Curriculum & Syllabus

of

B.E. Electronics and Communication Engineering

(For the batch admitted in 2010-11)

R 2010

K.S.RANGASAMY COLLEGE OF TECHNOLOGY
TIRUCHENGODE – 637 215

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE New Delhi)

K.S.Rangasamy College of Technology - Autonomous Regulation	R 2010
Department	Electronics and Communication Engineering
Programme Code & Name	EC : B.E. Electronics and Communication Engineering

VISION

To become recognized Nationally as a leader in Electronics and Communication Engineering education and research

MISSION

To produce professionals and technology leaders adherent to the professional ethical code in the areas of Electronics and communication Engineering

To address problems faced by the society while advancing boundaries of disciplinary and multidisciplinary research and cultivate universal moral values

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

I. Graduates of the programme will have successful technical or professional careers

II. Graduates of the programme will apply the scientific, mathematical and engineering fundamentals to solve problems in Electronics and Communication Engineering and related fields

III. Graduates of the programme will exhibit professional and ethical behaviour and engage in lifelong learning

PROGRAMME OUTCOMES (POs)

a) Apply the knowledge of mathematics, science, engineering fundamentals to the solution of complex problems in Electronics and Communication Engineering

b) Identify, formulate, research literature, and analyse complex Electronics and Communication engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

c) Design solutions for complex Electronics and Communication engineering problems and design system components or processes that meet t h e specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

d) 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 related to Electronics and Communication Engineering

e) Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex Electronics and Communication engineering activities with an understanding of the limitations

f) 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

g) Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

h) Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

i) Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

j) 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

k) Demonstrate knowledge and understanding of t h e 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

l) Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

K.S.Rangasamy College of Technology , Tiruchengode - 637215								
Curriculum for the Programmes under Autonomous Scheme								
Regulation	R 2010							
Department	Department of Electronics and Communication Engineering							
Programme Code & Name	EC : B.E. Electronics and Communication Engineering							
Semester I								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC 101	Technical English	3	0	0	3	50	50	100
10 EC 102	Engineering Mathematics I	3	1	0	4	50	50	100
10 EC 103	Physics of Materials (CS, EC, EE, EI, IT)	3	0	0	3	50	50	100
10 EC 104	Engineering Chemistry (CS, EC, EE, EI, IT)	3	0	0	3	50	50	100
10 EC 105	Engineering Graphics (CS, EC, EE, EI, IT)	2	0	3	4	50	50	100
10 EC 106	Basics of Civil and Mechanical Engineering (CS, EC, EE, EI, IT)	4	0	0	3	50	50	100
	PRACTICAL							
10 EC 107	Engineering Chemistry Laboratory (CS, EC, EE, EI, IT)	0	0	3	2	50	50	100
10 EC 108	Engineering Practices Laboratory (CS, EC, EE, EI, IT)	0	0	3	2	50	50	100
Total		18	1	9	24	800		
Semester II								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC 201	Communication Skills	3	0	0	3	50	50	100
10 EC 202	Engineering Mathematics II	3	1	0	4	50	50	100
10 EC 203	Environmental Engineering (CS, EC, EE, EI, IT)	3	0	0	3	50	50	100
10 EC 204	Engineering Physics (CS, EC, EE, EI, IT)	3	0	0	3	50	50	100
10 EC 205	Basics of Engineering Mechanics (CS, EC,EE,EI,IT)	3	1	0	4	50	50	100
10 EC 206	Fundamentals of Programming (CS, EC, EE, EI, IT)	3	1	0	3	50	50	100
	PRACTICAL							
10 EC 207	Engineering Physics Laboratory (CS, EC, EE, EI, IT)	0	0	3	2	50	50	100
10 EC 208	Fundamentals of Programming Laboratory (CS, EC, EE, EI, IT)	0	0	3	2	50	50	100
Total		18	3	6	24	800		

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Semester III								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC 301	Engineering Mathematics III	3	1	0	4	50	50	100
10 EC 302	Digital Principles and System Design (CS,EC,IT)	3	0	0	3	50	50	100
10 EC 303	Electron Devices	3	0	0	3	50	50	100
10 EC 304	Electrical Engineering	3	1	0	3	50	50	100
10 EC 305	Electrical Circuit Theory	3	1	0	4	50	50	100
10 EC 306	Signals and Systems	3	1	0	4	50	50	100
	PRACTICAL							
10 EC 307	Electrical Engineering Laboratory	0	0	3	2	50	50	100
10 EC 308	Electron Devices Laboratory	0	0	3	2	50	50	100
10 EC 309	Digital Integrated Circuits Laboratory	0	0	3	2	50	50	100
10 EC 310	Career Competency Development I	0	0	2	0	100	00	100
Total		18	4	11	27	1000		
Semester IV								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC 401	Random Processes	3	1	0	4	50	50	100
10 EC 402	Control Systems	3	1	0	4	50	50	100
10 EC 403	Data Structures using C++	3	0	0	3	50	50	100
10 EC 404	Electronic Circuits	3	0	0	3	50	50	100
10 EC 405	Microprocessors and Microcontrollers (CS, EC, IT)	3	0	0	3	50	50	100
10 EC 406	Electromagnetic Fields	3	1	0	4	50	50	100
	PRACTICAL							
10 EC 407	Data Structures using C++ Laboratory	0	0	3	2	50	50	100
10 EC 408	Electronic Circuits and Simulation Laboratory	0	0	3	2	50	50	100
10 EC 409	Microprocessors and Microcontrollers Laboratory (CS, EC, IT)	0	0	3	2	50	50	100
10 EC 410	Career Competency Development II	0	0	2	0	100	00	100
Total		18	3	11	27	1000		

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Semester V								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC 501	Linear Integrated Circuits	3	0	0	3	50	50	100
10 EC 502	Computer Organization and Architecture	3	0	0	3	50	50	100
10 EC 503	Communication Theory	3	1	0	4	50	50	100
10 EC 504	Embedded Systems	3	0	0	3	50	50	100
10 EC 505	Transmission Lines and Wave Guides	3	1	0	4	50	50	100
10 EC 506	Digital Signal Processing	3	1	0	4	50	50	100
	PRACTICAL							
10 EC 507	Embedded Systems Laboratory	0	0	3	2	50	50	100
10 EC 508	Linear Integrated Circuits Laboratory	0	0	3	2	50	50	100
10 EC 509	Digital Signal Processing Laboratory	0	0	3	2	50	50	100
10 EC 510	Career Competency Development III	0	0	2	0	100	00	100
Total		18	3	11	27	1000		
Semester VI								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC 611	Digital Communication	3	1	0	4	50	50	100
10 EC 612	Computer Networks	3	0	0	3	50	50	100
10 EC 613	Antennas and Wave Propagation	3	1	0	4	50	50	100
10 EC 614	VLSI Design	3	0	0	3	50	50	100
10 EC E1*	Elective I	3	0	0	3	50	50	100
10 HS 001	Professional Ethics	3	0	0	3	50	50	100
	PRACTICAL							
10 EC 6P1	Communication Laboratory I	0	0	3	2	50	50	100
10 EC 6P2	VLSI Laboratory	0	0	3	2	50	50	100
10 EC 6P3	Computer Networks Laboratory	0	0	3	2	50	50	100
10 TP 0P4	Career Competency Development IV	0	0	2	0	100	00	100
Total		18	2	11	26	1000		

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Semester VII								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC 711	Optical Communication	3	0	0	3	50	50	100
10 EC 712	Wireless Communications	3	0	0	3	50	50	100
10 EC 713	Microwave Engineering	3	1	0	4	50	50	100
10 EC 714	ASIC Design	3	0	0	3	50	50	100
10 EC E2*	Elective II	3	0	0	3	50	50	100
10 HS 002	Total Quality Management	3	0	0	3	50	50	100
	PRACTICAL							
10 EC 7P1	Communication Laboratory II	0	0	3	2	50	50	100
10 EC 7P2	System Design Laboratory	0	0	3	2	80	20	100
10 EC 7P3	Project Work – Phase I	0	0	4	2	100	00	100
10 TP 0P5	Career Competency Development V	0	0	2	0	100	00	100
Total		18	1	12	25	1000		
Semester VIII								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC 811	Telecommunication Switching Techniques	3	0	0	3	50	50	100
10 EC E3*	Elective III	3	0	0	3	50	50	100
10 EC E4*	Elective IV	3	0	0	3	50	50	100
10 HS 003	Principles of Management	3	0	0	3	50	50	100
	PRACTICAL							
10 EC 8P1	Project Work - Phase II	0	0	16	8	50	50	100
Total		12	0	16	20	500		

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Programme Code & Name	EC : B.E. Electronics and Communication Engineering							
Elective I								
Course Code	Course Name	Hours/ Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
	THEORY							
10 EC E11	Medical Electronics	3	0	0	3	50	50	100
10 EC E12	Advanced Signal Processing	3	1	0	3	50	50	100
10 EC E13	Television and Video Engineering	3	0	0	3	50	50	100
10 EC E14	Advanced Microprocessors	3	0	0	3	50	50	100
10 EC E15	Numerical Methods	3	1	0	3	50	50	100
10 EC E16	Foundations for Nanoelectronics	3	0	0	3	50	50	100
10 EC E17	Micro Electromechanical Systems	3	0	0	3	50	50	100
Elective II								
10 EC E21	Digital Image Processing	3	0	0	3	50	50	100
10 EC E22	VLSI Signal Processing	3	0	0	3	50	50	100
10 EC E23	Radar and Navigational Aids	3	0	0	3	50	50	100
10 EC E24	Operations Research	3	0	0	3	50	50	100
10 EC E25	Robotics	3	0	0	3	50	50	100
10 EC E26	RF Microelectronics	3	0	0	3	50	50	100
10 EC E27	Space Time Communication	3	0	0	3	50	50	100
10 EC E28	Soft Computing	3	0	0	3	50	50	100
Elective III								
10 EC E31	Pattern Recognition	3	0	0	3	50	50	100
10 EC E32	Bio signal Processing	3	0	0	3	50	50	100
10 EC E33	DSP Architecture With FPGA	3	0	0	3	50	50	100
10 EC E34	Embedded System Design	3	0	0	3	50	50	100
10 EC E35	Linear Algebra	3	0	0	3	50	50	100
10 EC E36	Optoelectronic Devices	3	0	0	3	50	50	100
10 EC E37	RF MEMS Circuit Design	3	0	0	3	50	50	100
10 EC E38	Cryptography and Network Security	3	0	0	3	50	50	100
Elective IV								
10 EC E41	Principles of Medical Imaging	3	0	0	3	50	50	100
10 EC E42	Speech Processing	3	0	0	3	50	50	100
10 EC E43	Multimedia Communication Technology	3	0	0	3	50	50	100
10 EC E44	Arm Architecture and Programming	3	0	0	3	50	50	100
10 EC E45	Avionics	3	0	0	3	50	50	100
10 EC E46	Virtual Instrumentation	3	0	0	3	50	50	100
10 EC E47	DSP Processor Architecture and Programming	3	0	0	3	50	50	100

