convolution theorem	2	Black Board
2.8	Parseval's identity	1	Black Board
2.9	Tutorial	2	
3.	Solution of Equations and Eigen Value Problem		
3.1	Newton-Raphson method	1	Black Board
3.2	Horner's method	1	Black Board
3.3	Gaussian elimination method	1	Black Board
3.4	Gauss-Jordan method	1	Flipped Class
3.5	Tutorial	2	
3.6	Gauss-Jacobi method	1	Black Board
3.7	Gauss-Seidel method	2	Black Board
3.8	Eigen value of a matrix by Power method	1	Black Board
3.9	Tutorial	2	
4.	Interpolation and Numerical Integration		
4.1	Lagrange's divided difference interpolation	2	Black Board
4.2	Newton's divided difference interpolation	1	Black Board
4.3	Newton's forward and backward interpolations	2	Black Board
4.4	Tutorial	2	1
4.5	Two and three point Gaussian quadrature	1	Flipped Class
4.6	Trapezoidal and Simpson's 1/3 and 3/8 rules	2	Black Board
4.7	Tutorial	2	1

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5.	Numerical Solution of Ordinary Differential Equations		
5.1	Taylor series method	2	Black Board
5.2	Euler's method	1	Black Board
5.3	Modified Euler's method	1	Flipped Class
5.4	Tutorial	2	
5.5	Runge-Kutta method	2	Black Board
5.6	Milne's predictor and corrector method	1	Black Board
5.7	Adam's predictor and corrector method	1	Black Board
5.8	Tutorial	2	
	Total	60	

List of MATLAB Programs:

- 1. Generate the Fourier series of f(x) in $(-\pi, \pi)$ and (-l, l), plot and visualize.
- 2. Compute the Fourier transform of f(x), plot and visualize.
- 3. Determine the solution of Non-linear equations using Iteration methods.
- Illustrate Gauss-Jacobi and Gauss-Seidal method for system of linear equations. 4.
- Compute Newton's forward and backward interpolation method. 5.
- 6. Demonstrate Trapezoidal and Simpson's rule.
- 7. Determine the solution of first order ODE using Fourth order Runge-kutta method.
- 8. Compute the solution of ODE using Milne's and Adam's Predictor and Corrector method.

Course Designers

- 5. Mr.G.Mohan mohang@ksrct.ac.in
- 6. Ms.K.Geetha geethak@ksrct.ac.in

Category	L	Т	Ρ	Credit
CS	3	0	0	3

- To learn the basic chemical structure and biological functions of biomolecules
- To impart knowledge on role of biomolecules for orderly structures of the cells/tissues
- To illuminate the metabolism of essential biomolecules that are indispensable for life
- To dissipate the knowledge on formations of specialized products from biomolecules
- To learn the principles of bioenergetics and redox reactions of the cell

Prerequisite

Basic knowledge on bioorganic chemistry and cell structure is needed.

Course Outcomes

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

CO1	syn	identify the structure of carbohydrates and understand their classification, synthesis, essentialChemical characteristics that make them indispensable for life.												Apply
CO2		lore th abolisr		cture,	classi	ficatio	n, biol	ogical	functi	ons of	lipids a	and their	ŀ	Apply
CO3	•				and cla huma			famino	o acids	, protei	ns, vitar	mins and	A	Apply
CO4	-				etabol ed pro			ssentia	al build	ling blo	cks of li	ife and its	s /	Apply
CO5										w cellul sphoryla		:ADP rati	o /	Apply
Mappi	ng wi	th Pro	gram	me Ou	Itcome	es								
COs	PO	РО	PO	PO	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2
	1	2	3	4										
CO1	3	3			2				1	1		2	3	3
CO2	3	3							2	2		2	2	2
CO3		3	2	3	2		2		2	2		3	3	3
CO4	2		2	3			2		2	2		2	2	2
CO5		1 2 3 2 2 2 3 3												
2 Ctro	trong; 2-Medium; 1-Some													

Assessment Pattern

Bloom's Category	Asses	ntinuous sment Tests (Marks)	Model Exam (Marks)	End Sem Examination (Marks)
	1	1 2		
Remember (Re)	20	20	30	30
Understand (Un)	20	20	30	30
Apply (Ap)	20	20	40	40
Analyze (An)	0	0	0	0
Evaluate (Ev)	0	0	0	0
Create (Cr)	0	0	0	0
Total	60	60	100	100



				Fechnology – - Biochemist					
				Biotechnology					
Semester	. Hours/We	eek		Total Hrs	Credit	Ν	Maximu	ım Mar	ks
Semester	L	Т	Р	TOTALLIS	С	CA	ES		Total
III	3	0	0	45	3	40	60		100
Carbohyd Polysaccl Aerobic p	HYDRATES * Irates: Basic chemic narides, structure and pathway of glucose mo sm: Pentose phospha	function - etabolism	Anaerob	oic pathway of cid cycle - Alte	glucose me ernate path	etabolism: ways of c	Glycol arbohy	lysis - /drate	[9]
LIPIDS Lipids: st phospholi metabolis	ructure and function ipids, glycolipids, sphi m: Biosynthesis of Fat ation - Alpha and ome	ngolipids ty acid, O	and stero	oids - Lipoprot of fattyacids - B	eins: Types eta oxidatio	and fund	ctions -	Lipid	[9]
Amino a Secondar Oxidative Biosynthe	S AND VITAMINS cids: Structure and y, Tertiary and Qua degradation of amine esis of urea, conversion ne and Norepinephri	ternary s o acids: T on of ami	tructure. Transamir no acids	Properties - nation, oxidativi in to specializ	Denaturation ve deamina ced product	on and R tion, deca s: DOPA	Renatur arboxyl , Dopa	ation. ation, mine,	[9]
ormation	ACIDS * cids: Structure of nitro of phosphodiester bo nucleotides: Denovo	nds - Str	ucture of	DNA and RN	IA - Biosyr	nthesis of	Purine		[9]
carriers, s	GETICS * emical potential and sites of ATP product chemiosmotic theory,	ion, inhibi	tors. Ox	idative phospl	norylation:	structure	of AT		[5]
		-					Total I	Hours	45
2. Ber	ce(s): blman J. and Roehm tion, 2005. 'g Jeremy M.; John L. 'k, USA, 7 th edition,20	Tymoczł							
	et Donald and Judy G		chemistr	v". 4 th edition .	John Wilev	& Sons In	c 201	2.	
4. Der	nise R. Ferrier, "Bioche Jusiness, 2017.				-				ver Lav
DG 3 - E	nsure healthy lives an	d promote	e well-bei	ng for all at all	age				
Course	Contents and Lectur	e Schedu	le						
S.No		Т	opic			No Ho	.of urs	con	le of tent very

		Delivery
CARBOHYDRATES		
Carbohydrates: Basic chemical structure.	1	Board
Classification – Monosaccharide	1	Board/CM
Disaccharides, Polysaccharides, structure and function	2	Board/CM
	1	

1

1.1

1.2

1.3

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1.4	Anaerobic pathway of glucose metabolism: Glycolysis.	1	PPT/Board
1.5	Aerobic pathway of glucose metabolism: Citric acid cycle.	1	PPT/Board
1.6	Alternate pathways of carbohydrate metabolism: Pentose phosphate pathway.	1	PPT
1.7	Synthesis of carbohydrates from various sources: Gluconeogenesis.	1	PPT/TPS
2	LIPIDS		
2.1	Lipids: structure and function of fatty acids and lipids,	1	Board
2.2	classification, major lipid subclasses phospholipids, glycolipids, sphingolipids and steroids.	1	PPT/CM
2.3	- Lipoproteins: Types and functions	1	PPT/CM
2.4	Lipid metabolism: Biosynthesis of Fatty acid,	1	PPTIBoard
2.5	Oxidation of fattyacids - Beta oxidation,	1	PPT
2.6	Other types of fatty acid oxidation - Alpha and omega oxidation	1	PPT/FP
2.7	Biosynthesis of cholesterol.	1	PPT
3	PROTEINS AND VITAMINS		
3.1	Amino acids: Structure and Classification.	1	PPTIBoard
3.2	Proteins: Structure and Classification:	1	PPT/CM
3.3	Primary, Secondary, Tertiary and Quaternary structure	1	PPT
3.4	Properties - Denaturation and Renaturation.	1	Board
3.5	Oxidative degradation of amino acids: Transamination, oxidative deamination, decarboxylation,	1	PPTIBoard
3.6	Biosynthesis of urea, conversion of amino acids in to specialized products: DOPA, Dopamine, Epinephrine and Norepinephrine.	1	PPT
3.7	Vitamins: Classification, sources, functions and deficiency diseases		CM/TPS
4	NUCLEIC ACIDS		
4.1	Nucleic acids: Structure of nitrogenous bases: purines and pyrimidines,	1	Board/TPS
4.2	nucleosides, nucleotides, formation of phosphodiesterbonds -	1	TPS
4.3	Structure of DNA and RNA	1	TPS/CM
4.4	Biosynthesis of Purine and pyrimidine nucleotides- Denovo pathway	2	PPT
4.5	Biosynthesis of Purine and pyrimidine nucleotides- salvage pathway	1	PPTIBoard
4.6	Purine and pyramidine degradation	1	PPT
5	BIOENERGETICS		
5.1	Electrochemical potential and redox reaction	2	PPT/Board
5.2	Mitochondrial electron transport chain: electron carriers, sites of ATP production, inhibitors.	2	PPT/CM
5.3	Oxidative phosphorylation: structure of ATPase complex,	1	PPT/Video
5.4	chemiosmotic theory, uncouplers	1	PPT/Video
5.5	inhibitors of oxidative phosphorylation	1	PPT/Video
	Total	45	

Course Designer

1. Dr.S.Sidhra – <u>sidhra@ksrct.ac.in</u>

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Category	L	Т	Ρ	Credit
PC	3	0	0	3

- To understand the basic and history of microbiology
- To impart the knowledge about the microorganisms and its classifications
- To understand the cellular organization of microbes and its identification system
- To study the nutritional requirements for the growth of microbes
- To learn about the basics of microbial growth, mode of infection and its control

Prerequisite

NIL.