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<tr><td colspan="8">Semester I</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 101</td><td colspan="2">TECHNICAL ENGLISH</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To improve learners vocabulary and to enable them to use words appropriately in different academic and professional contexts, familiarize learners with different rhetorical functions of Technical English, develop strategies that could be adopted while reading texts, acquire the ability to speak effectively in English in real-life and career related situations and train learners in organized academic and professional writing.</td></tr>
<tr><td>1</td><td colspan="5">GRAMMAR AND VOCABULARY</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Word formation with prefixes and suffixes – synonyms and antonyms – verb patterns- subject-verb agreement – tenses – voices – use of conditionals – comparative adjectives (affirmative and negative) – expanding nominal compounds – articles – use of prepositions - phrasal verbs – British and American vocabulary – error detection – abbreviations and acronyms.</td></tr>
<tr><td>2</td><td colspan="5">LISTENING</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Extensive listening – listening for general content – listening to fill up gapped texts – intensive listening – listening for specific information: retrieval of factual information – listening to identify topic, context, function, speaker’s opinion, attitude, etc. – global understanding skills and ability to infer, extract gist and understand main ideas – note-taking: guided and unguided</td></tr>
<tr><td>3</td><td colspan="5">SPEAKING</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Verbal and non verbal communication – speech sounds – syllables – word stress (structures and content words) – sentences stress – intonation – pronunciation drills, tongue twisters – formal and informal English – oral practice – developing confidence – introducing oneself – asking for or eliciting information – describing objects – expressing opinions (agreement / disagreement) – giving instructions</td></tr>
<tr><td>4</td><td colspan="5">READING</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Exposure to different reading techniques – reading for gist and global meaning – predicting the content – skimming the text – identifying the topic sentence and its role in each paragraph – scanning – inferring / identifying lexical and contextual meanings – reading for structure and detail – transfer of information / guided note-making – understanding discourse coherence – sequencing of sentences – cloze reading.</td></tr>
<tr><td>5</td><td colspan="5">WRITING</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Introductions to the characteristics of technical style – writing definitions and descriptions – paragraph writing (topic sentence and its role, unity, coherence and use of cohesive expressions) – process description (use of sequencing connectives) – comparison and contrast – classifying the data – analyzing / interpreting the data – formal letter writing (letter to the editor, letter for seeking practical training, and letter for undertaking project works in industries) – editing (punctuation, spelling and grammar)</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">Rizvi M Ashraf, ‘Effective Technical Communication’, 1st Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2005.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Dr.M.Balasubraminian and Dr.G.Anbalagan, ‘Performance in English’ Anuradha Publications, Kumbakonan, 2007.</td></tr>
<tr><td>2</td><td colspan="7">Sharon J. Gerson, Steven M. Gerson, ‘Techinical Writing – Process & Product’. 3rd Edition, Pearson Education (Singapore) (p) Ltd., New Delhi, 2004.</td></tr>
<tr><td>3</td><td colspan="7">Mitra K. Barun, ‘Effective Techinical Communication – A Guide for Scientists and Engineers’, Oxford University Press, New Delhi, 2006.</td></tr>
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Department	Electronics and Communication Engineering	Programme Code & Name			EC : B.E. Electronics and Communication Engineering			
Semester I								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 102	ENGINEERING MATHEMATICS I	3	1	0	4	50	50	100
Objective(s)	The course is aimed at developing the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many engineering fields, significantly in fluid mechanics, field theory and communication engineering.							
1	MATRICES				Total Hrs	8		
Column matrix as vector – linear independent and dependent of vector –Characteristic equation – Eigen values and Eigen vectors of a real matrix –Properties of eigen values and eigenvectors – Cayley – Hamilton theorem (without proof) – Similarity transformation (concept only) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.								
2	GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS				Total Hrs	9		
Curvature – Cartesian and polar co-ordinates – Centre and radius of curvature – Circle of curvature – Involutes and evolutes – Envelopes – Properties of envelopes and evolutes –Evolute as envelope of normals.								
3	FUNCTIONS OF SEVERAL VARIABLES				Total Hrs	9		
Functions of two variables – Partial derivatives – Total differential – Maxima and minima – Constrained maxima and minima – Lagrange's multiplier method – Jacobians.								
4	ORDINARY DIFFERENTIAL EQUATIONS				Total Hrs	9		
Linear differential equations of Second and higher order with constant coefficient when the R.H.S is e^{ax}, x^n n>0,sin ax , cos ax, e^{ax} x^n , $e^{\alpha x}$ Sinβx, $e^{\alpha x}$ cosβx, x^n sinα x and x^n cosα x – Differential Equations with variable coefficients (Cauchy's Form and Legendre's Linear Equation).								
5	DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS				Total Hrs	15		
Simultaneous first order linear equations with constant coefficients – Method of variation of parameters – Solution of specified differential equations connected with electric circuits, bending of beams and simple harmonic motion (Differential equations and associated conditions need be given)								
Total hours to be taught						60		
Text book (s) :								
1	Veerarajan. T., "Engineering Mathematics (for first year), Fourth Edition Tata McGraw- Hill Publishing Company Limited, New Delhi, 2005.							
2	Grewal. B.S., "Higher Engineering Mathematics", Thirty Eighth Edition, Khanna Publishers, Delhi, 2004.							
Reference(s) :								
1	Kandasamy. P, Thilagavathy. K and Gunavathy. K, "Engineering Mathematics" – S.Chand and Co. – New Delhi 2007.							
2	Kreyszig. E., "Advanced Engineering Mathematics," Eighth Edition, John Wiley and Sons (Asia) Limited, Singapore 2001.							
3	Venkataraman.M.K, "Engineering Mathematics, Volume I & II Revised Enlarged Fourth Edition".							

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<tr><td>Department</td><td colspan="2">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="3">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="8">Semester I</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 103</td><td colspan="2">PHYSICS OF MATERIALS
(CS, EC, EE, EI, IT)</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">Impart fundamental knowledge in various engineering materials and applications, knowledge about conducting, superconducting, semiconducting, dielectric and Nanomaterials.</td></tr>
<tr><td>1</td><td colspan="5">CONDUCTING AND SUPERCONDUCTING MATERIALS</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Introduction-Classical Free electron theory-verification of Ohm’s law -Electrical Conductivity- Expression for electrical Conductivity-Thermal Conductivity-Expression for thermal Conductivity-Widemann Franz Law(Derivation)- Lorentz number - Advantages and drawbacks of classical free Electron theory-Fermi distribution function- superconductivity-Properties of Superconductors-Factors affecting superconducting phenomena-penetration depth (Qualitative)- DC and AC Josephson effect (Qualitative)-BCS theory- Type-I and Type-II superconductors-High T_C Superconductors-Applications: SQUID, Cryotron, Magnetic Levitation.</td></tr>
<tr><td>2</td><td colspan="5">MAGNETIC MATERIALS</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Classification of Magnetic materials-properties-Heisenberg and Domain theory of ferromagnetism-Hystersis-Hard and Soft magnetic materials-Ferrites-Structure, preparation and Applications-Magnetic Recording and read out-Bubble memory-Magnetic Tape-Floppy Disc and Magnetic hard disc.</td></tr>
<tr><td>3</td><td colspan="5">SEMICONDUCTING MATERIALS</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Introduction-properties-Elemental and Compound Semiconductors-Intrinsic and Extrinsic Semiconductors-Properties-Carrier Concentration in intrinsic and Extrinsic semiconductors (Derivation)- electrical conductivity of a semiconductor- determination of band gap-Relation between electrical conductivity and mobility- Fermilevel-Variation of Fermi level with Temperature and impurities-Hall effect-Hall Coefficient-Experimental Determination of Hall Coefficient, Applications.</td></tr>
<tr><td>4</td><td colspan="5">DIELECTRIC MATERIALS</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Introduction-Polarization: Electronic, ionic, orientational and space charge-Frequency and Temperature dependence of polarization-Active and Passive Dielectric-internal field-Clasius –Mosotti relation(Derivation)-Dielectric Losses –types of dielectric materials (Liquid, Solid, gaseous)-Dielectric breakdown Mechanisms-Ferroelectric materials: properties and applications.</td></tr>
<tr><td>5</td><td colspan="5">NANOMATERIALS</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Introduction-Properties-Fabrication methods-Top-Down Process – Ball milling-Nanolithography-Bottom-up Process-Vapour Phase Deposition(PVD & CVD)-Molecular Beam Epitaxy(MBE)-Metal Organic Vapour Phase Epitaxy(MOVPE)-Carbon Nano Tube(CNT):Properties,Preparation and applications.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">Dr.Arumugam M, “Engineering Physics II” Anuradha Publications, Kumbakonam, Reprint 2010.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Raghavan V, “Materials and Engineering”, Prentice-Hall of India, New Delhi, 2007.</td></tr>
<tr><td>2</td><td colspan="7">Gaur R K, Gupta S L, “Engineering Physics”, Dhanpat Rai Publications, New Delhi, 2006.</td></tr>
<tr><td>3</td><td colspan="7">www.howstuffworks.com</td></tr>
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Semester I								
Course Code	Course Name	Hours / Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
10 EC 104	ENGINEERING CHEMISTRY (CS, EC, EE, EI, IT)	3	0	0	3	50	50	100
Objective(s)	The student should be conversant with the principles involved in electro chemistry, corrosion and its inhibition, treatment of water for industrial purposes and the concept of energy storage devices, knowledge with respect to fuels and combustion and polymer and engineering materials.							
1	WATER TREATMENT				Total Hrs	9		
Water - sources and sanitary significance – Hardness of water - Estimation of hardness by EDTA method – Alkalinity. Boiler feed water- scale formation, corrosion, caustic embrittlement, priming and foaming- softening of water - Internal and external treatment - zeolite process – demineralization – desalination – electro dialysis and reverse osmosis. Domestic water treatment.								
2	ELECTRO CHEMISTRY				Total Hrs	9		
Introduction – Kohlrausch's law- applications-conductometric titration-Electrode potential-Nernst equation-problems-Reference electrode-calomel electrode-SHE-weston cadmium cell-Types of electrodes-Measurement of pH using glass electrode-Galvanic series- emf series-applications. Electro chemical cells-concentration cells-reversible and irreversible cell – EMF - measurements – Potentiometric titrations								
3	CORROSION & CORROSION CONTROL				Total Hrs	9		
Corrosion – Electrochemical and chemical – Mechanism – factors influencing rate of corrosion - corrosion reaction – types of corrosion – differential aeration – pitting – corrosion control – Sacrificial anode and Impressed current method – Inhibitors – Protective coatings – Preliminary treatment – Electroplating (Cr & Ni) – Paints – Constituents and their functions – Special paints - Mechanism of drying.								
4	FUELS & COMBUSTION				Total Hrs	9		
Introduction-solid, liquid and gaseous fuels-Difference among solid,liquid and gaseous fuels-Explosive range(or) limits of inflammability-Calorific values –Spontaneous ignition temperature- flue gas analysis – Coal – analysis of coal– carbonization of coal-metallurgical coke -manufacture of metallurgical coke – hydrogenation of coal – petroleum – Cracking – Catalytic Cracking – Polymerisation - alkylation – Octane number – improving octane number by additives – Diesel – Cetane number –natural gas, water gas, producer gas, gobar gas & LPG.								
5	POLYMERS				Total Hrs	9		
Polymer structure – Nomenclature – Polymerization – types – mechanism (free radical only) – co-ordination polymerization – mechanism – individual polymers – Polyethylene, Polypropylene, PVC, Teflon, Acrylics, Nylon6-6, Bakelite, Polyester, Epoxy, Polyurethane – Structure, Preparation, Properties and Uses – Compounding and fabrication – Compression, Injection, Extrusion and Blow moulding– Foamed plastics.								
Total hours to be taught						45		
Text book :								
1.	R.Palanivelu, B.Srividhya, K.Tamilarasu and P.Padmanaban, "Engineering Chemistry", Sakura Publishers, Erode, 4th Edition, 2010.							
References :								
1.	Jain P.C. & Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co. New Delhi, 14th Edition, 2002.							
2.	Clair N Sawyer and Perry L Mc Carty, "Chemistry for Environmental Engineering", TMH Book Company, New Delhi, 14th Edition, 2002.							
3.	Dara S.S. "A text book of Engineering Chemistry, S.Chand & Co. Ltd., 2003.							
4.	Uppal M.M. revised by S.C.Bhatia, "Engineering Chemistry", Khanna Publishers, New Delhi, 6th Edition, 2001.							
5	www.howstuffworks.com							