Course Outcomes

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

CO1		elop th em in t					y, cont	ributio	ns and	various	classifi	ication	Арр	ly
CO2		Build the basics knowledge about microscopy techniques and its identificati Ising different staining methods										ication	Арр	ly
CO3	Ana	Analyze the structural organization and multiplication of Microorganism										۱	Analy	/ze
CO4	Ider	Identify the nutritional requirements of microbial growth										Арр	ly	
CO5	bior	Examine the various industrial application of microorganisms and role in bioremediation justify the different processes of sterilization, disinfection and action mechanism of antimicrobial agents										Analy	/ze	
Mappi	ing wi	th Pro	gramn	ne Out	tcome	S								
COs	P01	PO2	PO	PO	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
			3	4										
CO1	3	2	2	2	3	3	2	3	2	3	3	3	3	3
CO2	3	3	2	2	2	2	2	3	2	2	1	3	2	2

CO5	3	3	2	2	
3- Str	ong; 2-	Mediu	m; 1-S	ome	

Assessment

CO3

CO4

	Marks)	Model Exam (Marks)	End Sem Examination (Marks)	
1	2			
20	20	20	20	
20	20	20	20	
20	20	40	40	
0	0	20	20	
0	0	0	0	
0	0	0	0	
60	60	100	100	
	1 20 20 20 0 0 0 0	1 2 20 20 20 20 20 20 0 0 0 0 0 0 0 0	1 2 20 20 20 20 20 20 20 20 20 20 20 40 0 0 20 0 0 0 0 0 0 0 0 0	

Passed in BoS Meeting held on 21/11/2023

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		6	50 BT 302	- Microbiolog	ЗУ				
				Biotechnology					
0	Hours/	Week		Tatallina	Credit		Maximum	n Mar	ks
Semest	L L	Т	Р	Total Hrs	С	CA	ES		Total
	3	0	0	45	3	40	60		100
NTRO	DUCTION TO MICRO	BIOLOGY		-	_	_			
_eeuwe	and scope of microl enhoek, Louis Pasteur etic, numerical, phylog inative bacteriology.	r, Robert Ko	och, Elie M	letchnikoff and	d Fleming -	Classifica	tion syste	ems	[9]
Microso nicroso	SCOPY AND IDENTI copy-Simple and com cope, Identification of nd AFB) and special (c	pound micro bacteria - S	oscope, P Stain and s	hase contrast, staining technic	ues - Simp	le, Differe			[9]
Morpho	TURAL ORGANIZAT ology and reproduction nd lysogeny), algae, m	n – Bacteria	, Actinom	ycetes, Archea	abacteria, v	iruses - ba	acterioph	age	[9]
lutrition	BIAL NUTRITION AN			ria algae and	funai - Mar	dia prepar	ation o	olid	
quid, a nedia, ime, m environr	nal requirements and nd semisolid, Types Pure culture technique ean generation time mental factors on memental factors on mement of microbial groups	classification of media- Sources - anaero (g) and me nicrobial groups	n of bacte elective, E obic cultur ean growt owth - p	Enriched, Basa re techniques h rate constar H, temperatu	II, Simple, C - Kinetics o nt (k) - cale	Complex a of growth culations-	and Synth - genera Influenc	netic ation e of	[9]
iquid, a nedia, ime, m environr neasure CONTR Steriliza disinfect nicroorg	nal requirements and nd semisolid, Types Pure culture techniqu ean generation time mental factors on m	classification of media- Se ues - anaero (g) and me nicrobial gr owth - cell m ANISMS * - Physical n fficient test and mode o	n of bacte elective, E obic cultur ean growth owth - p nass and o nethods a t, sterility of actions o	Enriched, Basa re techniques h rate constar H, temperatu cell numbers. and Chemical n testing- pre	II, Simple, C - Kinetics on th (k) - calo re, pressu methods; a eservation	Complex a of growth culations- re, oxyge ssessmer and mai	and Synth - genera Influence an and s ntof chem ntenance	netic ation e of salt- nical e of	[9]
quid, a nedia, me, m neasure CONTR Steriliza lisinfec nicroore drug re	nal requirements and nd semisolid, Types Pure culture technique ean generation time mental factors on me ement of microbial gro CL OF MICROORGA ation and disinfection tant - phenol co-ef ganisms. Mechanism esistance – antibiotic	classification of media- Se ues - anaero (g) and me nicrobial gr owth - cell m ANISMS * - Physical n fficient test and mode o	n of bacte elective, E obic cultur ean growth owth - p nass and o nethods a t, sterility of actions o	Enriched, Basa re techniques h rate constar H, temperatu cell numbers. and Chemical n testing- pre	II, Simple, C - Kinetics on th (k) - calo re, pressu methods; a eservation	Complex a of growth culations- re, oxyge ssessmer and mai	and Synth - genera Influence an and s ntof chem ntenance	netic ation e of salt- nical e of ents	
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quid, a nedia, me, m nvironr neasure contra teriliza isinfec nicroorg drug re Textbo 1 P 2 P X Refere 1. B	nal requirements and nd semisolid, Types Pure culture technique ean generation time mental factors on mement of microbial gro CL OF MICROORGA ation and disinfection tant - phenol co-eff ganisms. Mechanism esistance – antibiotic Cok(s): Prescott, L.M., Harley, Publications, New Delh Pelczar, M.J., Chan, E. AcGraw- Hill Publication	classification of media- Se ues - anaero (g) and me nicrobial gro owth - cell m ANISMS * - Physical n fficient test and mode o sensitivity te J.P. and Kle ni, India, 201 C.S. and Kle ons, New De	n of bacte elective, E obic cultur ean growth owth - p nass and o nethods a t, sterility of actions o est. ein, D.A. " 10. rieg, M.R. elhi, India,	Enriched, Basa re techniques h rate constar H, temperatu cell numbers. and Chemical n testing- pre of anti-bacteria Microbiology", "Microbiology 2005.	II, Simple, C - Kinetics of nt (k) - calo re, pressu methods; a servation al, anti-fung 7th Edition : An applica	Complex a of growth culations- re, oxyge ssessmer and mai al and ant al and ant	and Synth - genera Influence and sent and sent intof cherrent ntenance i-viral age Total Ho Graw-Hill sed Approa	netic ation e of salt- nical e of ents Durs I ach".	[5] 45 Tata
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*SDG 3 - Ensure healthy lives and promote well-being for all at all age

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Course Contents and Lecture Schedule

S.No	Торіс	No.of	Mode of content
		Hours	Delivery
<u>1</u> 1.1	INTRODUCTION TO MICROBIOLOGY History and scope of microbiology - basic concepts	1	PPT
1.2		1	PPT
1.2	Spontaneous generation thoery Contributions of Leeuwenhoek Louis Pasteur, Robert Koch in	2	PPT
	microbiology		
1.4	contributions of Elie Metchnikoff and Fleming in the field of microbiology	2	PPT
1.5	Classification systems - phenetic, numerical, phylogenetic, major characteristics used in taxonomy	2	Board
1.6	Bergey's manual of determinative bacteriology	1	Board
2	MICROSCOPY AND IDENTIFICATION OF MICROBES		
2.1	Microscopy-Simple and compound microscope	1	PPT
2.2	Phase contrast, Dark field, Fluorescent, Electron microscope	2	PPT
2.3	Identification of bacteria - Stain and staining techniques	2	Flipped Class
	Č i		
2.4	Simple, Differential (Gram's, spore and AFB) and special (capsule staining, flagellar staining)	3	PPT
2.5	fungal staining	1	PPT
3	STRUCTURAL ORGANIZATION AND MULTIPLICATION OF MICROBES		
3.1	Morphology and reproduction – Bacteria, Actinomycetes, Archeabacteria	2	PPT
3.2	Morphology and reproduction viruses - bacteriophage (lytic and lysogeny)	2	PPT
3.3	Morphology and reproduction - algae, microalgae	2	PPT
3.4	Morphology and reproduction - fungi, yeast, lichens, protozoan	2	PPT
3.5	Morphology and reproduction - lichens, protozoan	2	PPT
4	MICROBIAL NUTRITION AND GROWTH		
4.1	Nutritional requirements and classification of bacteria, algae and fungi	1	Board
4.2	Media preparation – solid, liquid, and semisolid	1	Board
4.3	Types of media- Selective, Enriched, Basal, Simple, Complex and Synthetic media	1	Board
4.4	Pure culture techniques - anaerobic culture techniques	1	Board
4.5	Kinetics of growth - generation time, mean generation time (g) and mean growth rate constant (k) – calculations		Board
4.6	Influence of environmental factors on microbial growth - pH, temperature, pressure, oxygen and salt	1	Board
4.7	measurement of microbial growth - cell mass and cell numbers	1	Board
5	CONTROL OF MICROORGANISMS		
5.1	Sterilization and disinfection	1	Flipped Class
5.2	Physical methods and Chemical methods	2	PPT
5.3	Assessmentof chemical disinfectant- phenol co-efficient test, sterility testing	2	PPT
5.4	Preservation and maintenance of microorganisms	1	PPT
5.5	Mechanism and mode of actions of anti-bacterial, anti-fungal	2	PPT
5.6	Anti-viral agents - drug resistance	2	PPT
5.7	Antibiotic sensitivity test	1	PPT
5.7	Total	45	

Course Designer

Dr.Swathy J S 1.

- swathy@ksrct.ac.in

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Category	L	Т	Ρ	Credit
PC	3	0	0	3

- To build the knowledge on cell structure and functions of prokaryotes and eukaryotes at Molecular level
- To provide an insight on the process of eukaryotic cell division, regulation of cellular processes via signaling molecules and cell cycle regulation
- To impart the concept of Mendelian genetics and gene interactions
- To learn structure of chromosomes, Ploidisim and concept of mutation in genetics
- To understand the concepts in population genetics and its application for species analysis

Prerequisite

Basic biology

Course Outcomes

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

CO1	des	cribe a	bout c	ell orga	anelles	and t	ranspo	ort of m	olecul	es acros	ss mem	brane	Apply	
CO2		uss th ular co			and fur	nctions	of pr	okaryo	tic and	d eukar	yotic ce	ells and	Ар	ply
CO3	expl	explain the concept of mendelism and chromosomal theory Re											Reme	ember
CO4		describe in techniques in cytogenetics and types of mutations with the concept of cancer										Ap	ply	
CO5	just	justify the importance of population genetics and evolution										Ар	ply	
Mappi	i ng w i	th Pro	gram	ne Ou	tcome	s								
COs	PO	PO2	PO	PO	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2
	1		3	4										
CO1	3	2	2	3									3	3
CO2	3	2	2	2	2	2		1					2	2
CO3	2	2	1	1	2	2	2	1	3		3	2	3	3
CO4	2	2	2	3	2	1	1	3	3			2	2	2
CO5	3	3	1	1	1	2	1	1		3	2	3	3	3
3- Stro	ong: 2	-Mediu	im; 1-S	Some										•

Assessment pattern

Bloom's Category	Asses	ntinuous sment Tests Marks)	Model Exam (Marks)	End Sem Examination (Marks)
	1	2		
Remember (Re)	20	20	30	30
Understand (Un)	20	20	30	30
Apply (Ap)	20	20	40	40
Analyze (An)	0	0	0	0
Evaluate (Ev)	0	0	0	0
Create (Cr)	0	0	0	0
Total	60	60	100	100

BoS Chairman Signature

	_ _			Fechnology – Biology and G		US N2022			
				Biotechnology					
D	Hours/W				Credit		Maximum	Marks	
Semester	L	Т	Р	Total Hrs	С	CA	To	otal	
III	3	0	0	45	3	40	60	1(00
Cell and ce cell wall, E ranslation (chloroplast Mitochondr	D CELL ORGANEL III organelles; cell m Endoplasmic Reticu modifications, Ve ts and vacuoles), N ia and chloroplast, small molecules - a	nembranes Ilum, Golç esicular T Nucleus: s cell perme	gi comple ransport structure (eability - (ex and their r in Eukaryot of nuclear por concentration	ole in prot ic cells, e and nuc gradient ar	tein sortin Lysosomo lear-cytos nd partitio	ng and p es, Plast sol transp	ost ids ort,	[9]
The Cell n Molecular n	PRT ACROSS CELI nembrane- compose nodels of cell membranes, Cell cycle; Molecu	sed of pro prane, cell	oteins, lip permeab	pids and carb pility and cell di	ohydrates,		•		[9]
Mendel's pr Comb path and colour experiments	M AND THE CHRO rinciples: Mendel's e rerns in fowls, Comp ed genes in fowls s- Hershey & Cha at Assortments (Tes	experiment experimentary s, simple ase, Avery	ts, segreg genes - F problems /, McLeo	gation, Gene in Flower colour ir s. Identification d etc., Multipl	n sweet pea n of genei le alleles a	as, Epistas tic mater and grou	sis- Inhibit ial, classi ps antige	ory cal	[9]
-	and pedigree analy			oss), Sex deter	mination, E)osage co	ompensati		
Variation i chromosor	and pedigree analy IETICS AND MUTA n chromosomal str nal numbers: ane sis, lonizing and non	vsis. TIONS * ucture: de euploidy, (eletion, in euploidy,	version, transl polyploidy.	ocation, du Autations:	plication.	variation mutatior	in is,	[9]
Variation i chromosor mutagenes POPULAT Hardy-Wein population a	IETICS AND MUTA n chromosomal str nal numbers: ane	vsis. TIONS * ucture: de euploidy, d i-ionizing r ND EVOLU Extensions populatior	eletion, in euploidy, adiation, a JTION of Hard	version, transl polyploidy. M Ames test, Car ly- Weinberg o s. Mutation and	ocation, du Autations: ncer biology equilibrium, Migration s	iplication. types of c Cancer non-ran size. Natu	variation mutatior and its typ dom mati	in is, es	[9]
Variation i chromosor mutagenes POPULAT Hardy-Wein population a Evolution: D	IETICS AND MUTA n chromosomal str mal numbers: ane sis, lonizing and non ION GENETICS AN berg equilibrium, E analysis, Models for parwinian evolution,	vsis. TIONS * ucture: de euploidy, d i-ionizing r ND EVOLU Extensions populatior	eletion, in euploidy, adiation, a JTION of Hard	version, transl polyploidy. M Ames test, Car ly- Weinberg o s. Mutation and	ocation, du Autations: ncer biology equilibrium, Migration s	iplication. types of c Cancer non-ran size. Natu	variation mutatior and its typ dom mati	in ns, es ng, on.	
Variation i chromosor mutagenes POPULAT Hardy-Wein population a Evolution: D Textbook(IETICS AND MUTA n chromosomal str mal numbers: ane sis, lonizing and non ION GENETICS AN berg equilibrium, E analysis, Models for parwinian evolution,	vsis. ATIONS * ucture: de euploidy, o i-ionizing r ND EVOLU Extensions populatior Speciatior	eletion, in euploidy, adiation, <i>i</i> JTION of Hard genetics n, Genetic	version, transl polyploidy. M Ames test, Car y- Weinberg e Mutation and c variation and	ocation, du Autations: ncer biology equilibrium, Migration s Sociobiolo	plication. types of r: Cancer non-ran size. Natu gy.	variation mutatior and its typ dom mati ral selection Total Ho	in is, es ng, on. urs	[9]
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Variation i chromosor mutagenes POPULAT Hardy-Wein bopulation a volution: D Textbook(I. Dr. Ajc 2018 2. Phillip Januar Reference 1. Albert Garla	IETICS AND MUTA n chromosomal str nal numbers: ane sis, lonizing and non ION GENETICS AN berg equilibrium, E analysis, Models for parwinian evolution, Sheeler and Don ry 2009	vsis. ATIONS * ucture: de suploidy, d i-ionizing r ND EVOLU Extensions population Speciation f Genetics ald E. Bia _ewis, J., F ork, 2002	eletion, in euploidy, adiation, a JTION of Hard of Hard of Genetics of, Genetics of, ISBN: 9 anchi, Ce	version, transle polyploidy. M Ames test, Car y- Weinberg e s. Mutation and c variation and 78-93-84294-1 II and Molecul Roberts, K., and	ocation, du Autations: neer biology equilibrium, Migration s Sociobiolo 1-3 Pages lar Biology	iplication. types of c Cancer non-ran size. Natu gy. 1298 Se , 3ed Pa 3ed Pa	variation mutatior and its typ dom mati ral selection Total Ho cond Edition	on, in is, es ng, on. urs on: - 1,	[9]
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*SDG 3 - Ensure healthy lives and promote well-being for all at all age

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Course Contents and Lecture Schedule

S.No	Торіс	No.of Hours	Mode of content Delivery
1	CELL AND CELL ORGANELLES		
1.1	Cell and cell organelles	2	BB
1.2	Cell membranes (chemical composition, organization and fluidity), Plant cell wall	1	PPT
1.3	Endoplasmic Reticulum, Golgi complex and their role in protein sorting and post translation modifications	1	PPT
1.4	Vesicular Transport in Eukaryotic cells, Lysosomes, Plastids (chloroplasts and vacuoles), Nucleus: structure of nuclear pore and nuclear-cytosol transport	1	BB
1.5	Mitochondria and chloroplast, cell permeability - concentration gradient and partition coefficient	2	Flipped Class
1.6	transport of smallmolecules - active, passive, ion channels and facilitated diffusions.	2	PPT
2	TRANSPORT ACROSS CELL MEMBRANES AND CELL CYCLE		
2.1	The Cell membrane- composed of proteins	1	PPT
2.2	Lipids and carbohydrates	2	Flipped Class
2.3	Membrane proteins, Molecular models of cell membrane, cell permeability	2	PPT
2.4	Cell division: different stages of Mitosis and Meiosis,	3	GD/ quiz
2.5	Cell cycle; Molecules that control cell cycle.	1	PPT
3	MENDELISM AND THE CHROMOSOMAL THEORY		
3.1	Mendel's principles: Mendel's experiments, segregation, Gene interactions.	2	BB
3.2	supplementary genes - Comb patterns in fowls, Complementary genes - Flower color in sweet peas	2	PPT
3.3	Epistasis- Inhibitory and colored genes in fowls, simple problems. Identification of genetic material,	2	PPT
3.4	classical experiments- Hershey & Chase, Avery, McLeod etc., Multiple alleles and groups antigens, Independent Assortments (Test cross and back cross),	2	PPT
3.5	Sex determination, Dosage compensation, sex linkage and pedigree analysis	1	PPT
4	CYTOGENETICS AND MUTATIONS		
4.1	Variation in chromosomal structure	2	BB
4.2	deletion, inversion, translocation, duplication lonizing	2	PPT
4.3	non-ionizing radiation in Mutation	2	BB
4.4	variation in chromosomal numbers: aneuploidy, euploidy, polyploidy.	1	GD/ Role Play
4.5	Mutations: types of mutations, mutagenesis,	1	Seminar
4.6	Ames test	1	BB
4.7	Cancer biology. Cancer and its types	1	PPT
5	POPULATION GENETICS AND EVOLUTION		
5.1	Hardy-Weinberg equilibrium, Extensions of Hardy- Weinberg equilibrium,	2	BB
5.2	non-random mating, population analysis, Models for population genetics	1	BB
5.3	Mutation and Migration size	1	PPT
5.4	Natural selection Evolution: Darwinian evolution	1	PPT



5.5	Speciation	1	Seminar
5.6	Genetic variation	1	BB
5.7	Sociobiology	1	PPT
	Total	45	

Course Designer

1. Dr. J. Philip Robinson - philip@ksrct.ac.in

	PRINCIPLES OF CHEMICAL ENGINEERING	(Category	L	Т	Ρ	Credit
60 BT 304	PRINCIPLES OF CHEMICAL ENGINEERING		PC	3	1	0	4

Objective

- To impart basic knowledge in unit conversion, and basic chemical calculations.
- To understand the applications of material balance calculations.
- To impart the basics of energy balance calculations.
- To understand the fluid flow under various conditions
- To know mechanical operations and flow through columns.

Prerequisite

NIL.