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<tr><td>Department</td><td colspan="2">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="3">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="9">Semester I</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 105</td><td colspan="2">ENGINEERING GRAPHICS (CS, EC, EE, EI, IT)</td><td>2</td><td>0</td><td>3</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">Student’s skill in the graphical communication of concepts and ideas in the design of engineering products are to be obtained by training them to understand objects by making free hand sketches of simple engineering objects and computer 2D and 3D modeling techniques.</td></tr>
<tr><td colspan="9">Instructions:
1. Unit – I Free Hand Sketching
2. Unit – II to V, examination will be conducted using drafting software</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION TO ENGINEERING DRAWING (Free Hand Sketching)</td><td colspan="2">Total Hrs</td><td>10</td></tr>
<tr><td colspan="9">Drawing Sheet Layouts - Title Block - Instruments used - Lines - Lettering – Dimensioning
Construction of Pentagon, Hexagon, Conic Sections. Construction of Ellipse, Parabola and Hyperbola (Eccentricity method only) with tangent and normal Introduction to cycloid only and Involutes of square and circle. Introduction to Drafting Software</td></tr>
<tr><td>2</td><td colspan="5">ORTHOGRAPHIC PROJECTION(Using Drafting Software)</td><td colspan="2">Total Hrs</td><td>10</td></tr>
<tr><td colspan="9">Theory of projection - Terminology, Method of projection, introduction of First angle and Third angle projection. Conversion of pictorial views into orthographic view. Projection of points in first quadrant.</td></tr>
<tr><td>3</td><td colspan="5">PROJECTION OF LINES AND PLANES(Using Drafting Software)</td><td colspan="2">Total Hrs</td><td>10</td></tr>
<tr><td colspan="9">Projection of lines in first quadrant - parallel to one plane and inclined to other, true length, true inclinations. Projection of planes in first quadrant inclined to one plane – Triangular, Rectangular, Pentagonal, Hexagonal, Circular planes.</td></tr>
<tr><td>4</td><td colspan="5">PROJECTION OF SOLIDS AND SECTION OF SOLIDS(Using Drafting Software)</td><td colspan="2">Total Hrs</td><td>10</td></tr>
<tr><td colspan="9">Projection of simple solids (axis is parallel to one plane) - Prisms, Pyramids, Cylinder and Cone using change of position method. Sectioning of above solids in simple position (base is on HP and axis perpendicular to HP) by cutting plane inclined to one reference plane, true shape of section.</td></tr>
<tr><td>5</td><td colspan="5">DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTION(Using Drafting Software)</td><td colspan="2">Total Hrs</td><td>10</td></tr>
<tr><td colspan="9">Development of lateral surfaces of simple and truncated solids - Prisms, Pyramids, Cylinders and Cones with square hole perpendicular to the axis. Principles of isometric projection. Isometric scale - isometric projections of simple solids, Prisms, Pyramids, Cylinders and Cones. Introduction to Perspective Projection (Not for examination)</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">50</td></tr>
<tr><td colspan="9">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="8">Kulkani D.M, Rastogi A.P, Sarkar A.K, “Engineering Graphics with AutoCAD”, PHI Learning Private Limited, New Delhi, 2009.</td></tr>
<tr><td>2</td><td colspan="8">Venugopal K., “Engineering Graphics”, New Age International (P) Limited, 2002.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Bhatt N.D., “Engineering Drawing”, Charotar Publishing House Pvt. Ltd., 49th Edition, Anand, Gujarat, 2006.</td></tr>
<tr><td>2</td><td colspan="8">Natarajan K.V., “A textbook of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2006</td></tr>
<tr><td>3</td><td colspan="8">Shah M.B. and Rana B.C., “Engineering Drawing”, Pearson Education, 2005.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 106</td><td colspan="2">BASICS OF CIVIL AND MECHANICAL ENGINEERING (CS, EC, EE, EI, IT)</td><td>4</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="9">BASICS OF CIVIL ENGINEERING</td></tr>
<tr><td>Objective(s)</td><td colspan="8">At the end of the course the students must know the various aspect of Civil Engineering activity for society needs and developments.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Introduction – Scope of Civil Engineering – Function of Civil Engineers – Construction Materials – Classification – Uses –Requirements:- – Bricks-stone – Cement – Sand – Concrete – Steel Sections.</td></tr>
<tr><td>2</td><td colspan="5">SUBSTRUCTURE & SUPERSTRUCTURE</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Substructure – Selection of site for building– Bearing capacity of soil – Requirement of good foundation – Types of foundation – Residential foundation - Superstructure – Technical terms: - Types – Brick masonry – Stone masonry – Components:- – Beams – Columns – Lintels – Types of roofing – Types of Flooring.</td></tr>
<tr><td>3</td><td colspan="5">SURVEYING</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Surveying – Objectives – Types of Survey – Instruments used for Measurement of distances – Calculation of areas (Problems). e-waste management.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">27</td></tr>
<tr><td colspan="9">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="8">Palanisamy, M.S., “Basics of Civil Engineering.”, TMH Publishing Co., New Delhi, 2008.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Ramamrutham.S, ″Basic Civil Engineering ″ Dhanpat Rai Publishing Co. (P) Ltd. 1999</td></tr>
<tr><td colspan="9">BASICS OF MECHANICAL ENGINEERING</td></tr>
<tr><td>Objective(s)</td><td colspan="8">At the end of this semester, the student should be conversant in power plant, IC Engines, R & A/C and Belt drives.</td></tr>
<tr><td>1</td><td colspan="4">SOURCES OF ENERGY AND POWER PLANTS</td><td>Total Hrs</td><td colspan="3">9</td></tr>
<tr><td colspan="9">Introduction - classification of energy sources - conventional energy sources: working principle of steam, Gas, Diesel, Hydro-electric and Nuclear power plant - Non - conventional energy sources: working principle of Solar, Wind, Tidal and Geothermal power plant.</td></tr>
<tr><td>2</td><td colspan="4">INTERNAL COMBUSTION ENGINES</td><td>Total Hrs</td><td colspan="3">9</td></tr>
<tr><td colspan="9">Introduction - working principle of diesel and petrol engines - Four stroke and two stroke cycles -Comparison of two stroke and four stroke engine – fuel supply system-Ignition system - calculation of Mechanical efficiency and Brake thermal efficiency.</td></tr>
<tr><td>3</td><td colspan="4">REFRIGERATION AND AIR-CONDITIONING AND BELT DRIVES</td><td>Total Hrs</td><td colspan="3">9</td></tr>
<tr><td colspan="9">Introduction - Terminology of Refrigeration and Air conditions – working principle of vapour compression and absorption system-Layout of typical domestic refrigerator, window and split type room air conditioners - calculation of Cop -Types of Belt, selection of belt drives - material used for belt -calculation of power transmitted by belt.</td></tr>
<tr><td colspan="6">Total hours to be taught</td><td colspan="3">27</td></tr>
<tr><td colspan="9">Text book (s):</td></tr>
<tr><td>1</td><td colspan="8">Shanmugam.G, “Basic Mechanical Engineering”, Tata McGraw- Hill publishing Company Limited, New Delhi, Second Reprint, 2007.</td></tr>
<tr><td colspan="9">Reference(s):</td></tr>
<tr><td>1</td><td colspan="8">Khurmi.R.S, J.K. Gupta, “Theory of Machines”, Eurasia Publisher House (p)Ltd., New Delhi, 2003.</td></tr>
<tr><td>2</td><td colspan="8">www.howstuffworks.com</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Semester I								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 107	ENGINEERING CHEMISTRY LABORATORY (CS, EC, EE, EI, IT)	0	0	3	2	50	50	100
Objective(s)	Educate the theoretical concepts Experimentally							
1	Estimation of hardness of water by EDTA.				Total Hrs	3		
2	Estimation of alkalinity of water sample.				Total Hrs	3		
3	Estimation of chloride content in water sample.				Total Hrs	3		
4	Determination of dissolved oxygen in boiler feed water.				Total Hrs	3		
5	Determination of water of crystallization of a crystalline salt.				Total Hrs	3		
6	Conductometric titration of strong acid with strong base.				Total Hrs	3		
7	Conductometric titration of mixture of acids.				Total Hrs	3		
8	Precipitation titration by conductometric method.				Total Hrs	3		
9	Determination of strength of HCl by pH Meter.				Total Hrs	3		
10	Estimation of ferrous ion by potentiometric titration .				Total Hrs	3		
11	Determination of sodium and potassium in a water sample by flame photometry (Demo only).				Total Hrs	3		
12	Estimation of ferric ion by spectrophotometry (Demo only).				Total Hrs	3		
Total hours to be taught						36		
Lab Manual :								
1	R.Palanivelu and B.Srividhya, “Engineering Chemistry Lab Manual”.							
Reference(s) :								
1	J. Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel’s Text book of Quantitative Chemical Analysis, 6th Edition, Pearson Education, 2004.							

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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 108</td><td colspan="2">ENGINEERING PRACTICES LABORATORY
(CS, EC, EE, EI, IT)</td><td>0</td><td>0</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To provide exposure to the students with hands on experience on various basic engineering practices in Mechanical Engineering</td></tr>
<tr><td>1</td><td colspan="5">FITTING</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Safety aspects in Fitting, Study of tools and equipments, Preparation of models- Filing, Square, Vee.</td></tr>
<tr><td>2</td><td colspan="5">CARPENTRY</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Safety aspects in Carpentry, Study of tools and equipments, Preparation of models- Planning, Tee Halving, Cross Lap, Wood turning.</td></tr>
<tr><td>3</td><td colspan="5">SHEET METAL</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Safety aspects in Sheet metal, Study of tools and equipments, Preparation of models- Cylinder, Cone, Tray.</td></tr>
<tr><td>4</td><td colspan="5">WELDING</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Safety aspects of welding, Study of arc welding equipments, Preparation of models -Lap, butt, T-joints. Study of Gas Welding and Equipments.</td></tr>
<tr><td>5</td><td colspan="5">ELECTRICAL WIRING AND PLUMBING</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Safety aspects of Electrical wiring, Study of Electrical Materials and wiring components, Wiring circuit for a lamp using single and stair case switches. Wiring circuit for fluorescent lamps
Study of plumbing tools, Study of pipe connection with coupling and reducer.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 201</td><td colspan="2">COMMUNICATION SKILLS</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To equip students with effective speaking and listening skills in English, help them develop the soft skills and people skills which will make them to excel in their jobs and enhance to students' performs at placement interviews</td></tr>
<tr><td>1</td><td colspan="5">LISTENING</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Barriers in Listening - Listening to academic lectures - Listening to announcements at railway stations, airports, etc - Listening to news on the radio / TV - Listening to casual conversation - Listening to live speech</td></tr>
<tr><td>2</td><td colspan="5">COMMUNICATION</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">What is communication? - What does it involve? Accuracy, fluency and appropriateness - Levels of formality - Differences between spoken and written communication - Greeting and introduction - Making requests - Asking for permission, Giving / Denying permission - Giving directions - Art of small talk - Taking part in casual conversation - Making a short formal speech Describing people, place, things and events</td></tr>
<tr><td>3</td><td colspan="5">CONVERSATION SKILLS</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Using the telephone - Preparing for a call - Stages of a call - Handling calls - Identifying self – Asking for repetitions - Spelling out names or words - Giving information on the phone – Making requests - Answering calls - Leaving messages on Answer Machines - Making / changing appointments - Making complaints – Reminding - Agreeing / Disagreeing – Listening - Listening and Taking messages - Giving instructions & Responding to instructions</td></tr>
<tr><td>4</td><td colspan="5">REMEDIAL GRAMMAR & VOCABULARY</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Tenses - 'Do' forms – Impersonal Passive voice - Imperatives – using should form – Direct, Indirect speech – Discourse markers – SI Units – Numerical expressions - Use of negatives – Prepositions - Phrasal verbs - Correct use of words - Use of formal words in informal situations - Commonly confused words – Editing.</td></tr>
<tr><td>5</td><td colspan="5">WRITTEN COMMUNICATION & CAREER SKILLS</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Writing e-mails - Writing Reports – Lab Reports - Preparing Curriculum Vitae and cover letters – Facing an Interview - Presentation skills - Persuasion skills – Flow Charts, Tree diagram – Recommendations – Check List – Slide Preparation – Verbal Reasoning (Analogy, Alphabet Test, Assertion & Reason, Situation Reaction Test) – Logical Deduction (Deriving Conclusions from passages, Theme Detection, Cause and Effect Reasoning).</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">Rizvi M Ashraf, 'Effective Technical Communication', 1st Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2005.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Kiranmai Dutt P, Geetha Rajeevan and Prakash C L N, 'A Course in Communication Skills', by Ebek – Cambridge University Press India Pvt. Ltd.</td></tr>
<tr><td>2</td><td colspan="7">Naterop, cup 'Telephoning in English' – Cambridge University Press India Pvt.Ltd., 2007</td></tr>
<tr><td>3</td><td colspan="7">Richard, 'New Interchange Services (Student's Book)' – Introduction, Level – 1, Level – 2, Level – 3, Cambridge University Press India Pvt.Ltd., 2007.</td></tr>
<tr><td>4</td><td colspan="7">Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.</td></tr>
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<tr><td>10 EC 202</td><td>ENGINEERING MATHEMATICS II</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">An aim of the course is to train the students in additional areas of engineering mathematics necessary for grooming them into successful engineers. The topics introduced will serve as basic tools for specialized studies in many engineering fields, significantly in fluid mechanics, field theory and communication engineering.</td></tr>
<tr><td>1</td><td colspan="5">MULTIPLE INTEGRALS</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Double integration in Cartesian and Polar coordinates – Change of order of integration – Area between two curves – Area as double integrals - Triple integration in Cartesian coordinates – Volume as triple integrals (simple problems only) .</td></tr>
<tr><td>2</td><td colspan="5">VECTOR CALCULUS</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Gradient, divergence and curl – Line, surface and volume integrals – Green’s, Gauss divergence and Stoke’s theorems (without proof) – Verification of the above theorems and evaluation of integrals using them.</td></tr>
<tr><td>3</td><td colspan="5">ANALYTIC FUNCTIONS</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Function of a complex variable – Analytic function – Necessary conditions –Polar form– Cauchy– Riemann equations – Sufficient conditions (excluding proof) – Properties of analytic function – Harmonic conjugate – Construction of Analytic functions -Conformal mapping: w = az, 1/z and bilinear transformation.</td></tr>
<tr><td>4</td><td colspan="5">COMPLEX INTEGRATION</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Cauchy’s theorem (without proof) – Cauchy’s integral formula – Taylor and Laurent series (without proof) – Singularities – Classification – Cauchy’s residue theorem – Contour integration – circular and semi-circular contours (excluding poles on real axis).</td></tr>
<tr><td>5</td><td colspan="5">LAPLACE TRANSFORM</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Laplace Transform – Conditions for existence – Transform of elementary functions – Basic properties – Derivatives and integrals of transforms – Transforms of derivatives and integrals – Initial and final value theorems – Transform of unit step function – Transform of periodic functions. Inverse Laplace transform – Convolution theorem – Solution of linear ODE of second order with constant coefficients and first order simultaneous equations with constant coefficients using Laplace transformation.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">Veerarajan. T., “Engineering Mathematics (for first year), Fourth Edition Tata McGraw- Hill Publishing Company Limited, New Delhi, 2005.</td></tr>
<tr><td>2</td><td colspan="7">Grewal. B.S., “Higher Engineering Mathematics”, Thirty Eighth Edition, Khanna Publishers, Delhi, 2004.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Kandasamy. P, Thilagavathy. K and Gunavathy. K, “Engineering Mathematics” – S.Chand and Co. New Delhi 2007.</td></tr>
<tr><td>2</td><td colspan="7">Venkataraman.M.K, “Engineering Mathematics, Volume I & II Revised Enlarged Fourth Edition”, The National Pub. Co., Chennai, 2004.</td></tr>
<tr><td>3</td><td colspan="7">Widder. D.V., “Advanced Calculus”, Second Edition, Prentice Hall of India, New Delhi, 2000.</td></tr>
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Semester II								
Course Code	Course Name	Hours / Week			Credit	Maximum marks		
		L	T	P	C	CA	ES	Total
10 EC 203	ENVIRONMENTAL ENGINEERING (CS, EC, EE, EI, IT)	3	0	0	3	50	50	100
Objective(s)	The student should be conversant with the evolution of environmentalism and the importance of environmental studies, various natural resources and the current threats to their sustainability, significance and protection of bio diversity and various forms of environmental degradation and international conventions and protocols for the protection of environment.							

1	ATMOSPHERE AND ECOSYSTEM	Total Hrs	9

Atmosphere – composition of atmosphere (troposphere, stratosphere, mesosphere and thermosphere) - Ozone and ozone depletion – Air pollution – sources, effects and control – Green house effect - Global warming – Climate change – Acid rain - Planet Earth – Biosphere – Hydrosphere – Lithosphere. Concept of ecosystem – structure and functions of ecosystem- producers, consumers and decomposers - Energy flow –Ecological succession-Food chains-Food webs- Ecological pyramids-Introduction, types, characteristic features-structures and function of forest, grassland and aquatic ecosystems (ponds and rivers) - Case Studies in current scenario.