Course Outcomes

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

	······································	
CO1	Review the basis of unit conversion, unit operations and unit processes	Understand
CO2	Execute material balance calculations with and without chemical reactions	Apply
CO3	Interpret energy balance calculations and enthalpy changes accompanying chemical reactions	Analyze
CO4	Understand the fluid behaviour, types and multiphase flow concept	Apply
CO5	Demonstrate size reduction equipment and principle of packed and fluidized columns	Understand
1	with Dreaman Outcomes	

Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	3	3		2						3	3	3	3
CO2	3	3	3		2						2	3	3	3
CO3	3	3	2	3	2						2	2	3	2
CO4	3	3	2	2							2	3	2	3
CO5	3	3	2	2								3	3	3
3- Stron	g; 2-M	edium;	1-Som	3- Strong; 2-Medium; 1-Some										

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Assessment pattern

Bloom's Category	Asses	ntinuous sment Tests (Marks)	Model Exam (Marks)	End Sem Examination (Marks)
	1	2		
Remember (Re)	10	10	10	10
Understand (Un)	20	10	30	30
Apply (Ap)	20	40	40	40
Analyze (An)	10	0	20	20
Evaluate (Ev)	0	0	0	0
Create (Cr)	0	0	0	0
Total	60	60	100	100

	K. S.			Technology –			2		
		60 BT 304		s of Chemical Biotechnology		ng			
	н	ours/Week	D. Tech. E		Credit	N	Maximum M	arke	
Semes	ster		Р	Total Hrs	Credit				
	3	1	г 0	45	4	40	60	<u>Total</u> 100	
)ver v xpres	mentals of Chem view of process in sing composition ions and unit proce	dustries, units ofmixtures ar	s and dimen						
Guideli	al Balance calcul ines for material ba niometry of microbi	alance calcula						s [9]	
asics apacit	y Balance calcula energy balance o ties, mean molal tic process, heat o	calculations, f heat capaciti	ies, enthalpy	•	-				
ature	o f Fluids e of fluids, classific tinuity, Bernoulli's		· ·	•			ow, equatio	n [9]	
aws c rushe	nical Operations of size reduction; er, roll crusher, ba on, Fluidization: pr	differential an II mill, hamm	d cumulative er mill. Pac	e size analysis ked bed: flow	; size reduc				
						Total Ho	urs(45+1	5) 60	
Refer	rence(s):								
	Bhatt, B.I., Vora S 2004.	.M., "Stoichior	metry", 4th E	dition, Tata Mo	Graw-Hill F	Publicatior	n, New Delł		
								ni,	
2. I	McCabe, W.L., Sr <u>McGraw – HillInc.</u>			Unit Operatior	ns In Chem	ical Engir	neering", 7t		
2. 3. \$		<u>, New Delhi, :</u> hyamal K. Sa	2004. Inyal and Sid	ddhartha Datta		0	U	h Editio	

4	4.	Gavhane K.A.," Introduction to Process Calculation", Nirali prakashan Publication, New Delhi, 2008.
!	5.	Gavhane K.A.,"Unit operations-I", Nirali prakashan Publication, 19th Edition, New Delhi, 2010.
(6.	Geankoplis C.J., "Transport Processes and Unit Operations", Prentice Hall India, New Delhi, 2002.

*SDG 7: Affordable and Clean Energy

Course Contents and Lecture Schedule

S. No	Торіс	No. of Hours	Mode of content Delivery
1	Unit-I Fundamentals of Chemical Engineering		
1.1	Over view of process industries	1	Board
1.2	Units and dimensions	1	Board
1.3	Unit conversion	1	PPT
1.4	Methods of expressing composition of mixtures and solutions	1	Flipped Class
1.5	Calculations	2	Board
1.6	Basic laws	1	PPT
1.7	Average molecular weight of gas mixture	1	Video/Board
1.8	Unit operations and unit processes	1	Board
2	Unit II Material Balance calculations		
2.1	Guidelines for material balance calculations	1	Board
2.2	Material balance without chemical reactions	2	Flipped Class
2.3	Calculations material balance without chemical reactions	1	Board
2.4	Material balance with chemical reactions	1	Board
2.5	Calculations material balance with chemical reactions	2	Board
2.6	Stoichiometry of microbial growth and product formation	1	Video/PPT
2.7	Recycling and bypass operations	1	Board
3	Unit III Energy Balance calculations		
3.1	Basic energy balance calculations	1	Board
3.2	First law of thermodynamics & Sensible and latent heat	1	Board
3.3	Heat capacities & Mean molal heat capacities	1	Board
3.4	Enthalpy changes accompanying chemical reactions	2	Video/Board
3.5	Problems on heat capacities and energy balance calculations	2	Board
3.6	Adiabatic processes	1	Board
3.7	Heat of solution and mixing	1	Board
4	Unit IV Flow of Fluids		
4.1	Nature of fluids: classification of fluids	1	Board
4.2	Concept of viscosity	1	Board
4.3	Laminar and turbulent flow	1	Video/GD
4.4	Equation of continuity	1	Board
4.5	Bernoulli's equation and applications	1	Flipped Class/Board
4.6	Friction factor	1	Board
4.7	Calculations	2	Board
4.8	Multiphase flow	1	Board

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5	Unit –V Mechanical Operations and flow through packed and fluidized bed		
5.1	Laws of size reduction	1	Board
5.2	Differential and cumulative size analysis	1	PPT
5.3	Size reduction equipment –Jaw crusher, roll crusher, ball mill, hammer mill	1	Flipped Class
5.4	Packed bed: Flow through porous media pressure drop calculations	1	Video/Board
5.5	Packed bed: Ergun's equation	1	Board
5.6	Pressure drop calculations	1	Board
5.7	Fluidization: principle and types	1	Video
5.8	Calculations	2	Board

Course Designer

1. Dr. S. Poornima - <u>spoornima@ksrct.ac.in</u>

		Category	L	Т	Ρ	Credit
60 BT 305	Molecular Biology	PC	3	0	0	3

Objective(s)

- Understand the fundamental chemistry and structure of nucleic acids.
- Explore DNA replication, transcription, and translation in both prokaryotes and eukaryotes.
- Analyze mechanisms of DNA mutation and repair.
- Understand regulation of gene expression including operon concepts.
- Apply knowledge to problem-solving scenarios in molecular biology.

Prerequisite

Chemistry, Biochemistry, Cell Biology

Course Outcomes

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

CO1	Interpret the chemistry and structure of nucleic acids, including DNA and RNA, and their role in genetic information storage.	Understand, Apply
CO2	Explain the process of DNA replication in prokaryotes and eukaryotes, and the functions of DNA polymerases.	Understand, Apply, Aanalyze
CO3	Describe the transcription process and its regulation in prokaryotes and eukaryotes.	Understand, Apply, Aanalyze
CO4	Interpret the genetic code and understand protein synthesis in both prokaryotic and eukaryotic ribosomes.	Understand, Apply, Analyze
CO5	Evaluate gene expression regulation mechanisms in prokaryotes and eukaryotes, including small noncoding RNAs and epigenetic modifications.	Understand, Apply, Analyze

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Mapping with Programme Outcomes

COURSE	со		РО											PSO	
NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3			1				2				1	2
	CO2	3	3		3	1				2		3		1	2
Molecular Biology	CO3	3	3		3	1				2		3		2	2
Biology	CO4	3	3		3	1				2		3		2	2
	CO5	3	3		3	1				2		3		2	2

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

Assessment Pattern

Bloom's Category	Continuous Ass	essment Tests (Marks)	End Semester Examination (Marks)
bioonin's category	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	20	20	40
Analyze	20	20	30
Evaluate	0	0	0
Create	0	0	0

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		IX.O.IXalig		305 – Molecula			-					
				Fech Biotechno								
Semester		Hours/	Week	Total bra	Credit		Maximum Ma					
	L	Т	Р		Total hrs. C CA ES 45 3 40 60							
	3	0	0	45	3	40	60	100				
Central dog Acids, Base nucleic acid double heli chromosom	ma of molec e pairing rule ls: Sugar-Ph x, Superco les: Nucleos	es, Hydroge nosphate ba iling, Quadr ome, Euchro	basics of nu n bonding a ckbone and ruplex Struc	Icleic acid chemi nd Base stackir base sequence tures, and RN omatin and Hete	ng in DNA ar , Secondary A Structures	nd RNA, Prima and Tertiary st	ry structure of ructures: DNA	[9]				
DNA replica functions in Prokaryotes frameshift n and mismat	replication, and Euka nutations, a ch repair.	s: Semicons DNA replica ryotes, Telo nd indels, D	tion origins a meres and NA repair pa	onservative, and and initiation, Mo telomerase, Ty athways: Base e ion and Repair.	plecular mech pes of DNA	nanisms of DNA mutations: po	A replication in bint mutations,	[9]				
RNA polymetermination, Promoters, RNA process	nd function of erase and its Terminatio enhancers a ssing, RNA of	s subunits in n of Transc	prokaryotes cription in P otion factors, lternative sp		, RNA synthe aryotic Tran	esis: Initiation, e scription and i	elongation and ts Regulation:	[9]				
importance, termination Posttranslat	to Genetic Prokaryoti of protein tional modifi	c and euka synthesis cations and	aryotic ribos in prokaryo its importano	etic code, Codo somes. Steps i otes and euka ce. de and Protein S	n translatior ryotes. Inhit	: Initiation, E	longation and	[9]				
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Reference												
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3. Krebs, J.	E., Goldstei	n, E. S. and	Kilpatrick, S	. T. (2018) Lewi	n's GENES >	(II. Jones and I	Bartlett Learning					
4. Weaver,	R. (2011) M	olecular Biol	ogy. 5th edit	ion. McGraw-Hi	II Education							
*SDG 3: Go	od Health a	nd Well bein	a									

*SDG 3: Good Health and Well-being

Course Content and Lecture Schedule

Topics	No. of hours
Chemistry and Structure of Nucleic Acids	
Central dogma of molecular biology, basics of nucleic acid chemistry: nucleosides, nucleotides, and nucleic Acids	1
	Chemistry and Structure of Nucleic Acids Central dogma of molecular biology, basics of nucleic acid chemistry:

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1.2	Base pairing rules, Hydrogen bonding and Base stacking in DNA and RNA	1
1.2		1
1.3	Primary structure of nucleic acids: Sugar-Phosphate backbone and base sequence	1
1.4	Secondary and Tertiary structures: DNA double helix, Supercoiling, Quadruplex Structures	1
1.5	RNA Structures	1
1.6	Structural organization of chromosomes	1
1.7	Nucleosome, Euchromatin, Chromatin and Heterochromatin.	1
1.8	Problem Solving: Analyzing the Structure of Nucleic Acids, Predicting DNA secondary structures and their effects on gene expression.	2
2.0	DNA Replication and Repair	
2.1	DNA replication models: Semiconservative, conservative, and dispersive	1
2.2	DNA polymerases and their functions in replication	1
2.3	DNA replication origins and initiation, Telomeres and telomerase	1
2.4	Molecular mechanisms of DNA replication in Prokaryotes and Eukaryotes	1
2.5	Types of DNA mutations: point mutations, frameshift mutations, and indels	1
2.6	DNA repair pathways: Base excision repair	1
2.0	nucleotide excision repair, and mismatch repair	1
	Problem Solving: Case Studies on DNA Replication and Repair	2
2.8		Z
3.0	Transcription	
3.1	Structure and function of mRNA, rRNA and tRNA. Characteristics of promoter	1
	and enhancer sequences	
3.2	Termination of Transcription in Prokaryotes	1
3.3	RNA polymerase and its subunits in prokaryotes and eukaryotes	1
3.4	RNA synthesis: Initiation, elongation and termination	1
3.5	Transcription initiation: Promoters and transcription factors	1
3.6	Eukaryotic Transcription and its Regulation: Promoters, enhancers and transcription factors	1
3.7	RNA capping, Polyadenylation	1
3.8	Splicing in eukaryotic RNA processing, RNA editing and alternative splicing	1
3.9	Problem Solving: Designing Experiments in Transcription	1
4.0	Translation	
4.1	Introduction to Genetic code: Elucidation of genetic code	1
4.2	Codon degeneracy, Wobble hypothesis and its importance	1
4.3	Prokaryotic and eukaryotic ribosomes	1
4.4	Initiation, Elongation and termination of protein synthesis in prokaryotes	1
4.5	Initiation, Elongation and termination of protein synthesis in Eukaryotes	1
4.6	Inhibitors of protein synthesis	1
4.7	Posttranslational modifications and its importance	1
4.8	Problem Solving: Deciphering the Genetic Code and Protein Synthesis	2
5.0	Regulation of Gene Expression	
5.1	Operon Concepts in Prokaryotes, Lac Operon	1
5.2	Trp Operon, and ara Operon	1
5.3	Role of small noncoding RNAs: miRNAs and siRNAs	1
5.4	Riboswitches: RNA-based genetic regulation	1
5.5	Epigenetic modifications and their role in gene expression control	1
5.6	DNA methylation, histone modifications	1
5.7	Chromatin remodeling	1
5.8	Problem Solving: Case Studies in Gene Expression Regulation	2

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Total

45

Course Designer

Dr.B.Kalpana - kalpana@ksrct.ac.in

60 BT 3P1	BIOCHEMISTRY LABORATORY	Category	, L	т	Р	Credit
		PC	0	0	4	2

Objective

- To learn the fundamental approaches for experimental investigation.
- To learn the theoretical foundations for the methods used for biochemical analysis.
- To determine the characteristics features of various molecules with reference to its analytical characters.
- To evaluate and estimate the biological molecules through various methods.
- To analyze the level of various elements through suitable standards.

Prerequisite

Nil

Course Outcomes

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

CO1	describe the calibration of glass-wares and understand the preparation of solutions.	Apply
CO2	standardize the pH meter and preparation of buffer solutions.	Apply
CO3	elucidate the fundamental analysis of carbohydrates and lipids qualitatively and quantitatively	Apply
CO4	examine and interpret the results by determining the amount of glycine and ascorbic acid	Apply
CO5	estimate the amount of carbohydrate, protein, cholesterol, creatinine, urea and uric acid quantitatively	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	РО 5	PO6	PO7	PO 8	РО 9	PO1 0	PO11	PO12	PSO1	PSO2
CO1			2	3							2		3	3
CO2			2	3							2		3	3
CO3			2	3						2	2		3	2
CO4			2	3						2	2		2	3
CO5			2	3						2	2		3	3
3- Stro	ng; 2-N	ledium; ´	1-Low											

List of Experiments*

- 1. Calibration of glass wares- pipettes and volumetric flasks
- 2. Preparation of solutions:1) percentage solutions, 2) molar solutions, 3) normal solutions
- 3. Standardization of pH meter and preparation of buffer of a given pH and molarity
- 4. Qualitative analysis of Carbohydrates- Monosaccharides (Determination of reducing property, differentiation

Ceeses &

of aldoses and ketoses, Osazone formation).

- 5. Qualitative analysis of Carbohydrates- Disaccharides and Polysacccharides (hydrolysis of glycosidic bond and osazone formation)
- 6. Qualitative analysis of Lipids Determination of Acid number of an edible oil (coconut oil).
- 7. Qualitative analysis of Lipids Determination of Iodine number of an edible oil (Sunflower oil).
- 8. Estimation of ascorbic acid by dye method (Titrimetry)
- 9. Estimation of amino acid (glycine) by Sorenson's Formal titration method.
- 10. Determination of total Carbohydrate content by Anthrone's method.
- 11. Estimation of protein by Lowry's method
- 12. Estimation of cholesterol by Zak'smethod
- 13. Estimation of creatinine by Jaff'smethod
- 14. Determination of urea in the urine sample by Dam method
- 15. Evaluation of uric acid by Caraway's method

*SDG 3: Good Health and Well-being

-Course Designers

1. Dr.S.Sidhra - sidhra@ksrct.ac.in

2. Dr. K.Syed Zameer Ahmed – syedzameerahmed@ksrct.ac.in

60 BT 3P2	MICROBIOLOGY LABORATORY	Category	L	т	Р	Credit
		PC	0	0	4	2

Objective

- To understand the growth and development of microbes through various culturing methods
- To observe the differences in staining reactions in bacteria and fungi
- To learn the culture conditions of anaerobic microbes
- To understand the concept of quality analysis of water and milk samples.
- To identify the effective method to control microbes

Prerequisite

Nil

Course Outcomes

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

CO1	•	n the as olid medi	•						ry and	d prepa	aration of	liquid	Ap	ply	
CO2	interpret the differential staining techniques for identification of bacteria and fungi												Apply		
CO3	demonstrate anaerobic microbe culture techniques											Ар	ply		
CO4	analysis for physiological identification of microorganisms											Ар	ply		
CO5	examine the quality of water and milk, and carry out the antibiotic sensitivity test											Ар	ply		
Mapping	ng with Programme Outcomes														
COs	PO1	PO2	PO3	PO4	РО 5	PO6	P07	PO 8	РО 9	PO1 0	PO11	PO12	PSO1	PSO2	

Passed in BoS Meeting held on 21/11/2023

Approved in Academic Council Meeting held on 23/12/2023

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CO1	3	2	3	3	2	1	2	3	2	3	2	3	3	3
CO2	2	3	2	2	2	2	3	1	2	2	2		3	3
CO3													3	2
CO4													2	3
CO5													3	3
3- Stror	3- Strong; 2-Medium; 1-Low													

List of Experiments*

- 1. Laboratory Precautions, principles of aseptic techniques
- 2. Preparation of Liquid and solid nutrient media
- 3. Preparation and observation of bacteria by using various selective media
- 4. Cultivation of microorganisms Pour plate, spread plate and streak plate
- 5. Gram's staining Gram positive and Gram-negative bacteria
- 6. Fungal staining Lacto phenol cotton blue staining of Mold
- 7. Determination of Microbial growth-viable count and turbidity method
- 8. Cultivation of anaerobic bacteria
- 9. Physiological characterization of microbes Carbohydrate fermentation test and catalase test
- 10. Starch and casein hydrolysis test
- 11. IMViC test for Coliform bacteria
- 12. Enumeration of Bacteria, fungi and Actinomycetes (Design experiment)
- 13. Rapid detection of bacteriological quality of water Most Probable Number test
- 14. Quality analysis of Milk samples Methylene Blue Reduction Test
- 15. Antibiotic resistance / sensitivity test
- *SDG 3: Good Health and Well-being

-Course Designers

1. Dr. Swathy J S- swathy@ksrct.ac.in

Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023

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		Category L T		Ρ	Credit	
60 CG 0P2	CAREER SKILL DEVELOPMENT II	CGC	0	0	2	0

- 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

Prerequisite

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	PO1	PO2	PO	PO	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
			3	4										
CO1								2	3	3	2	3	3	3
CO2								2	3	3	2	3	3	3
CO3								2	3	3	2	3	3	2
CO4								2	3	3	2	3	2	3
CO5								2	3	3	2	3	3	3
3- Stro	3- Strong; 2-Medium; 1-Some													

BoS Chairman Signature

		K.S.Ranga			Fechnology –		us R2022		
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				ommon	to All Branche		1		
Semes	ster	Hours	/Week	1	Total Hrs	Credit	Maximum		arks
		L	Т	Р		C	CA	ES	Total
		0	0	2	25	0	100	00	100
organi comple proces	ative iser (c eting- ss/eve	Listening: Advertis hoosing a product gap filling exercis ent descriptions to ic ting solutions - Liste	or service ses. Lister lentify cau	by comp ning techi se & effec	arison) - Lister nical informatio	ning to long on from po	ger technic dcasts -	cal talks and Listening to	
accide preser	eting a ents conting (i product, persuasi or disasters based oral reports, Mini p Il interviews	on news	reports,	Group Discu	ssion (base	ed on ca	se studies)	,
essays	ng ad s, and	vertisements, user l letters / emails of any profiles, Staten	complaint	- Case St	tudies, excerpt				
	sional aints F	l emails, Email et Precis writing, Sum	•	•		•	-	•	
Verbal	l Abili	ity II							[5]
Readin	ng Co	omprehension (Infe Change of Voice –					Analogie	es – Theme	
		J I	0 -					Total Hour	s 25
Refer	rence	(s):							<u> </u>
1.	'Engli	sh for Engineers & rsity, 2020	Technolog	<i>gists'</i> Orie	ent Blackswan	Private Ltd	. Departm	ent of Engli	sh, Anna
		an Lewis, <i>'Word</i> bulary Book', Pengi				olete Handl	book for	Building a	Superior
	Rama 2019	ın. Meenakshi, Sha	rma. Sano	geeta, 'Pro	ofessional Eng	lish'. Oxfor	d Universi	ty Press. Ne	ew Delhi.
		r Brookes and Pe nediate Learners', (Activities	for Elemen	tary and

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Course Contents and Lecture Schedule

S.No	Торіс	No.of Hours
		Hours
<u>1</u> 1.1	Listening Evaluative Listening: Advertisements, Product Descriptions	1
1.2	Listening to longer technical talks and completing– gap filling	1
1.2	exercises.	I
1.3	Listening technical information from podcasts	1
1.4	Listening to process/event descriptions to identify cause & effects and documentaries depicting a technical problem and suggesting solutions	1
1.5	Listening to TED Talks	1
2	Speaking	
2.1	Marketing a product, persuasive speech techniques	1
2.2	Describing and discussing the reasons of accidents or disasters based on news reports,	1
2.3	Group Discussion (based on case studies)	1
2.4	Presenting oral reports, Mini presentations on select topics with visual aids	1
2.5	participating in role plays and virtual interviews	1
3	Reading	
3.1	Reading advertisements, user manuals and brochures	1
3.2	Reading - longer technical texts- cause and effect essays, and letters / emails of complaint	1
3.3	Case Studies, excerpts from literary texts, news reports etc.	1
3.4	Company profiles	1
3.5	Statement of Purpose (SoPs)	1
4	Writing	
4.1	Professional emails, Email etiquette	1
4.2	Compare and contrast essay	1
4.3	Writing responses to complaints	1
4.4	Precis writing, Summarizing and Plagiarism	1
4.5	Job / Internship application – Cover letter & Résumé	1
5	Verbal Ability II	
5.1	Reading Comprehension (Inferential fillups) and Theme Detection	1
5.2	Spotting Errors	1
5.3	Verbal Analogies	1
5.4	Change of Voice and Change of Speech	1
5.5	One word substitution	1
	Total	25