2	WATER RESOURCES AND ITS TREATMENT	Total Hrs	9

Water – hydrological cycle – ground water – water shed – water use and quality – point and non-point sources of pollution – Oceans and fisheries – salinity – temperature – density – pressure – light – bioluminescence – Tsunamis – Glaciers – Water pollution – dissolved oxygen – surface water treatment – waste water treatment – Thermal pollution, noise pollution and control - Case Studies in current scenario.

3	LAND RESOURCES AND ITS DEGRADATION	Total Hrs	9

Land – weathering and erosion - types of weathering – types of soil – soil erosion – land slides – Wet land and deforestation- deserts – types – desertification – land degradation – features of desert – geochemical cycling – solid and hazardous waste, chemical waste, radio active waste – non hazardous waste - Case Studies in current scenario.

4	FUTURE POLICY AND ALTERNATIVES	Total Hrs	9

Future policy and alternatives – fossil fuels – nuclear energy – solar energy – wind energy – hydroelectric energy – geothermal energy – tidal energy – sustainability – green power – nano technology – international policy - Case Studies in current scenario.

5	BIO DIVERSITY AND HUMAN POPULATION	Total Hrs	9

Introduction to Bio diversity-Definition, genetic species and ecosystem diversity. Biogeographical classification of India – Biodiversity in India – India as mega diversity nation – hotspots of biodiversity in India – threats to biodiversity – endemic and endangered- habitat – conservation of biodiversity – environment protection act – issues and possible solution – population growth - population explosion – environment and human health - HIV-AIDS- Case Studies in current scenario.

Total hours to be taught	45

Text book :

1. R.Palanivelu and B.Srividhya, “Environmental Engineering:, Sakura Publishers, Erode, 4th Edition, 2010.

Reference(s) :

1. Linda D. Williams – “Environmental Science Demystified”, Tata McGraHill Publishing Company Limited, 2005.
2. G. Tyler Miller, JR _ “Environmental Science “, Thomson, 2004.
3. William P. Cunningham – “Principles of Environmental Science”, Tata McGraHill, New Delhi, 2007.
4. Bharucha Erach –“The Biodiversity of INDIA”, Mapin Publishing Private Limited, Ahamedabad, India.
5. Trivedi R.K., “Hand Book of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Volume I & II, Environmedia.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering	Programme Code & Name			EC : B.E. Electronics and Communication Engineering			
Semester II								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 204	ENGINEERING PHYSICS (CS, EC, EE, EI, IT)	3	0	0	3	50	50	100
Objective(s)	To enhance students' knowledge of theoretical and modern technological aspects in physics, enable the students to correlate the theoretical principles with application oriented studies.							
1	ACOUSTICS OF BUILDING AND SOUND INSULATION				Total Hrs	9		
Introduction-Classification of sound – Characteristics of musical sound – sound intensity level – Weber-Fechner law –Bel, Decibel, Phon, Sone – Acoustics of building - Reverberation – Reverberation time – Sabine's formula – Absorption co-efficient (derivation)– Factors affecting the acoustics of buildings and their remedies- Factors to be followed for good acoustics of building.								
2	LASER AND APPLICATIONS				Total Hrs	9		
Introduction – Principle of spontaneous emission, stimulated absorption and emission – Einstein's co-efficient (derivation)– Types of lasers: Nd:YAG, Semiconductor laser (homo junction and hetro junction), CO_2 laser – Applications: Lasers in welding, cutting, drilling and soldering- medical applications: laser endoscopy, bloodless surgery – Holography: Construction and reconstruction of hologram –applications.								
3	FIBER OPTICS AND SENSORS				Total Hrs	9		
Principles – cone of acceptance, numerical aperture (derivation)- Modes of propagation – Concept of bandwidth (Qualitative)- Crucible-crucible technique –zone refining (rod and tube method)- Classification based on materials, refractive index and modes– Splicing – Losses in optical fiber – Light sources for fiber optics – Detectors – Fiber optical communication links – Advantage of fiber optical cable over copper cables- Fiber optic sensors: Temperature, Displacement, Voltage and magnetic field measurement.								
4	ULTRASONICS AND APPLICATIONS				Total Hrs	9		
Introduction: Production of ultrasonic waves – Magnetostriction effect, magnetostriction generator-inverse piezoelectric effect, piezoelectric generator – Ultrasonic detection, properties, cavitation- acoustical grating- Industrial applications: Cleaning, SONAR, depth of sea – Non destructive testing – Pulse echo system, through transmission, resonance system- Medical applications:cardiology, neurology, ultrasonic imaging.								
5	QUANTUM PHYSICS AND APPLICATIONS				Total Hrs	9		
Development of Quantum theory – Dual nature of matter and radiation – de-Broglie wave length – Uncertainty principle, applications: single slit experiment, electron microscope - Schrodinger's equation time dependent and time independent – Particle in a box(one dimensional and three dimensional)- limitation of optical microscopy –electron microscope- Scanning electron microscope-transmission electron microscope-scanning transmission electron microscope-applications.								
Total hours to be taught						45		
Text book (s) :								
1	Dr.Palanisamy P.K, "Engineering Physics", Scitech Publications, Chennai, 2010.							
Reference(s) :								
1	Pillai S O, "Engineering Physics", New Age International Publishers, New Delhi, 2005.							
2	Rajendran V, "Engineering Physics", Tata McGraw-Hill Publishers, New Delhi, 2008							
3	www.howstuffworks.com							

<table>
<tr><td colspan="7">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td>Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="8">Semester II</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 205</td><td colspan="2">BASICS OF ENGINEERING MECHANICS (CS, EC, EE, EI, IT)</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">At the end of this course the student should be able to understand the scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.</td></tr>
<tr><td>1</td><td colspan="5">FUNDAMENTALS</td><td>Total Hrs</td><td colspan="2">7+4</td></tr>
<tr><td colspan="8">Introduction - Units and Dimensions - Laws of Mechanics – Lame’s theorem, Parallelogram and triangular Law of forces –Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.</td></tr>
<tr><td>2</td><td colspan="5">EQUILIBRIUM OF RIGID BODIES</td><td>Total Hrs</td><td colspan="2">7+4</td></tr>
<tr><td colspan="8">Free body diagram – Types of supports and their reactions -Types of trusses-Analysis of trusses (Method of Joints only) – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Scalar components of a moment – Varignon’s theorem - Equilibrium of Rigid bodies in two dimensions.</td></tr>
<tr><td>3</td><td colspan="5">PROPERTIES OF SURFACES AND SOLIDS</td><td>Total Hrs</td><td colspan="2">7+4</td></tr>
<tr><td colspan="8">Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section by using standard formula – second moment of plane area – Rectangle, triangle, circle from integration - T section, I section, Angle section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia.</td></tr>
<tr><td>4</td><td colspan="5">DYNAMICS OF PARTICLES</td><td>Total Hrs</td><td colspan="2">7+4</td></tr>
<tr><td colspan="8">Displacement, Velocity, acceleration and their relationship – Relative motion – Curvilinear motion – Newton’s law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.</td></tr>
<tr><td>5</td><td colspan="5">FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS</td><td>Total Hrs</td><td colspan="2">7+4</td></tr>
<tr><td colspan="8">Frictional force – Laws of Coloumb friction – simple contact friction – Rolling resistance – Belt friction. Translation and Rotation of Rigid Bodies; Velocity and acceleration – General Plane motion.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">55</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">Beer,F.P and Johnson Jr. E.R, “Vector Mechanics for Engineers”, Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, 1997.</td></tr>
<tr><td>2</td><td colspan="7">Rajasekaran, S, Sankarasubramanian, G., “Fundamentals of Engineering Mechanics”, Vikas Publishing House Pvt. Ltd., 2000.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Ashok Gupta, “Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)”, Pearson Education Asia Pvt., Ltd., 2002.</td></tr>
<tr><td>2</td><td colspan="7">Hibbeller, R.C.,”Engineering Mechanics”, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000.</td></tr>
<tr><td>3</td><td colspan="7">Palanichamy, M.S., Nagan, S., “Engineering Mechanics – Statics & Dynamics”, Tata McGraw-Hill, 2001.</td></tr>
<tr><td>4</td><td colspan="7">www.howstuffworks.com</td></tr>
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<tr><td colspan="7">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td>Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="8">Semester II</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 206</td><td colspan="2">FUNDAMENTALS OF PROGRAMMING (CS, EC, EE, EI, IT)</td><td>3</td><td>1</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To enable students to learn the basic concepts of computer and developing skills in programming using C language.</td></tr>
<tr><td>1</td><td colspan="5">COMPUTER BASICS</td><td>Total Hrs</td><td>8</td></tr>
<tr><td colspan="8">Evolution of computers- Generations of computers- Applications of computers- - Computer Memory and Storage- Input Output Media – Algorithm- Flowchart- Pseudo code – Program control structures- - Programming languages- - Computer Software- Definition- Categories of Software.</td></tr>
<tr><td>2</td><td colspan="5">C FUNDAMENTALS</td><td>Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Introduction to C- Constants- Variables- Data types- Operators and Expressions- Managing Input and Output operations- Decision Making and Branching- Looping.</td></tr>
<tr><td>3</td><td colspan="5">ARRAYS AND FUNCTIONS</td><td>Total Hrs</td><td>10</td></tr>
<tr><td colspan="8">Arrays- Character Arrays and Strings- User defined functions- Storage Classes</td></tr>
<tr><td>4</td><td colspan="5">STRUCTURES AND FILES</td><td>Total Hrs</td><td>10</td></tr>
<tr><td colspan="8">Structures- Definition- Initialization- Array of Structures- Structures within structures- Structures and Functions- Unions- File Management.</td></tr>
<tr><td>5</td><td colspan="5">POINTERS</td><td>Total Hrs</td><td>8</td></tr>
<tr><td colspan="8">Pointer Basics – Pointer Arithmetic – Pointers and array Pointers and character string
Pointers and functions – Pointers and structures</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">Dr.K.Duraisamy, R.Nallusamy, R.Kanagavalli, S.Ponmathangi, D.Muthusankar, P.Kaladevi, “Fundamentals of Programming”, Techvision Publishers 2008.</td></tr>
<tr><td>2</td><td colspan="7">E.Balagurusamy, “Programming in ANSI C”, TMH, New Delhi, 2002.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Rajaraman V, “Fundamentals of Computers”, Fourth Edition, PHI 2006.</td></tr>
<tr><td>2</td><td colspan="7">Byron Gottfried, “Programming with C”, II Edition, TMH, 2002.</td></tr>
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<tr><td colspan="10">Semester II</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td colspan="2" rowspan="2">Course Name</td><td colspan="3">Hours / Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC 207</td><td colspan="2">ENGINEERING PHYSICS LABORATORY (CS, EC, EE, EI, IT)</td><td>0</td><td>0</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="8">To give exposure for understanding the various physical phenomena’s in optics, acoustics material science and properties of matter in engineering applications, determine the fundamental constants like acceleration due to gravity, viscosity of liquid, wave length of laser, band gap of semiconductor etc.,</td></tr>
<tr><td colspan="10">LIST OF EXPERIMENTS (Any Ten)</td></tr>
<tr><td>1</td><td colspan="9">Determination of rigidity modulus of a wire by torsional pendulum.</td></tr>
<tr><td>2</td><td colspan="9">Determination of Young’s modulus of the material of a uniform bar by non-uniform bending method.</td></tr>
<tr><td>3</td><td colspan="9">Determination of Young’s modulus of the material of a uniform bar by uniform bending method.</td></tr>
<tr><td>4</td><td colspan="9">Determination of Viscosity of liquid by Poiseuille’s method.</td></tr>
<tr><td>5</td><td colspan="9">Determination of acceleration due to gravity by compound (bar) pendulum.</td></tr>
<tr><td>6</td><td colspan="9">Determination of wavelength of mercury spectrum by Spectrometer grating.</td></tr>
<tr><td>7</td><td colspan="9">Determination of thickness of fiber by Air-wedge method.</td></tr>
<tr><td>8</td><td colspan="9">Determination of wavelength of laser using grating and particle size determination.</td></tr>
<tr><td>9</td><td colspan="9">Determination of velocity of ultrasonic waves and compressibility using ultrasonic interferometer.</td></tr>
<tr><td>10</td><td colspan="9">Determination of band gap energy of a semiconductor.</td></tr>
<tr><td>11</td><td colspan="9">Determination of radius of curvature of a Plano convex lens by Newton rings method.</td></tr>
<tr><td>12</td><td colspan="9">Determination of acceptance angle numerical aperture using fibre optics.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td colspan="2">30</td></tr>
<tr><td colspan="10">Lab Manual :</td></tr>
<tr><td>1</td><td colspan="9">“Physics Lab Manual”, Department of Physics, KSRCT.</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering	Programme Code & Name			EC : B.E. Electronics and Communication Engineering			
Semester II								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 208	FUNDAMENTALS OF PROGRAMMING LABORATORY (CS, EC, EE, EI, IT)	0	0	3	2	50	50	100
Objective(s)	To enable the students to apply the concepts of C to solve real time problems							
List of experiments								

1. Write a C program to print Pascal's triangle.
2. Write a C program to print the sine and cosine series.
3. Write a C program to perform Matrix multiplication.
4. Write a C program to prepare and print the sales report.
5. Write a C program to perform string manipulation functions like string concatenations, comparison, find the length and string copy without using library functions.
6. Write a C program to arrange names in alphabetical order.
7. Write a C program to calculate the mean, variance and standard deviation using functions.
8. Write a C program to perform sequential search using functions.
9. Write a C program to print the Fibonacci series and to calculate the factorial of the given number using functions.
10. Write a C program to print the mark sheet of n students using structures.
11. Write a C program to merge the given two files.
12. Write a C Program to perform Swap Using Pointers.

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<tr><td>Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="8">Semester III</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 301</td><td colspan="2">ENGINEERING MATHEMATICS III</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">The course objective is to impact analytical skills to the students in the areas of boundary value problems and transform techniques. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.</td></tr>
<tr><td>1</td><td colspan="5">PARTIAL DIFFERENTIAL EQUATIONS</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange’s linear equation – Linear partial differential equations of second and higher order with constant coefficients.</td></tr>
<tr><td>2</td><td colspan="5">FOURIER SERIES</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Dirichlet’s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series –Parseval’s Identity – Harmonic Analysis.</td></tr>
<tr><td>3</td><td colspan="5">BOUNDARY VALUE PROBLEMS</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Fourier series solutions in Cartesian coordinates.</td></tr>
<tr><td>4</td><td colspan="5">FOURIER TRANSFORM</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval’s Identity – Problems.</td></tr>
<tr><td>5</td><td colspan="5">Z -TRANSFORM AND DIFFERENCE EQUATIONS</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Z-transform - Elementary properties - Initial and final value theorem – Inverse Z – transform – Partial fraction method – Residue method - Convolution theorem - Solution of difference equations using Z - transform.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>60</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">Grewal, B.S., “Higher Engineering Mathematics”, Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.</td></tr>
<tr><td>2</td><td colspan="7">T.Veerarajan, “Engineering Mathematics-III”, Tata McGraw Hill Publishing Company Limited, New Delhi.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Kandasamy, P., Thilagavathy, K., and Gunavathy, K., “Engineering Mathematics Volume III”, S. Chand & Company ltd., New Delhi, 1996</td></tr>
<tr><td>2</td><td colspan="7">Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G., “Advanced Mathematics for Engineering Students”, Volumes II and III, S. Viswanathan (Printers and Publishers) Pvt. Ltd. Chennai, 2002.</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name		EC : B.E. Electronics and Communication Engineering			
Semester III								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 302	DIGITAL PRINCIPLES AND SYSTEM DESIGN (CS, EC, IT)	3	0	0	3	50	50	100
Objective(s)	To introduce number systems and codes, basic postulates of Boolean algebra and show the correlation between Boolean expressions. To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits and to introduce the concept of memories and programmable logic devices.							
1	NUMBER SYSTEMS				Total Hrs	9		
Binary, Octal, Decimal, Hexadecimal - Number base conversions – complements – signed Binary numbers. Binary Arithmetic - Binary codes: Weighted – BCD – 2421 - Gray code - Excess 3 code - ASCII – Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan's Theorem-Principle of Duality - Boolean function - Minimization of Boolean expressions – Sum of Products (SOP) – Product of Sums (POS) – Minterm – Maxterm - Canonical forms – Conversion between canonical forms – Karnaugh map Minimization – Don't care conditions.								
2	LOGIC GATES & COMBINATIONAL CIRCUITS				Total Hrs	9		
LOGIC GATES: AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR - Implementations of Logic Functions using gates, NAND – NOR implementations – Multi level gate implementations - Multi output gate implementations. TTL and CMOS Logic and their characteristics –Tristate gates. COMBINATIONAL CIRCUITS: Design procedure – Adders - Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor - BCD adder - Magnitude Comparator – Multiplexer / Demultiplexer - encoder / decoder – parity checker – code converters: binary to gray, gray to binary, BCD to excess 3 code. Implementation of combinational logic using MUX.								
3	SEQUENTIAL CIRCUIT				Total Hrs	9		
Flip flops SR, JK, T, D and Master slave – Characteristic table and equation – Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter – Classification of sequential circuits – Moore and Mealy machines – Analysis of clocked sequential circuits: state equation - State table – State diagram – State reduction & assignment - Design procedure. Register – shift registers - Universal shift register – Shift counters – Ring counters.								
4	ASYNCHRONOUS SEQUENTIAL CIRCUITS				Total Hrs	9		
Analysis procedure – Transition table - Flow table – Race conditions -Design of fundamental mode circuits – Primitive flow table – Reduction of state and flow table – Race free state assignment - Hazards: Static – Dynamic – Essential – Hazards elimination.								
5	MEMORY DEVICES				Total Hrs	9		
Classification of memories – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – ROM organization - PROM – EPROM – EEPROM – EAPROM – Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) - Field Programmable Gate Arrays (FPGA). Implementation of combinational logic using ROM, PAL and PLA.								
Total hours to be taught						45		
Text book (s) :								
1	M. Morris Mano, Michael D. Ciletti 'Digital Design', 4th edition, Pearson education, New Delhi, 2008.							
Reference(s) :								
1	Donald P.Leach and Albert Paul Malvino, Goutam Saha 'Digital Principles and Applications', 7th edition., Tata McGraw Hill Publishing Company Limited, New Delhi, 2010.							
2	S. Salivahanan and S. Arivazhagan, 'Digital Circuits and Design', 3rd edition, Vikas Publishing House Pvt. Ltd, New Delhi.							
3	John F.Wakerly, 'Digital Design: principles and practices', 4th edition, Pearson Education, 2008.							
4	Charles H.Roth, 'Fundamentals of Logic Design', 5th edition, Brooks/cole, 2004.							
5	John .M Yarbrough, 'Digital Logic Applications and Design', 1st edition, Nelson engineering, 2006.							

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name			EC : B.E. Electronics and Communication Engineering		
Semester III								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 303	ELECTRON DEVICES (EC)	3	0	0	3	50	50	100
Objective(s)	To learn basic semiconductor theory, to study construction and working principles of diode, BJT, JFET, MOSFET, other special semiconductor devices and power supply.							
1	SEMICONDUCTOR THEORY				Total Hrs	9		
Semiconductor Theory: Review of Intrinsic & extrinsic semiconductors – Energy Band theory – charge densities in semiconductors – mobility and conductivity – Drift and Diffusion current. Construction of PN junction diodes – VI characteristics – Quantitative theory of PN diode, current components Diode resistance Transition and diffusion capacitances – Effect of temperature on PN junction characteristics – Model of diode – Diode specification – Clipping and Clamping Circuits – Voltage multipliers using diodes.								
2	BI-POLAR JUNCTION TRANSISTOR				Total Hrs	9		
Construction of a Transistor – Principle of Transistor action - Currents in transistor – Input and output characteristics of a transistor in CE, CB and CC configurations – cut off, active saturation and break down regions – Current gain in CE, CB and CC configurations – h parameter model for BJT – BJT specification.								
3	FIELD EFFECT TRANSITORS				Total Hrs	9		
Construction and characteristics of JFET – parameters of JFET – MOSFET – Depletion and Enhancement mode – FET in CS, CD and CG Configurations – equivalent circuits of FET at low frequencies – FET model at high frequencies – FET specification, Construction.								
4	SPECIAL SEMICONDUCTOR DEVICES				Total Hrs	9		
Fabrication and Characteristics of Zener Diode – Tunnel Diode – Pin Diode – Varactor Diode – Theory of operation and characteristics of UJT - Construction and Characteristics of SCR – Two Transistor Equivalent Circuits – Applications – TRIAC and DIAC – LASCR and CCD – Photodiodes – Photo conductive cell – photo voltaic cell – LED, LCD – photo transistors – solar cell – opto couplers.								
5	POWER SUPPLIES				Total Hrs	9		
Half wave Rectification - Full wave Rectification - Filters - Discrete Transistor Voltage Regulation - IC Voltage Regulators - Practical Applications - SMPS.								
Total hours to be taught						45		
Text book (s) :								
1	David A. Bell, 'Electric Circuits and Electronic Devices ', Oxford University Press, 1st edition, New Delhi, 2010.							
Reference(s) :								
1	Jacob Millman, Christos C.Halkias, 'Electronic Devices and Circuits', Tata McGraw Hill Publishing Limited, New Delhi, 2007.							
2	Ben G. Streetman and Sanjay Banerjee, 'Solid State Electronic Devices', Pearson Education, 2002.							
3	Sedra Smith, "Micro Electronic Circuits" Oxford University Press, Fifth edition, 2004.							
4	V.K Metha, Rohit Metha, ' Principles of Electronics', S. Chand, Revised Edition 2005							
5	Robert L. Boylestad , Louis Nashelsky ' Electronic Devices and circuit theory' 10th edition Pearson , New Delhi 2009							

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering	Programme Code & Name			EC : B.E. Electronics and Communication Engineering			
Semester III								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 304	ELECTRICAL ENGINEERING	3	1	0	3	50	50	100
Objective(s)	The course objective is to learn the mechanism of DC Generator, DC Motors. And to learn Transformer, Induction motors, Synchronous and special machines. To study about transmission and distribution of electronic power systems.							

1	D.C. MACHINES	Total Hrs	12
D.C Generator- Constructional details –Principle of operation- EMF equation –Types –series,shunt&compound-Characteristics of series, shunt and compound generators. D.C Motor – Principle of operation of D.C. motor – Back EMF-Torque Equation- Characteristics of series, shunt and compound generators- Starting of D.C. motors – Types of starters - Speed control of D.C. shunt motors Testing- brake test – Swinburne's test.			
2	TRANSFORMERS	Total Hrs	12
Constructional details – Principle of operation – EMF equation – Voltage Transformation ratio – Transformer on no load– Transformer on load – Equivalent circuit – Transformer on load – Regulation - Testing – Load test, open circuit and short circuit tests.			
3	INDUCTION MOTORS	Total Hrs	12
3 phase Induction motors-Construction – Principle of operation – Equivalent circuit –Torque speed characteristics – speed control-starting-star delta starter, rotor resistance starter, and auto transformer starter. 1 phase Induction motors- Double filed revolving theory-types-capacitor start-and run motor, shaded pole motor-Equivalent circuit.			
4	SYNCHRONOUS AND SPECIAL MACHINES	Total Hrs	12
Synchronous machines-Construction-principle of operation -types –method of starting- with different excitations-Induced EMF – Voltage regulation; EMF and MMF methods. Special machines-Stepper motor-types-permanent magnet stepping motor – permanent magnet D.C motor-switched reluctance motor.(construction and working principle only)			
5	POWER QUALITY	Total Hrs	12
General classes of power quality problems- Power quality terms- Sources of transient over voltages – Harmonic distortion – Voltage versus current distortion – Harmonics versus transients – Harmonic indices – Harmonic sources from commercial loads – Harmonic sources from industrial loads- Principles of controlling harmonics - typical wiring and grounding problems – Power quality measurement equipment.			
Total hours to be taught			60

Text book (s) :	
1	B.L.Theraja and A.K. Theraja,"A text book of Electrical Technology-Volume II (AC&DC Machines)",S.Chand&Company Ltd., New Delhi, 2005.
2	Roger C. Dugan and Mark.F.Mc Granaghan "Electrical Power systems Quality" Tata McGraw Hill, Second edition, 2008
Reference(s) :	
1	D.P.Kothari and I.J.Nagrath, "Basic Electrical Engineering", Tata McGraw Hill publishing company ltd, Second edition, 2002.
2	C.L. Wadhwa, "Electrical Power Systems", Wiley eastern ltd India, 1985.
3	V.K Mehta and Rohit Mehta ' Principle of Electrical Engineering', S Chand & Company, 2008