Course Designer

2. Dr.A.Palaniappan

- palaniappan@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 2022-2023 onwards)

FOUTRH SEMESTER

S.No.	Course		Duration of Internal Exam	Weighta	ige of Mar	Minimum Marks for Pass in End Semester Exam					
5.NO.	Code	Name of the Course		Continuous Assessment *	End Semester Exam **		End Semester Exam	Total			
	THEORY										
1	60 MA 021	Probability and Statistics	2	40	60	100	45	100			
2	60 BT 401	Genetic Engineering	2	40	60	100	45	100			
3	60 BT 402	Protein and Enzyme Engineering	2	40	60	100	45	100			
4	60 BT 403	Biochemical Thermodynamics	2	40	60	100	45	100			
5	60 MY 002	Universal Human Values	2	100	-	100	-	100			
6	60 BT E1	Open Elective – I	2	40	60	100	45	100			
			PRACTIC	AL				-			
7	60 BT 4P1	Molecular Biology and Genetic Engineering Laboratory	3	60	40	100	45	100			
8	60 BT 4P2	Protein and Enzyme Engineering Laboratory	3	60	40	100	45	100			
9	60 C 0P3	Career Skill Development – III	3	100	-	100	-	-			
10	60 CG 0P6	Internship	-	100	-	100	-	100			

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		Catego	ory L	Т	Ρ	Credit
60 MA 021	Probability and Statistics	BS	3	1	0	4

- To get exposed to the basic concepts of probability.
- To familiarize the concepts of correlation and regression.
- To familiarize various methods in hypothesis testing.
- To get exposed to the fundamentals of analysis of variance.
- To learn basics of descriptive statistics and control charts.

Prerequisite

Nil

Course Outcomes

At the end of the course, the students will be able to

CO1	Understand the basic concepts of probability.	Remember Understand Apply
CO2	Calculate coefficient of correlation and regression.	Remember Understand Apply
CO3	Apply Student's t test, F test and Chi-square test for testing the statistical hypothesis.	Remember Understand Apply
CO4	Apply the concepts of ANOVA to test the equality of means for more than two populations.	Remember Understand Apply
CO5	Compute measures of central tendency and measures of dispersion, and apply the concepts of control charts for decision making.	RememberUnderstand Apply

Mapping with Programme Outcomes

mapp															
COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2							3	2		
CO2	3	3	2	2	2							3	2		
CO3	3	3	3	3	2							3	2		
CO4	3	3	3	3	2							3	2		
CO5	3	3	3	3	2							3	2		
3 – S	trong;	2 – Me	edium;	1 – So	ome										

Assessment Pattern

Bloom's Category	Continuous / Tests (Ma		Model Exam (Marks)	End Semester Examination		
	1	2		(Marks)		
Remember (Re)	10	10	20	20		
Understand (Un)	10	10	20	20		
Apply (Ap)	40	40	60	60		
Analyze (An)	0	0	0	0		
Evaluate (Ev)	0	0	0	0		
Create (Cr)	0	0	0	0		
Total	60	60	100	100		

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		K.S.Ranga	asamy Co	llege of T	echnology –	Autonomou	us R2022		
					bility and Stat				
		Con	nmon to B	liotechno	logy and Foo	d Technolo	ogy		
Semes	ster	Hours/	Week		Total hrs	Credit	Ν	/laximum Ma	rks
		L	T P			С	CA	CA ES	
IV		3	1 0 60 4 40 60 10			100			
Proba Rando variat	ability om va ple - P	and Random Var - Axioms of proba ariable - Discrete r robability density fu	bility - Tot andom va unction - N	riable - F	Probability mas	ss function			
Joint of Corre	distrib	usional Random V ution - Marginal dis - Regression.		Conditior	nal distribution	- Covarianc	ce - Corre	lation - Rank	[9]
Type Differe	I and ence o	Hypothesis Type II errors - Tea of means - F- test -							[9]
Analy classi	, sis of ificatio	Experiments f variance - One on - Randomized bl	ock desigr			randomized	d design	- Two way	[9]
Meas - Stand	ures c dard d	Ind Quality Contro of Central tendency: leviation - Coefficie C chart.	: Mean, Me						
						Total Hou	ırs: 45 + ⁻	15 (Tutorial)	60
Text l	book(s):							
0	Gupta	S.C and Kapoor V.	K., "Funda	amentals	of Mathematica	al Statistics"	, 12 th Edit	tion, Sultan (Chand &
^{1.} s	Sons, I	New Delhi, 2020.							
^{2.} E	Educat	d A Johnson, "Mille tion Limited, New D			oility and Statis	tics for Eng	ineers", 9	th Edition, Pe	earson
Refer	rence	(s):							
1. s	<u>Sheld</u> o	on Ross, "A first cou	<u>urse in P</u> ro	bability",	10 th Edition, Pe	earson Educ	cation, Ne	w Del <u>hi, 2</u> 01	9.
^{2.} fo	or Eng	E. Walpole, Raym	sts", 9 th Ec	lition, Pea	arson Education	n, New Dell	ni, 2011.		
<u>З.</u> С	Compa	ajan T., "Probability any Ltd, New Delhi,	2008.						
		utz, Seymour, Schi lcGraw-Hill Publish					n to Proba	ability and St	atistics",
Cours	se Co	ntents and Lectur	e Schedu	le					

Number S.No. Topic of Hours Probability and Random Variable 1. Axioms of probability 1.1 1 Total probability 1.2 1.3 Conditional probability 1 1.4 Bayes theorem 2 Tutorial 1.5 2 Discrete random variable - Probability mass function 1.6 2 beenergy

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1.7	Continuous random variable - Probability density function	1
1.8	Moment generating function	1
1.9	Tutorial	2
2.	Two Dimensional Random Variables	
2.1	Joint distribution	1
2.2	Marginal distribution	1
2.3	Conditional distribution	1
2.4	Covariance	1
2.5	Tutorial	2
2.6	Correlation	2
2.7	Rank Correlation	1
2.8	Regression	1
2.9	Tutorial	2
3.	Testing of Hypothesis	
3.1	Student's 't' test – Single mean	1
3.2	Student's 't' test - Difference of means	2
3.3	F- test	2
3.4	Tutorial	2
3.5	Chi-square test -Goodness of fit	1
3.6	Chi-square test - Independence of attributes	2
3.7	Tutorial	2
4.	Design of Experiments	
4.1	Analysis of variance - One way classification	2
4.2	Analysis of variance - Completely randomized design	1
4.3	Analysis of variance - Two way classification	2
4.4	Tutorial	2
4.5	Analysis of variance - Randomized block design	1
4.6	Analysis of variance - Latin square	2
4.7	Tutorial	2
5.	Statistics and Quality Control	
5.1	Mean, Median, Mode	2
5.2	Quartile deviation	1
5.3	Standard deviation	1
5.4	Coefficient of variation	1
5.5	Tutorial	2
5.6	Mean (X) chart and Range (R) chart	1
5.7	nP chart	1
5.8	C chart	1
5.9	Tutorial	2
	Total	60

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List of MATLAB Programs:

- 1. Calculating the probability for one dimensional random variable
- 2. Computing Coefficient of Correlation
- 3. Plotting Lines of regression
- 4. Visualizing data and performing Testing of hypothesis
- 5. Visualizing data and performing Chi-square test
- 6. Visualizing data and performing Analysis of Variance
- 7. Computing Mean, Median and Mode
- 8. Plotting and visualizing control charts

Course Designers

- 3. Mr.G.Mohan mohang@ksrct.ac.in
- 4. Ms.K.Geetha geethak@ksrct.ac.in

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Category	L	Т	Ρ	Credit
PC	3	0	0	3

- To discuss the methods, tools and techniques involved in genome analysis, expression of cloned genes in different host system.
- To understand the production of recombinant proteins, mutation analysis and the importance of PCRin genome analysis.
- The student would learn about various aspects of Genetic Engineering, its application and ethical issues.
- To determine the strategies involved in gene cloning with the help of genomic libraries, cDNA libraries and other libraries.
- To discuss the production of useful molecules like cytokines, vaccines and antibiotics and define thesafety guidelines for recombinant.

Prerequisite

Molecular Biology and Biochemistry Course Outcomes

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

CO1	Understand restriction and modification system and their role in genetic engineering	Understand
CO2	Know about the cloning vectors used in manipulation of genes.	Understand
CO3	Examine the strategies involved in gene cloning and methods involved in screening of cloned genes to identify the target gene.	Apply
CO4	Illustrate the PCR based techniques involved in genetic manipulation including mutagenesis and demonstrate various sequencing techniques	Apply
CO5	Comprehend the applications of rDNA technology and describe the role of knock out and RNA Interference technology in gene expression studies.	Analyze

Mapping with Programme Outcomes

COs	P01	PO2	PO	PO	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2
			3	4										
CO1	3	3	2	2	3			3		3	2	3	3	3
CO2	3	3	2	3		3	3	3		3		3	3	2
CO3	3	3	3	3				3	3		3	3	3	2
CO4	3	3	3	3	3	3	3			3		3	3	2
CO5	3	3	3	3		3			3		3	3	3	3
3- Stro	ong; 2-l	Mediur	n; 1-So	ome									•	
Accoc	emont	Datta	n											

Assessment Pattern

Bloom's Category		Assessment Tests Marks)	End Sem Examination
Biooni s category	1	2	(Marks)
Remember (Re)	10	10	10
Understand (Un)	20	20	40
Apply (Ap)	20	10	30
Analyse (An)	10	20	20

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Approved in Academic Council Meeting held on 23/12/2023

	K.S.R		60 B1	[401 – G	enetic Engine	erina			
			00 2			,			
				B.Tech. I	Biotechnology	A	-		<u> </u>
Semes	ter F	Hours/Week				Credit		Aaximum N	
N /	L		T	P	45	C	CA	ES	Total
	AMENTAL TECHN		0	0	45	3	40	60	100 [9
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Course Contents and Lecture Schedule