<table>
<tr><td colspan="8">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td colspan="2">Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="9">Semester III</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td colspan="2" rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC 305</td><td colspan="2">ELECTRICAL CIRCUIT THEORY</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">The students should appreciate the function of any complex electronic circuits by his understanding of RL, RC, RLC and transformed coupled circuits.</td></tr>
<tr><td>1</td><td colspan="5">BASIC CIRCUIT ANALYSIS</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Basic terminologies: Charge- Current-Voltage and Power-Basic circuit elements: R,L,C-Energy Sources-Controlled Sources- Ohm’s law- Kirchoff’s laws- Resistors, Inductors and Capacitors in series and parallel Circuits- Mesh and Nodal analysis for DC circuits.</td></tr>
<tr><td>2</td><td colspan="5">SINUSOIDAL STEADY STATE ANALYSIS</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Characteristics of sinusoids-Forced response to sinusoidal function-Complex forcing function-Phasor-Phasor relationship for R,L,C-Impedance-Admittance-Phasor diagram-Instantaneous power-Average power-Effective values of voltage and current-Apparent power and power factor-Complex power-Nodal and Mesh analysis.</td></tr>
<tr><td>3</td><td colspan="5">NETWORK THEOREMS AND TWO PORT NETWORKS</td><td colspan="2">Total Hrs</td><td colspan="2">16</td></tr>
<tr><td colspan="9">Thevenin’s and Norton’s theorem – Super position theorem – Maximum power transfer theorem – Reciprocity Theorem –Tellegen’s theorem-Two port networks: Z, Y, ABCD, h parameters and their inter relationships.</td></tr>
<tr><td>4</td><td colspan="5">RESONANCE AND COUPLED CIRCUITS</td><td colspan="2">Total Hrs</td><td colspan="2">10</td></tr>
<tr><td colspan="9">Series and parallel Resonance, their frequency response, Quality factor and Bandwidth, Self and Mutual Inductance, coefficient of coupling, Tuned circuits, single tuned circuits.</td></tr>
<tr><td>5</td><td colspan="5">TRANSIENT FOR DC CIRCUITS</td><td colspan="2">Total Hrs</td><td colspan="2">10</td></tr>
<tr><td colspan="8">Transient response of RL , RC and RLC circuits using Laplace transform for DC input.</td><td></td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>60</td></tr>
<tr><td colspan="9">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="8">William Hayt, Jack Kemmerly, Steven Durbin, “Engineering Circuit Analysis”, TMH Publishers, 2007</td></tr>
<tr><td colspan="9">Reference(s):</td></tr>
<tr><td>1</td><td colspan="8">Joseph A.Edminister, Mahmood Nahvi, “Electric Circuits”, Schaum’s Series, Tata McGraw- Hill, New Delhi, 2010.</td></tr>
<tr><td>2</td><td colspan="8">Paranjothi S R,” Electric Circuit Analysis”, 4th edition, New Age International Ltd., New Delhi, 2011.</td></tr>
<tr><td>3</td><td colspan="8">Chakrabarti A, “Circuit Theory (Analysis and Synthesis)”, Dhanpath Rai & Sons, New Delhi, 2010.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 306</td><td colspan="2">SIGNALS AND SYSTEMS</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To learn the properties of continuous time and discrete time signals and systems, to analyze their response in time and frequency domain and to study the realization of systems.</td></tr>
<tr><td>1</td><td colspan="4">INTRODUCTION TO SIGNALS AND SYSTEMS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Classification of Signals –Periodic and aperiodic, energy and power, Deterministic and Random, Complex exponential and sinusoidal signals. signal operations – signal models – even and odd functions – systems – Classification of Systems- Continuous time and Discrete time – Stable and unstable - Linear and non linear – Time-variant and Time-invariant – Memory and memoryless – Causal and non causal – Invertible and noninvertible</td></tr>
<tr><td>2</td><td colspan="4">TIME DOMAIN ANALYSIS OF CONTINUOUS TIME AND DISCRETE TIME SYSTEMS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Convolution Integral - Properties of convolution Integral - graphical method- stability of LTICT Systems - Differential equation representation-Natural response, forced response, complete response. Convolution sum - properties of convolution sum - linear convolution - graphical method– stability of LTIDT Systems- Linear difference equation- natural response – forced response – complete response.</td></tr>
<tr><td>3</td><td colspan="4">TRANSFORM DOMAIN ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Review of Fourier series - Fourier Transform – properties of Fourier transform - System function - system analysis using Fourier Transform – frequency response and impulse response. Laplace Transform, properties of Laplace Transform, poles and zeros, Inverse Laplace Transform – System function - Solution of differential equation using Laplace Transform.</td></tr>
<tr><td>4</td><td colspan="4">TRANSFORM DOMAIN ANALYSIS OF DISCRETE TIME SIGNALS AND SYSTEMS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Sampling theorem – reconstruction of signal – Fourier series – DTFT - Inverse DTF - Properties of DTFT - System function - System analysis using DTFT - Frequency response and impulse response - Z transform - two sided and one sided Z transform - Properties of Z transform - Poles, zeros and ROC – Properties of ROC – Inverse Z transform, System function - System analysis using Z transform - frequency response and impulse response.</td></tr>
<tr><td>5</td><td colspan="4">SYSTEM REALIZATION</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Realization of continuous time systems – Direct form I and Direct form II, Realization of Discrete time systems – IIR system-Direct form I, Direct form II, cascade form, parallel form, FIR system – Direct form, cascade form, Linear phase FIR system</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>60</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">B P Lathi, ‘Signal processing and Linear systems’, Oxford University Press, July 2009</td></tr>
<tr><td>2</td><td colspan="7">Ashok Ambardar, ‘Analog Digital Signal Processing’, CL – Engineering, 2nd edition</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">John G.Proakis and Dimitris G.Manolakis, “Digital Signal Processing, Principles, Algorithms and Applications”, 3rd edn., PHI, 2000.</td></tr>
<tr><td>2</td><td colspan="7">M.J.Roberts, “Signals and Systems Analysis using Transform method and MATLAB”, TMH 2003.</td></tr>
<tr><td>3</td><td colspan="7">Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999.</td></tr>
<tr><td>4</td><td colspan="7">AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, “Signals & Systems”, 2nd edn., Pearson Education, 1997.</td></tr>
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<tr><td colspan="8">Semester III</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours / Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 307</td><td colspan="2">ELECTRICAL ENGINEERING LABORATORY</td><td>0</td><td>0</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To study characteristics and working principles of DC motors, DC generators, and induction motors.</td></tr>
<tr><td colspan="8">List of Experiments</td></tr>
<tr><td>1</td><td colspan="7">Open circuit and load characteristics of separately excited and self excited D.C. generator.</td></tr>
<tr><td>2</td><td colspan="7">Load test on D.C. shunt motor.</td></tr>
<tr><td>3</td><td colspan="7">Load test on D.C. series motor.</td></tr>
<tr><td>4</td><td colspan="7">Swinburne’s test and speed control of D.C. shunt motor.</td></tr>
<tr><td>5</td><td colspan="7">Load test on single phase transformer and open circuit and short circuit test on single phase transformer</td></tr>
<tr><td>6</td><td colspan="7">Regulation of three phase alternator by EMF and MMF methods.</td></tr>
<tr><td>7</td><td colspan="7">Load test on three phase induction motor.</td></tr>
<tr><td>8</td><td colspan="7">No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)</td></tr>
<tr><td>9</td><td colspan="7">Load test on single-phase induction motor.</td></tr>
<tr><td>10</td><td colspan="7">Study of D.C. motor and induction motor starters.</td></tr>
</table>

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering	Programme Code & Name			EC : B.E. Electronics and Communication Engineering			
Semester III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 308	ELECTRON DEVICES LABORATORY	0	0	3	2	50	50	100
Objective(s)	To study the characteristics of electronic devices and to teach the working principles of rectifiers.							

List of Experiments	
1	Characteristics of PN Junction and Zener Diode
2	Characteristics of BJT (Common emitter configuration).
3	BJT (Common base configuration).
4	Characteristics of JFET and MOSFET.
5	Characteristics of UJT.
6	Characteristics of SCR.
7	Characteristics of DIAC and TRIAC.
8	Characteristics of Photo Diode and Photo Transistor.
9	Measurement of Voltage ,Frequency and Phase angle using CRO
10	Measurement of Hybrid parameters of the Transistor.
11	Half Wave Rectifier.
12	Full Wave Bridge Rectifier.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name		EC : B.E. Electronics and Communication Engineering			
Semester III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 309	DIGITAL INTEGRATED CIRCUITS LABORATORY	0	0	3	2	50	50	100
Objective(s)	To design and test basic combinational and sequential logic circuits.							

List of Experiments	
1	a) Study of logic gates. b) Design and implementation of Adders and Subtractors using logic gates.
2	Design and implementation of 4 bit binary Adder/ subtractor and BCD adder using IC 7483.
3	Design and implementation of magnitude comparators using logic gates.
4	Design and implementation of odd/even parity generator and checker using IC74180.
5	Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154.
6	Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147.
7	Characteristics of SR, D, JK and T flip flops using logic gates and study of ICs 7474 and 7476.
8	Design and implementation of shift registers (SISO & PIPO).
9	Construction and verification of 4 bit ripple counter and Mod-10 Ripple counter.
10	Design and implementation of 3-bit synchronous counter.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Semester III								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 310	CAREER COMPETENCY DEVELOPMENT I	0	0	2	0	100	00	100
Objective(s)	To enhance employability skills and to develop career competency							

1	Aptitude Skills	Hrs
a. Arithmetic ability : Percentage – Average - Ratio and proportion - Partnership and share – Mixtures - Chain rule - Time, work and wages. b. Verbal Reasoning : Series - Analogy - Classification c. Nonverbal Reasoning : Series – Analogy		8
2	Programming Skills	
C Language : Basics of C - Data Types - Conditional and Looping Statements – Functions - Arrays and Strings - Structures and Unions - Pointers - File Operations		6
3	Written Communication Skills	
Error correction in the usage of noun, pronoun, adjective, Verb, Adverb & Prepositions – Comprehension – Introduction to oral communication. Evaluation I – Written Test		4 2
4	Oral Communication Skills	
Evaluation II – Two Minutes talk Evaluation III – Two minutes Extempore Speech		2 2
5	Technical Paper Presentation	
Evaluation IV - Technical Paper Presentation I (Association Session)		8
	Total	32

Reference(s):	
1	Abhijit Guha, “Quantitative Aptitude”, TMH, 3rd edition
2	R.S.Aggarwal ,”Quantitative Aptitude”, S.Chand & Company Ltd., New Delhi, Reprint 2007 (Twice)
3	R.S.Aggarwal , “A Modern Approach to verbal & Non – verbal Reasoning”, S.Chand & Company Ltd, New Delhi, 2008
4	Yashavant Kanetkar, “ Let us ‘C’ ”, BPB Publication, 2007
5	CCD Guide by Training Cell

EVALUATION CRITERIA

S.No.	Particular	Test Portion	Marks
1	Evaluation I Written Test	Unit I – OQ – 50, Unit II – OQ – 30 Unit III – OQ 20	50
2	Evaluation II Two Minutes Talk	P – 10 Marks, C – 5 Marks	15
3	Evaluation III Two Minutes speech Extempore	P – 10 Marks, C – 5 Marks	15
4	Evaluation IV Technical Paper Presentation	P – 10 Marks, C – 5 Marks, Q – 5	20
P – Presentation C – Content Q – Queries OQ – Objective type question T – Total			T = 100

Note :

1. Question paper and answer key will be supplied by the training cell for Evaluation I
2. Respective Departments will conduct Evaluation I, II, III & IV, correct and submit the marks to the Training Cell and COE office

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<tr><td colspan="9">Semester IV</td></tr>
<tr><td rowspan="2">Course Code</td><td colspan="2" rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td><td></td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 401</td><td colspan="2">RANDOM PROCESSES</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To have a fundamental knowledge of the basic probability concepts and have a well – founded knowledge of standard distributions which can describe real life phenomena. The Acquire skills in handling situations involving more than one random variable and functions of random variables.</td></tr>
<tr><td>1</td><td colspan="5">PROBABILITY AND RANDOM VARIABLE</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Axioms of probability - Conditional probability - Total probability – Baye’s theorem - Random variable - Probability mass function - Probability density functions- Properties –Moments - Moment generating functions and their properties.</td></tr>
<tr><td>2</td><td colspan="5">STANDARD DISTRIBUTIONS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable.</td></tr>
<tr><td>3</td><td colspan="5">TWO DIMENSIONAL RANDOM VARIABLES</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.</td></tr>
<tr><td>4</td><td colspan="5">CLASSIFICATION OF RANDOM PROCESSES</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.</td></tr>
<tr><td>5</td><td colspan="5">CORRELATION AND SPECTRAL DENSITIES</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">60</td></tr>
<tr><td colspan="9">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="8">Ross, S., “A First Course in Probability”, Fifth edition, Pearson Education, Delhi, 2002.</td></tr>
<tr><td>2</td><td colspan="8">Peebles Jr. P.Z., “Probability Random Variables and Random Signal Principles”, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002. (Chapters 6, 7 and 8).</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Henry Stark and John W. Woods “Probability and Random Processes with Applications to Signal Processing”, Pearson Education, Third edition, Delhi, 2002</td></tr>
<tr><td>2</td><td colspan="8">Veerarajan. T., “Probability, Statistics and Random process”, Tata McGraw-Hill Publications, Second Edition, New Delhi, 2002</td></tr>
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<tr><td>10 EC 402</td><td colspan="2">CONTROL SYSTEMS</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To understand the methods of representation of systems and getting their transfer function models. To provide adequate knowledge in the time response of systems and steady state error analysis. To give basic knowledge in obtaining the open loop and closed–loop frequency responses of systems. To understand the concept of stability of control system and methods of stability analysis. To study the three ways of designing compensation for a control system.</td></tr>
<tr><td>1</td><td colspan="5">MODELLING OF CONTROL SYSTEMS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Classification of control systems: open loop systems – closed loop systems – basic elements – examples – Transfer function – Modeling of mechanical systems – electrical Systems – Force-Voltage and Force-Current Analogous – Techniques to find transfer function: Block diagrams - Signal Flow Graphs.</td></tr>
<tr><td>2</td><td colspan="5">TIME RESPONSE ANALYSIS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Time Response – Standard Test Signals – Time response of first order systems – second order systems – Time domain specifications – steady state error – Routh stability criterion – root locus technique – Time Response analysis using MATLAB – Root Locus plot with MATLAB.</td></tr>
<tr><td>3</td><td colspan="5">FREQUENCY RESPONSE ANALYSIS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Frequency domain specifications – Correlation between time and frequency response – Bode plot – Polar plot – Nyquist plot – Constant M and N Circles – Nichol’s Chart – MATLAB simulation of frequency response plots.</td></tr>
<tr><td>4</td><td colspan="5">COMPENSATOR</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Types of compensators – Realization of basic compensators – Design of lag, lead, lag lead compensator using bode plot and root locus.</td></tr>
<tr><td>5</td><td colspan="5">STATE SPACE AND COMPONENTS OF CONTROL SYSTEMS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Introduction of state space analysis: Concept of state, state variables and state model – solution of state equation – Error detectors: Potentiometers and synchros – Tachogenerators – AC and DC servo motors – Gear trains – Stepper Motors.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>60</td></tr>
<tr><td colspan="9">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="8">Anand Kumar.A, “Control Systems” Prentice Hall of India, New Delhi, 2009</td></tr>
<tr><td>2</td><td colspan="8">Gopal.M, “Control Systems, Principles and Design”, 3rd edition, Tata Mcgraw Hill Publication, New Delhi. 2008</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Nagrath.I.J and Gopal.M, “Control Systems Engineering”, 5th edition , New Age International Publishers, New Delhi. 2009</td></tr>
<tr><td>2</td><td colspan="8">Bhattacharya.S.K, “Control Systems Engineering” , 2nd edition , Pearson Education, , New Delhi, 2008</td></tr>
<tr><td>3</td><td colspan="8">Palani.S, “Control Systems Engineering, 2nd edition”, Tata Mcgraw Hill Publication, , New Delhi, 2008</td></tr>
</table>

<table>
<tr><td colspan="8">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td colspan="2">Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Program code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="9">Semester IV</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td colspan="3" rowspan="2">Course Name</td><td colspan="3">Hours / Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC 403</td><td colspan="3">DATA STRUCTURES USING C++ (EC)</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">Learning C++ Programming and different methods of organizing large amounts of data, efficient implementation of different data structures, and implementing solutions for specific problems.</td></tr>
<tr><td>1.</td><td colspan="5">INTRODUCTION</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Basic Concepts of oops – Operators in C++ - Functions – Classes and objects – Constructors and Destructors – Operator overloading – Inheritance – Single, Multilevel, Multiple, Hierarchical – pointers – Templates.</td></tr>
<tr><td>2.</td><td colspan="5">LISTS, STACKS AND QUEUES</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Abstract Data Type (ADT) – The List ADT – The Stack ADT –The Queue ADT</td></tr>
<tr><td>3.</td><td colspan="5">TREES</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Preliminaries – Binary Trees – The Search Tree ADT – Binary search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Priority Queues (Heaps) – Model – Simple implementations – Binary Heap.</td></tr>
<tr><td>4.</td><td colspan="5">SORTING</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Perliminaries – Insertion Sort – Heap sort – Merge sort – Quick sort – External Sorting – 2 way merge K-way merge.</td></tr>
<tr><td>5.</td><td colspan="5">GRAPHS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Definitions – Shortest – Path Algorithms – Unweighted Shortest Paths – Dijkstra’s Algorithm – Minimum Spanning Tree – Prim’s Algorithm, Kruskal’s Algorithm – Applications of Depth – First Search – Undirected Graphs – Biconnectivity.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book (s):</td></tr>
<tr><td>1.</td><td colspan="8">M.A. Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education, Third Edition, 2006.</td></tr>
<tr><td>2.</td><td colspan="8">E.Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw – Hill, New Delhi, Fourth Edition, 2008.</td></tr>
<tr><td colspan="9">Reference(s):</td></tr>
<tr><td>1.</td><td colspan="8">Glenn W.Rowe,”Introduction to Data Structures and algorithms with C++”, Prentice Hall of India, 1998.</td></tr>
<tr><td>2.</td><td colspan="8">Richard F.Gilberg,Behrouz A,Forouzan, Thomson,”Data Structure a pseudocode approach with C++”, Brooks/cole, 2002.</td></tr>
<tr><td>3.</td><td colspan="8">Peter Smith,”Applied Data Structures with C++”, Narosa Publishing Hourse, First Edition 2004.</td></tr>
</table>

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name		EC: B.E. Electronics and Communication Engineering			
Semester IV								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 404	ELECTRONIC CIRCUITS	3	0	0	3	50	50	100
Objective(s)	To study various biasing techniques for BJT and FET, Midband analysis of small signal amplifiers and frequency response of amplifiers. To study different power amplifiers, feedback amplifiers and oscillators.							

1	TRANSISTOR BIASING	Total Hrs	9
BJT – Need for biasing - Fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to h_{FE} variation within manufacturers tolerance. Stability factors. Different types of biasing circuits. Method of stabilizing the Q point to the extent possible. Advantage of Self bias (voltage divider bias) over other types of biasing. Use of Self bias circuit as a constant current circuit. Source self bias and voltage divider bias for FET. Use of JFET as a voltage variable resistor.			
2	MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS	Total Hrs	9
CE, CB and CC amplifiers. Method of drawing small-signal equivalent circuit. Midband analysis of various types of single stage amplifiers to obtain gain, input impedance and output impedance. Miller's theorem. Comparison of CB, CE and CC amplifiers and their uses. Darlington connection using similar and Complementary transistors. Methods of increasing input impedance using Darlington connection and bootstrapping. CS, CG and CD (FET) amplifiers Multistage amplifiers – coupling of amplifier stages. Cascade and cascode amplifiers			
3	FREQUENCY RESPONSE OF AMPLIFIERS	Total Hrs	9
General shape of frequency response of amplifiers. Definition of cut off frequencies and bandwidth. Low frequency analysis of amplifiers to obtain lower cut off frequency Hybrid – pi equivalent circuit of BJTs. High frequency analysis of BJT amplifiers to obtain upper cut off frequency. High frequency equivalent circuit of FETs. High frequency analysis of FET amplifiers. Gain-bandwidth product of FETs. General expression for frequency response of multistage amplifiers. Calculation of overall upper and lower cut off frequencies of multistage amplifiers. Amplifier rise time and sag and their relation to cut off frequencies.			
4	LARGE SIGNAL AMPLIFIERS	Total Hrs	9
Classification of amplifiers (Class A, B, AB, C&D), Efficiency of class A, RC coupled and transformer-coupled power amplifiers. Class B complementary-symmetry, push-pull power amplifiers. Calculation of power output, efficiency and power dissipation. Crossover distortion and methods of eliminating it. Heat flow calculations using analogous circuit. Calculation of actual power handling capacity of transistors with and without heat sink. Heat sink design.			
5	FEEDBACK AMPLIFIERS AND OSCILLATORS.	Total Hrs	9
Classification of amplifier- the feedback concept- general characteristics of negative feedback amplifiers- Effect of negative feedback upon output and input resistances - voltage series, current series, current shunt and voltage shunt feedback amplifiers – feedback and stability-gain and phase margin- sinusoidal oscillators Barkhausen Criterion. Mechanism for start of oscillation and stabilization of amplitude. Analysis of LC Oscillators, Colpitts, Hartley oscillators. Quartz Crystal Construction. Electrical equivalent circuit of Crystal. Crystal Oscillator circuits			
Total hours to be taught			45

Text book (s):	
1.	Millman J. and Halkias .C., " Electronic devices and circuits ", Tata McGraw-Hill, 2007
2.	David A. Bell, " Electronic devices and circuits ", Oxford University press, 5th edition, 2008
Reference(s):	
1.	Robert L. Boylestad and Louis Nashelsky, "Electronic Devices & Circuit Theory", Pearson education, 10th edition, 2009.
2.	Schilling and Belove, "Electronic Circuits", TMH, Third Edition, 2002.
3.	Sedra, Smith, "Micro Electronic Circuits", Oxford university Press, 5th edition, 2004.
4.	Floyd, "Electronic Devices", Pearson Education, Sixth edition, 2003

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<tr><td colspan="7">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td>Department</td><td colspan="2">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="3">EC: B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="8">Semester IV</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 405</td><td colspan="2">MICROPROCESSORS AND MICROCONTROLLERS (CS, EC, IT)</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To introduce the architecture and programming of 8085 and 8086 microprocessor, interfacing of peripheral devices with 8085 microprocessor and architecture and programming of 8086 microprocessor. To introduce the architecture, programming and interfacing of 8051 micro controller.</td></tr>
<tr><td>1</td><td colspan="4">8085 MICROPROCESSOR</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">8085 Architecture - Instruction set - Addressing modes - Timing diagrams - Assembly language programming - Memory interfacing – Interfacing I/O devices.</td></tr>
<tr><td>2</td><td colspan="4">PERIPHERALS INTERFACING</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Programmable Peripheral Interface(PPI 8255) –Programmable Interval Timer(PIT 8253) – 8259 Programmable Interrupt Controller – keyboard & display controller (8279)- Interfacing serial I /O (8251)- ADC/DAC interfacing - stepper motor interfacing – Traffic light controller.</td></tr>
<tr><td>3</td><td colspan="4">8086 MICROPROCESSOR</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">8086 Internal Architecture - Addressing modes - Instruction set - Assembly language Programming- signals and timing – MIN/MAX mode of operation – Interrupts - Interfacing memory and I/O devices – System design using 8086</td></tr>
<tr><td>4</td><td colspan="4">8051 MICROCONTROLLER</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">8051 Architecture- Instruction set - Addressing modes - Assembly language programming - I/O port programming -8051 Micro controller hardware - I/O pins, ports and circuits - External memory - - Interfacing to external memory and 8255</td></tr>
<tr><td>5</td><td colspan="4">8051 PROGRAMMING AND APPLICATION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Interrupts -Counters and Timers- Timer and counter programming - Serial Communication - Interrupt programming - 8051 Interfacing: LCD, ADC, Sensors, Stepper Motors, Keyboard and DAC.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="8">Text book (s):</td></tr>
<tr><td>1</td><td colspan="7">Ramesh S Gaonkar,” Microprocessor Architecture, Programming and application with 8085”, 5th Edition, Prentice Hall, New Delhi,2002.</td></tr>
<tr><td>2</td><td colspan="7">Krishna Kant, Microprocessors and microcontrollers Architecture , Programming and System design 8085,8086,8051,8096,PHI-Third Printing-2010</td></tr>
<tr><td colspan="8">Reference(s):</td></tr>
<tr><td>1.</td><td colspan="7">Mohammed Ali Mazidi and Janice Gilli Spil Mazidi, The 8051 microcontroller, Prentice Hall of India, 2006.</td></tr>
<tr><td>2.</td><td colspan="7">Douglas V.Hall, ”Microprocessors and Interfacing Programming and Hardware”, Tata McGraw-Hill publishing company Limited, New Delhi. Fifteenth reprint 2002</td></tr>
<tr><td>3.</td><td colspan="7">A.K. Ray and K.M.Burchandi, Intel Microprocessors Architecture Programming and Interfacing, McGraw Hill International Edition. Twelfth reprint 2009</td></tr>
<tr><td>4.</td><td colspan="7">M.Rafiquizzaman “ Microprocessor - Theory and applications” Prentice Hall of India Pvt Ltd., 2005</td></tr>
</table>

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<tr><td colspan="9">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td colspan="2">Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="3">EC: B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="10">Semester IV</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td colspan="3" rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td><td></td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC 406</td><td colspan="3">ELECTROMAGNETIC FIELDS</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="8">To understand the fundamental concepts of static and dynamic electromagnetic fields, to have a fundamental knowledge of electromagnetic waves and the importance of Maxwell's equations.</td></tr>
<tr><td>1</td><td colspan="5">VECTOR ANALYSIS</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="10">Vector Algebra: scalars and vectors – Unit vector – Vector Addition and Subtraction – Position and Distance vectors – Vector multiplication – Components of a Vector – Coordinate Systems and Transformation: Cartesian, Cylindrical and Spherical Coordinates – Constant coordinate Surfaces – Vector Calculus: Differential Length, Area and Volume – Line, Surface and Volume Integrals – Del Operator – Gradient of a Scalar – Divergence of a Vector – Divergence Theorem – Curl of a Vector – Stokes Theorem – Laplacian of a scalar – Classification of vector fields.</td></tr>
<tr><td>2</td><td colspan="5">ELECTROSTATICS</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="10">Electrostatic fields: Coulomb's Law – Electric Field Intensity – Electric Fields due to Continuous Charge Distributions – Electric Flux Density - Gauss's Law – Applications of Gauss's Law – Electric Potential – Relationship between E and V – Electric Dipole and Flux Lines – Energy Density in Electrostatic Fields.
Electric Fields in Materials: Properties of Materials - Convection and Conduction Currents – Conductors – Polarization in Dielectrics – Dielectric constant and Strength – Linear, Isotropic and Homogeneous Dielectrics – Continuity Equation and Relaxation Time – Boundary Conditions – Poisson's Laplace's Equations – Resistance and Capacitance.</td></tr>
<tr><td>3</td><td colspan="5">MAGNETOSTATICS</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="10">Magnetostatic Fields: Biot-Savart Law – Ampere's Circuit Law – Applications of Ampere's Law – Magnetic Flux Density – Maxwell's Equations for Static EM Fields – Magnetic Scalar and Vector Potentials – Poisson's Equation. Magnetic Fields in Materials: Forces due to Magnetic Fields – Magnetic Torque and Moment – Magnetic Dipole – Magnetization in Materials – Classification of Magnetic Materials – Magnetic Boundary Conditions – Inductors and Inductances – Magnetic Energy – Magnetic Circuits.</td></tr>
<tr><td>4</td><td colspan="5">MAXWELL'S EQUATIONS</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="10">Faraday's Law – Transformer and Motional EMFs – Displacement Current – Maxwell's Equations in Integral and Differential forms – Time-Varying Potentials – Time-Harmonic Fields.</td></tr>
<tr><td>5</td><td colspan="5">ELECTROMAGNETIC WAVE PROPOGATION</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="10">Waves – Wave Propagation in Lossy Dielectrics – Plane waves in Lossless Dielectrics – Plane waves in Free space – Plane waves in Good Conductors – Power and the Poynting Vector – Reflection of a Plane wave at Normal Incidence – Reflection of a Plane wave at Oblique Incidence.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td colspan="2">60</td></tr>
<tr><td colspan="10">Text Book(s) :</td></tr>
<tr><td>1</td><td colspan="9">Matthew N.O.Sadiku : "Elements of Electromagnetics" Oxford University Press , Third Edition.</td></tr>
<tr><td>2</td><td colspan="9">William H.Hayt , John.A.Buck : "Engineering Electromagnetics" TATA McGRAW-HILL , Seventh Edition.</td></tr>
<tr><td colspan="10">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="9">John D.Kraus "Electromagnetics" McGraw-Hill international edition (4th edition 1991).</td></tr>
<tr><td>2</td><td colspan="9">E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hall of India 2nd edition 2003. (Unit IV, V). McGraw-Hill, 9th reprint</td></tr>
<tr><td>3</td><td colspan="9">K.A.Gangadhar "Field Theory" Khanna Publishers, New Delhi.</td></tr>
<tr><td>4</td><td colspan="9">Narayana Rao, N : "Elements of Engineering Electromagnetics" 4th edition, Prentice Hall of India, New Delhi, 1998.</td></tr>
</table>

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name			EC : B.E. Electronics and Communication Engineering		
Semester IV								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 407	DATA STRUCTURES USING C++ LABORATORY	0	0	3	2	50	50	100
Objective(s)	Teaching the students to write programs in C++, implementing various data structures as Abstract Data Types using C++.							