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BoS Chairman Signature

S.No	Торіс	No.of Hours
1	FUNDAMENTAL TECHNIQUES OF GENE MANIPULATION	ſ
1.1	Restriction enzymes: types and mechanisms	1
1.2	DNA modification enzymes - Alkaline phosphatase- Terminal deoxynucleotidal transferase- polynucleotide kinase	2
1.3	DNA Methyltransferases (DNMTs)- DNA Polymerases, S1 nuclease	2
1.4	Restriction mapping	1
1.5	Design of linkers and adapters	1
1.6	Joining of DNA molecules	1
1.7	Basics of cloning	1
2	BIOLOGY OF CLONING VECTORS	
2.1	Characteristics of cloning vectors	1
2.2	Types of vectors, Selectable markers	1
2.3	Experimental applications of vectors: Plasmids- pBR322,	1
2.4	pUC, λ vectors, cosmids, M13 vectors	1
2.5	Phagemids	1
2.6	Artificial Chromosomes: YAC, PAC, BAC, HAC	1
2.7	Expression vectors	1
2.8	Insect, Yeast and Mammalian vectors.	2
3	GENE CLONING STRATEGIES ANDSCREENING	
3.1	Cloning of genes: Genomic libraries,	1
3.2	cDNA libraries, Directional cDNA cloning	1
3.3	PCR based libraries-RACE	2
3.4	Subtraction libraries	1
3.5	Screening: Nucleic acid probe hybridization	2
3.6	Immuno screening and Functional screening	2
4	AMPLIFICATION AND SEQUENCING OF DNA	
4.1	PCR: Mechanism, Types- Nested,	1
4.2	Hot start, colony PCR, Taqman assay	1
4.3	Molecular beacons	1
4.4	Site directed mutagenesis: primer extension -	1
4.5	Strand selection -Cassette mutagenesis - PCR based	1
4.6	Methods of nucleic acid sequencing: Sanger'smethod	1
4.7	Automated sequencing	1
4.8	Next Generation sequencing method: Illumina and Ion Torrent	2
5	APPLICATIONS OF RDNA TECHNOLOGY	
5.1	Differential display, Microarrays	1
5.2	FISH, Knock-out analysis	2
5.3	Antisense and RNA interference, Yeast two hybrid system	1
5.4	RAPD, RFLP	1
5.5	VNTRs and SSR	1
5.6	Production of useful molecules: cytokines, vaccines and antibodies	2
5.7	improving agronomictraits.	1
5.8	Safety guidelines for recombinant rDNA technology. Total	1 45

Course Designers

5. Dr.Swathy J S

- swathy@ksrct.ac.in

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BoS Chairman Signature

Category	L	Т	Ρ	Credit
EN	3	0	0	3

- To impart concept on Protein engineering and Enzyme Engineering.
- To learn basic principles in Enzyme kinetics and catalysis
- To evaluate the Production and purification of Proteins and Enzymes
- To comprehend the various methods of protein and enzyme engineering
- To analyze the application of proteins and enzymes in various industries

Prerequisite

Basic knowledge on Chemistry, Cell Biology and Biochemistry is needed to understand this course. **Course Outcomes**

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

CO1	Demonstrate the basic, types and structural confirmation of proteins and enzymes Understand												
CO2	Examin	e the co	oncepts	of enzy	yme act	ivity and	d its cat	alysis					Apply
CO3	Illustrate the protein/ enzyme purification methods and factors affecting Apply immobilization												
CO4	Infer the strategies for protein/ enzyme engineering and rational enzyme design. Analyze												
CO5	Examine the design of enzyme electrodes and applications of protein/ enzyme Analyze in various domain												
Mappi	ng with	Progra	mme O	utcome	es								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1	1	PO12
CO1	2												1
CO2	2	3		1									1
CO3	3	2	2										
CO4			3	1									
CO5			3	1	2								
3- Stro	3- Strong; 2-Medium; 1-Some												

Assessment Pattern

Bloom's Category		Assessment Tests Marks)	End Sem Examination
Bioonin's Gategory	1	2	(Marks)
Remember (Re)	10	10	10
Understand (Un)	20	20	40
Apply (Ap)	20	10	30
Analyse (An)	10	20	20

BoS Chairman Signature

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		6			and Enzyme		g			
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Enzym	e kinetics ar	nd catalysi	is							[9]
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<i>in vitro</i> enzyme	protein evolu	tion (DNA shaping en	ein splicing shuffling, E	, random rror prone	e PCR), cell su	irface displa	y techno	logy - Rat	ional	
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*SDG 9: Industry, Innovation, and Infrastructure

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S.No	Торіс	No.of
	Introduction to Destaine and England	Hours
1	Introduction to Proteins and Enzymes	
1.1	Introduction to proteins	1
1.2	Structural characterization and determination - Ramachandran Plot	1
1.3	Enzymes: definition, nomenclature	1
1.4	Classification of enzymes	1
1.5	Holoenzymes, Apoenzymes, Metalloenzymes, and Ribozyme,	1
1.6	Factors affecting enzyme activity	1
1.7	Regulation of enzyme activity	1
1.8	Allosteric Regulation	1
1.9	Enzyme Inhibition (Competitive, Noncompetitive and Uncompetitivve Inhibition)	1
2	Enzyme kinetics and catalysis	
2.1	Concept of active site	1
2.2	Mechanism of enzyme action	1
2.3	specificity of enzyme action	1
2.4	Michaelis Menton equation and its Transformations	1
2.5	turn over number, Analytical problems in turn over number,	1
2.6	transformations of MM equations.	1
2.7	Catalysis- Acid base catalysis,	1
2.8	Covalent catalysis,.	1
2.9	Mechanism of action of lyzosymes	1
3	Production and purification of Proteins and Enzymes	
3.1	Production and Purification of enzyme from plant,	2
3.2	animal and microbial source:	1
3.3	extraction, precipitation,	1
3.4	dialysis, Ion exchange chromatography,	1
3.5	Hydrophobic interaction chromatography,	1
3.6	Gel filtration chromatography.	1
3.7	Types of Enzyme immobilization	2
4	Strategies for protein and enzyme engineering	
4.1	Protein engineering cycle	1
4.2	protein splicing,	1
4.3	random and site directed mutagenesis,	1
4.4	peptidomimetics,	1
4.5	<i>in vitro</i> protein evolution (DNA shuffling, Error prone PCR mechanisms, engineering by molecular assembling.	1
4.6	cell surface display technology -	1
4.7	Rational enzyme Design:	1

Course Contents and Lecture Schedule

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4.8	Reshaping enzyme specificity,	1
4.9	reengineering catalytic	1
5	Application of Proteins and Enzymes	
5.1	Importance of recombinant enzymes and proteins	2
5.2	Industrial applications of enzymes,.	2
5.3	design of enzyme electrodes	1
5.4	Case studies on protein engineering	1
5.5	applications in food, detergent,	1
5.6	environment and health care industries	2
	Total	60

Course Designers

6. Dr.S.Sidhra

- sidhra@ksrct.ac.in

		Category	L	Т	Ρ	Credit
60 BT 403	Biochemical Thermodynamics	PC	3	1	0	4

Objective (s)

- To learn about basic thermodynamic relations and properties of fluids
- To understand partial molar properties and property change of mixing
- To understand the concept of phase equilibria
- To know the application of chemical reaction equilibrium
- To apply the thermodynamics concepts in bioengineering
- Prerequisite Basic knowledge of Engineering Mathematics and physics

Course Outcomes

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

CO1	Understand the basic laws of thermodynamics to predict the thermodynamic properties of pure fluids	Understand
CO2	Understand the various thermodynamic properties of solutions	Understand
CO3	Know the criteria of phase equilibria for single and multicomponent systems	Understand
CO4	Apply the concept of chemical reaction equilibria and equilibrium conversion	Apply
CO5	Apply the bioenergetics and thermodynamics of biochemical reactions	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										2	3

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CO2	2	3	1	1						3	2
CO3	3	1	2	1	1					3	2
CO4	2	3	1							2	3
CO5	3	2	1							2	3
3- Stro	3- Strong; 2-Medium; 1-Some										

Assessment Pattern

Bloom's Category		Assessment Tests Marks)	End Sem Examinatior		
Bloom's category	1	2	(Marks)		
Remember	10	10	20		
Understand	30	30	40		
Apply	20	20	40		
Analyze	-	-	-		
Create	-	-	-		

K. S. Rangasamy College of Technology – Autonomous R2022 60 BT 403- Biochemical Thermodynamics **Common to All Branches** Hours/Week Credit Maximum Marks Semester Total hrs Ρ С CA ES Total Т 60 IV 3 1 0 4 40 60 100 **Thermodynamic Properties of Pure Fluids** Basic concepts and laws of thermodynamics - basics of entropy - volumetric properties of fluids estimation of thermodynamic properties using equations of state, calculations involving actual property [9] changes, Maxwell's relations and applications. Solution Thermodynamics* Partial molar properties - concept of chemical potential and fugacity in solutions - activity - activity [9] coefficients - effect of pressure and temperature - Gibbs-Duhem equations - property changes of mixing - heat effects of mixing in biological broths. Phase equilibria Criteria for phase equilibria - phase equilibria in single and multicomponent systems - Duhem's theorem.

V-L-E calculations for binary and multi component systems. Liquid-liquid equilibria and solid-liquid [9] equilibria.

Chemical Reaction equilibria
Chemical reaction equilibrium: evaluation of equilibrium constant, effect of temperature and pressure on
equilibrium constant, equilibrium conversion for single and multiple reactions.[9]Biochemical Thermodynamics

 Thermodynamics and energetics of metabolic pathways, oxygen requirement and heat generation in aerobic growth, energy coupling (NADH and ATP), Thermodynamics of oxidation-reduction reactions.
 [9]

 Case study.
 Total Hours
 60

Text book(s):

Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023

1.	Smith J.M., Van Ness H.C., Abbot M.M. Chemical Engineering Thermodynamics, Sixth edition, McGraw- Hill, 2001.
2.	Narayanan K.V., "A Text Book of Chemical Engineering Thermodynamics", Second Edition, Prentice Hall of India, New Delhi, 2016.
Refe	erence(s):
1.	Gopinath Halder, "Introduction to Chemical Engineering Thermodynamics", PHI Learning Pvt. Ltd. New Delhi, 2009.
2.	Sandler S. I., Chemical, Biochemical and Engineering Thermodynamics, Fourth Edition, John Wiley & Sons Inc., 2006.
3.	Gavhane K.A, "Chemical Engineering thermodynamics-1", Nirali Prakasan Publications, Pune, 2013.
4.	Haynie D.T., "Biological Thermodynamics", Second Edition., Cambridge University Press, 2008.

*SDG 7: Affordable and Clean Energyth and Well-being

Course Contents and Lecture Schedule

S.No	Торіс	No. of Hours
1	Thermodynamic Properties of Pure Fluids	
1.1	Basic concepts and laws of thermodynamics	1
1.2	Basics of entropy	1
1.3	Volumetric properties of fluids	1
1.4	Estimation of thermodynamic properties using equations of state	2
1.5	Calculations involving actual property changes	3
1.6	Maxwell's relations and applications	1
2	Solution Thermodynamics	
2.1	Partial molar properties	2
2.2	Concept of chemical potential and fugacity in solutions	1
2.3	Activity	1
2.4	Activity coefficients	1
2.5	Effect of pressure and temperature	1
2.6	Gibbs-Duhem equations	1
2.7	Property changes of mixing	1
2.8	Heat effects of mixing in biological broths	1
3	Phase equilibria	
3.1	Criteria for phase equilibria	1
3.2	Phase equilibria in single and multicomponent systems	1
3.3	Duhem's theorem	1
3.4	V-L-E calculations for binary and multi component systems	3
3.5	Liquid-liquid equilibria	2
3.6	Solid-liquid equilibria	1
4	Chemical Reaction equilibria	
4.1	Chemical reaction equilibrium	1

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	Total	45
5.5	Case study	2
5.4	Thermodynamics of oxidation-reduction reactions	2
5.3	Energy coupling (NADH and ATP)	1
5.2	Oxygen requirement and heat generation in aerobic growth	2
5.1	Thermodynamics and energetics of metabolic pathways	2
5	Biochemical Thermodynamics	
4.5	Equilibrium conversion for multiple reactions	2
4.4	Equilibrium conversion for single reactions	2
4.3	Effect of temperature and pressure on equilibrium constant	2
4.2	Evaluation of equilibrium constant	2

Course Designers

Dr.S.Poornima

- spoornima@ksrct.ac.in

		Category	L	Т	Ρ	Credit
60 MY 002	UNIVERSAL HUMAN VALUES	PC	2	1	0	3

- 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

Prerequisite

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	Analyze				
CO5	Develop appropriate human conduct and management patterns to create harmony in professional and personal lives.	Create				
Mappin	Mapping with Programme Outcomes					

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COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								3	2		2	3	2	3
CO2						3		3	3			3	3	2
CO3						3	3	3	3			3	3	2
<u>CO3</u> CO4						3	3	3	3			3	2	3
CO5						3	3	3	3	3		3	2	3
3- Strong; 2-Medium; 1-Some														
Asses	Assessment Pattern													

Bloom's Category	Continuous A	Continuous Assessment Tests (Marks)					
	1	2	Model	Examination (Marks)			
Remember	10	10	20				
Understand	10	10	20	No End Semester			
Apply	20	20	30	Examination			
Analyse	20	20	30				
Evaluate	0	0	0				
Create	0	0	0				

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	Hours / Week			Total hrs	Credit	Ma	aximum Mark	(S
Semester	L	Т	Р	Total IIIS	С	CA	ES	Total
III/IV	2	1	0	45	3	50	50	100
Introduction to v	alue Educa	ation						
and prosperity-the and prosperity - c		•	-	-	•		acility – happ	iness
Harmony in the l	Human Bei	ing						
Understanding Hu	ıman heina	as the Co-	Evistanca	of the self and t	he Body-Die	stinguishing h	etween the n	aade
of the self and the	•					0 0		
the self with the b	•	•			-			[9]
Harmony in the I	Family and	Society						
-	-	-						_
Harmony in the Fa	•						•	
the foundation val		•	espect'- as	the right evalu	ation-unders	standing harm	iony in the so	ciety [9]
-vision for the uni								
Harmony in the l	Nature/EXIS	stence						
Understanding ha four orders of nat existence.	•				-			-

Recent BoS Chairman Signature

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

Total F	lours	45
Text B	ook(s):	
1.	A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria,	2 nd
	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,	
Refere	nce(s):	
1.	Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.	
2.	Human Values, A.N. Tripathi, New Age International. Publishers, New Delhi, 2004.	

Course Contents and Lecture Schedule

S. No	Торіс	No. of Hours
1	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	HARMONY IN THE HUMAN BEING	2
2.1	Understanding Human being - As Co-Existence of the self and the Body - The Needs of the Self and the Body	2.1
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	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

Passed in BoS Meeting held on 21/11/2023 Approved in Academic Council Meeting held on 23/12/2023

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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	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	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
	Total	45
Cour	se Designers	

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

Dr.K.Raja - rajak@ksrct.ac.in

eeeef & **BoS Chairman Signature**

Category	L	Т	Ρ	Credit
PC	0	0	4	2

- To understand steps involved in the isolation of DNA form Bacteria, Fungi and Plant.
- To understand the concepts of plasmid DNA extraction and transformation
- To provide hands-on experience in performing basic recombinant DNA techniques
- To develop the ability to design, conduct, analyze and interpret data related to genetic engineering experiments
- To inculcate the research aptitude and technical skills to fulfill the need of both industry and research **Prerequisite**

Molecular Biology, Genetic Engineering and Cell Biology	
Course Outcomes	

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

CO1	Appl	Apply the knowledge of DNA extraction to isolate DNA from different sources. Apply											pply			
CO2	Analyse and interpret the data obtained from the agarose gel using graphical, UV spectrophotometricand software methods.												An	Analyze		
CO3	Identify the correct restriction enzymes to digest the vector DNA that give Apply cohesive ends, ligate it to make recombinant DNA and transform it with <i>E.coli</i> DH5 gcells												pply			
CO4	Perform PCR at appropriate concentration and operate the thermocycler to Analyze amplify the DNA											alyze				
CO5	to de scree	esign e ening a	experin and inte	nent , c erpret	onfirm	its prota obta	•	eithe	r by P	CR or		nd PCR ing and	A	pply		
Mappi	ng wit	h Prog	gramm	e Out	comes	5										
COs	PO1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO11	PO12	PSO1	PSO2		

COs	PO1	PO2	PO	PO	PO5	PO6	PO7	PO8	PO9	PO1	PO11	PO12	PSO1	PSO2		
			3	4						0						
CO1	3	2	2	2	2		2	2	3	2	2	2	2	3		
CO2	3	2	2	2		3	3	2	1		2	2	3	3		
CO3	3	2	2	2	2		3	2	1		2	2	3	2		
CO4	3	2	2	2		2		2	1	2		2	2	3		
CO5	3	2	2	2		3	2	2	1		2	2	3	2		
3- Stro	3- Strong; 2-Medium; 1-Some															
Analyse (An) 30									30			50				
Create	(Cr)				0				0				0			

BoS Chairman Signature

List of Experiments

- 1. Isolation of genomic DNA from bacterial cells*
- 2. Isolation of genomic DNA from fungal cell
- 3. Isolation of DNA from Blood by high salt method
- 4. Quantification of DNA by UV spectrometer and agarose gel electrophoresis
- 5. Extraction of Plasmid DNA
- 6. Isolation of total RNA from prokaryotes
- 7. Extraction of DNA from Agarose gel
- 8. Restriction Enzyme Digestion of Vector and genomic DNA
- 9. Ligation of restricted DNA to construct DNA
- 10. Competent cell preparation- Calcium Chloride method
- 11. Transformation by heat-shock induction method
- 12. PCR- 16S rDNA amplification
- 13. Random Amplification of Polymorphic DNA
- 14. Isolate DNA from any five different sources, quantify it and interpret your result by comparing the data obtained
- 15. Make a recombinant DNA of your own gene of interest using the given vector and confirm it by the any one of the following techniques: Transformation and blue-white screening, Colony PCR
- *SDG 3: Good Health and Well-being

Course Designers

1. Dr.Swathy J S- swathy@ksrct.ac.in

BoS Chairman Signature

		Category	L	Т	Ρ	Credit
60 BT 4P2	Protein and Enzyme Engineering Laboratory	PC	0	0	4	2

- To impart basics of intra and extra cellular protein and enzyme extraction.
- To study the biochemical characterization of enzymes
- To learn the principle and procedure for enzyme and protein purifications.
- To know the specific activity and kinetics of enzymes.
 - To learn about the fabrication of enzymesensors and their functions

Prerequisite

•

Basic knowledge of extraction and purification is needed

Course Outcomes

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

CO1	Demonstrate the extraction and production of intra cellular proteins											Understand			
CO2	Identify the Kinetic characteristics and specific activity for the given enzyme												A	pply	
CO3	Construct the purification pattern for the given enzyme												Apply		
CO4	Compare the kinetic characteristics of free and immobilized enzymes											Analyze			
CO5	analyze the protein expression pattern and fabrication of enzyme sensors Analyze											alyze			
Mapping with Programme Outcomes															
COs	PO1	PO2	PO	РО	PO5	PO6	P07	PO8	PO9	P01	P011	PO12	PSO1	PSO2	

COs	P01	PO2	РО	PO	PO5	PO6	P07	P08	PO9	P01	PO11	PO12	PS01	PSO2
			3	4						0				
CO1	2			3	2							1	3	3
CO2		2		3	1								3	2
CO3	1			2									2	3
CO4		1			1								3	3
CO5				2									2	3
3- Stro	3- Strong; 2-Medium; 1-Some													

List of Experiments

BoS Chairman Signature

- 1. Extraction and estimation of extra cellular proteins from bacteria and fungi*
- 2. Production and estimation of protease
- 3. Digestion of milk protein into amino acids with quantification
- 4. Effect of pH on Acid phosphatase activity
- 5. Effect of Temperature on Acid phosphatase activity
- 6. Kinetic characterization (Km & Vmax) of Acid phosphatase LB plot
- 7. Identification of inhibition types of Acid phosphatase
- 8. Purification of protein by ion exchange chromatography
- 9. SDS PAGE analysis for partial purification of proteinsample
- 10. Identification of isozyme pattern of Peroxidase by Native-PAGEanalysis
- 11. Immobilization of enzymes using gel entrapment method
- 12. Comparative kinetic characterization of free and immobilized enzymes
- 13. Engineering the active site using chemical modification method
- 14. Western blot Analysis of protein expression pattern
- 15. Fabrication of enzyme sensors and demonstration of their functions

*SDG 3: Good Health and Well-being

Course Designers

Dr.S.Sidhra- sidhra@ksrct.ac.in

BoS Cnairman Signature