List of experiments	
1.	Write a C++ Program using operator overloading.
2.	Write a C++ program using concepts of Templates.
3.	Array implementation of List Abstract Data Type (ADT).
4.	Linked list implementation of list ADT.
5.	Implement Doubly Linked List using C++ with the following operations: i) Find ii) Insert iii) Delete iv) Display
6.	Linked list implementations of Stack ADT.
7.	Implementation of stack applications – Program for Balanced Parenthesis.
8.	Queue ADT.
9.	Search Tree ADT – Binary Search Tree.
10.	Quick Sort.
11.	Write a C++ Program using inheritance.
12.	Write a C++ Program to Implement Heap Sort.
13.	Write a C++ Program to implement the following Binary tree Traversals. i) Inorder ii) Preorder iii) Postorder

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		L	T	P	C	CA	ES	Total
10 EC 408	ELECTRONIC CIRCUITS AND SIMULATION LABORATORY	0	0	3	2	50	50	100
Objective(s)	To teach designing and testing of basic electronic circuits by conducting suitable experiments using electronics components and by using simulation package.							

List of experiments	
1.	Study of different biasing circuits for BJT
2.	Frequency response of Common collector amplifier
3.	Frequency response of CE amplifier
4.	Common source JFET amplifier in voltage divider bias
5.	Frequency response of common source JFET amplifier
6.	Source follower with Bootstrapped gate resistance
7.	Class B Complementary symmetry power amplifier
8.	Two stage RC coupled amplifier
9.	Cascode amplifier
10.	Series and Shunt feedback amplifiers
11.	Design of Hartley and Colpitt's Oscillator
12.	Clipper, Clamper , Integrator and differentiator

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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		L	T	P	C	CA	ES	Total
10 EC 409	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	0	0	3	2	50	50	100
Objective(s)	To teach programming and interfacing concepts of microprocessors and microcontrollers.							

List of experiments	
1	Programs for sorting and searching (Using 8086 & 8051).
2	Interfacing and programming of keyboard & display controller
3	Interfacing and programming of interrupt controller
4	Interfacing and programming of Timer
5	Interfacing ADC and DAC with 8085.
6	Parallel Communication and Serial Communication
7	Interfacing and Programming of Traffic light controller.
8	Interfacing and programming of digital clock using timer.
9	Interfacing, Programming of Stepper Motor & DC Motor Speed control.
10	Microcontroller 8051- Sample programs through IDE using KEIL.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Semester IV								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 410	CAREER COMPETENCY DEVELOPMENT II	0	0	2	0	100	00	100
Objective(s)	To enhance employability skills and to develop career competency							

1	Aptitude Skills	Hrs
a. Arithmetic ability : Pipes and cisterns - Profit, loss and discount - Simple interest - Compound interest – Growth and Depreciation - Time and distance - Trains - Boats and streams – Clocks b. Verbal Reasoning : Coding and decoding - Blood Relations - Puzzle Test - Directions sense test - Logic - Statement – Arguments - Statements - Assumptions c. Nonverbal Reasoning : Analytical Reasoning - Mirror – Images - Water – Images		8
2	Programming Skills	
Data Structures : Linked List – Stack – Queue – Sorting - Tree - Graph		6
3	Written Communication Skills	4
Error correction in the usage of conjunctions, Tenses, Voices & Subject – verb Agreement (concord) - Essay Writing Evaluation I – Written Test		2
4	Oral Communication	
Evaluation II - Group Discussion I Evaluation III - Group Discussion II		2 2
5	Technical Paper Presentation	
Evaluation IV - Technical Paper Presentation II (Association Session)		8
	Total	32

Reference(s):

1	Abhijit Guha, “Quantitative Aptitude”, TMH, 3rd edition
2	R.S.Aggarwal ,”Quantitative Aptitude”, S.Chand & Company Ltd., New Delhi, Reprint 2007 (Twice)
3	R.S.Aggarwal , “A Modern Approach to Verbal and Non – Verbal Reasoning”, S.Chand & Company Ltd., New Delhi, 2008.
4	Mark Allen Weiss , “Data Structures and Algorithm Analysis in C”, Pearson Education 2002.
5	CCD Guide by Training Cell

EVALUATION CRITERIA

S.No.	Particular	Test Portion	Marks
1	Evaluation I Written Test	Unit I – OQ – 50, Unit II – OQ – 30 Unit III – OQ 20	50
2	Evaluation II Group Discussion I	P – 5 Marks, C – 5 Marks, TS – 5 Marks	15
3	Evaluation III Group Discussion II	P – 5 Marks, C – 5 Marks, TS – 5 Marks	15
4	Evaluation IV Technical Paper Presentation	P – 10 Marks, C – 5 Marks, Q – 5	20
P–Presentation C–Content Q–Queries OQ–Objective type question T–Total TS–Team Skills			T = 100

Note :
1. Question paper and keys will be supplied by the training cell for Evaluation I
2. Respective Departments will conduct Evaluation I, II, III & IV, correct and submit the marks to the Training Cell and COE office

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<tr><td colspan="9">Semester V</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 501</td><td colspan="2">LINEAR INTEGRATED CIRCUITS</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To introduce the basic building blocks of linear integrated circuits and theory and applications of analog multipliers and PLL. To learn the linear and non-linear applications of operational Amplifiers.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Basis of Differential Amplifier, Need for ICs, IC classification based on application and fabrication, operational amplifier – circuit symbol, Packages and Power Supply Connection, Ideal Op Amp – Block Diagram, Properties, Ideal Voltage Transfer Curve, Voltage Series Feedback amplifier, Voltage Shunt Feedback Amplifier, DC Characteristics, AC Characteristics Op-Amp Applications: Differentiator, Integrator, Summing Amplifier, Scale Changer, Instrumentation Amplifier, Voltage to Current Converter, Current to Voltage Converter.</td></tr>
<tr><td>2</td><td colspan="5">COMPARATORS AND ACTIVE FILTERS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Basic Comparator, Zero Crossing Detector, Schmitt Trigger, Comparator Characteristics OP amp with diodes – Clippers, Clampers, Precision rectifier – Half Wave and Full Wave rectifiers , Peak detectors, Sample and hold circuit, Log and Antilog Amplifier, Power Amplifier Review of filter basics-Order of response and number poles concept – Advantages and limitations of Active filters-Low Pass, High Pass, Band Pass filters and Switched Capacitor filters.</td></tr>
<tr><td>3</td><td colspan="5">WAVE FORM GENERATORS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Astable Multivibrator, Monostable Multivibrator using opamp, Sine Wave Generators – Wien Bridge Oscillator, RC phase Shift Oscillator, Traingular Wave Generator, Saw tooth Wave Generator, 555 Timer- Block diagram, Astable Multivibrator, Monostable multivibrator using 555 timer, Applications</td></tr>
<tr><td>4</td><td colspan="5">PLL AND MULTIPLIER</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">PLL Block diagram, Closed Loop analysis of PLL Applications – Frequency Multiplier, Divider, FSK Modulator, Frequency translation, AM detection, FM detection, Analog Multipliers – Basic Multiplier and its Characteristics.Voltage Divider, Squaring Circuit, Square Rooting Circuit, Frequency Doubler Using Multiplier, Gilbert cell Multiplier</td></tr>
<tr><td>5</td><td colspan="5">DAC / ADC , REGULATORS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">ADC / DAC Specification – Resolution, Linearity, Accuracy, Monotonicity, Settling time, Stability DAC – Weighted Resistor DAC, R – 2R Ladder type DAC, Inverted R-2R Ladder type DAC, ADC – Single Slope ADC, Dual Slope ADC, Successive Approximation ADC, Flash type ADC, Delta Modulation , Adaptive Delta Modulation, Voltage Regulators – Linear and Switched Mode Types.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">D.Roy Choudry , Shail Jain , ‘Linear integrated Circuits‘, New Age International Pvt Ltd, 4th Edition, 2011.</td></tr>
<tr><td>2</td><td colspan="8">Ramakant A. Gayakwad, ‘Op – Amps and Linear Integrated circuits’, Prentice Hall, 4th Edition, 2009.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Gray and Meyer, ‘Analysis and Design of Analog Integrated Circuits‘, Wiley International, 5th Edition, 2009.</td></tr>
<tr><td>2</td><td colspan="8">J.Michael Jacob, ‘Applications and Design with Analog Integrated Circuits‘, Prentice Hall, 1996.</td></tr>
<tr><td>3</td><td colspan="8">K.R.Botkar, ‘Integrated Circuits‘, Khanna Publishers, 5th Edition, 2010.</td></tr>
<tr><td>4</td><td colspan="8">Stanley, ‘Operation Amplifiers with Linear integrated Circuits’, 4th Edition, Prentice Hall, 2002.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 502</td><td colspan="2">COMPUTER ORGANIZATION AND ARCHITECTURE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To learn in detail the different types of control and the concept of pipelining, learn the hierarchical memory system including cache memories and virtual memory.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION TO PROCESSOR ARCHITECTURE</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Design Methodology- System Representation –Design Process - Gate level – Register level – Processor level – CPU Organization – Data Representation – Basic Formats – Fixed Point Numbers – Floating Point Numbers – Instruction Sets – Instruction Formats – Instruction Types – Programming Considerations.</td></tr>
<tr><td>2</td><td colspan="5">DATA PATH DESIGN</td><td colspan="2">Total Hrs</td><td colspan="2">8</td></tr>
<tr><td colspan="9">Fixed Point Arithmetic – Addition and Subtraction – Multiplication – Division – Arithmetic Logic Units – Combinational ALUs – Sequential ALUs – Floating Point Arithmetic – Pipeline Processing.</td></tr>
<tr><td>3</td><td colspan="5">CONTROL DESIGN</td><td colspan="2">Total Hrs</td><td colspan="2">8</td></tr>
<tr><td colspan="9">Basic Concepts – Introduction – Hardwired Control – Design Examples – Microprogrammed Control – Basic Concepts – Multiplier Control Unit – CPU Control Unit – Pipeline Control – Instruction Pipelines – Pipeline Performance – Superscalar Processing.</td></tr>
<tr><td>4</td><td colspan="5">MEMORY ORGANIZATION</td><td colspan="2">Total Hrs</td><td colspan="2">10</td></tr>
<tr><td colspan="9">Memory Hierarchy – Main memory – RAM and ROM chips – Memory Address Map – Memory Connection to CPU – Auxiliary Memory – Magnetic disks – Magnetic Tape – Associative Memory – Hardware Organization - Read Operation – Write Operation – Cache Memory : Associative Mapping – Direct Mapping – Set Associative Mapping –Virtual Memory – Address Space and Memory Space – Address Mapping Using Pages – Associative Memory Page Table – Page Replacement – Memory Management Hardware – Segmented Page Mapping.</td></tr>
<tr><td>5</td><td colspan="5">SYSTEM ORGANIZATION</td><td colspan="2">Total Hrs</td><td colspan="2">10</td></tr>
<tr><td colspan="9">Communication Methods – Basic Concepts – Bus Control – I/O and System Control – Programmed I/O – DMA and Interrupts – I/O Processors – Operating Systems – I/O Organization – Isolated Versus Memory Mapped I/O - Parallel Processing – Processor Level Parallelism – Multiprocessors – Fault Tolerance.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">John.P.Hayes, “Computer Architecture and Organization”, McGraw-Hill, Computer Science Series, 3rd Edition, 1998, Reprint 2011.</td></tr>
<tr><td>2</td><td colspan="8">Morris Mano, “Computer System Architecture”, Prentice-Hall India, Eastern Economy Edition, 3rd Edition, 8th Impression 2011.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Carl Hamacher, Zvonko Vranesic & Safwat Zaky, “Computer Organization”, McGraw Hill, 5th Edition, 2002.</td></tr>
<tr><td>2</td><td colspan="8">Pal Choudhuri P., “Computer Organization and Design”, Prentice-Hall, 2nd Edition, 2004.</td></tr>
<tr><td>3</td><td colspan="8">Patterson D.A. & Hennessy J.L., “Computer Organization and Design”, Morgan Kaufmann Publishers, 4th Edition, 2011.</td></tr>
<tr><td>4</td><td colspan="8">William Stallings, “Computer Organization and Architecture”, Pearson Education, 8th Edition, 2009.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC 503</td><td>COMMUNICATION THEORY</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To learn the fundamentals of Analog Communication Systems and Design considerations.</td></tr>
<tr><td>1</td><td colspan="4">MATHEMATICAL FOUNDATION OF COMMUNICATION</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Spectral Density – Autocorrelation – Cross correlation – Transmission of signals through linear systems – Hilbert Transform – Pre envelope – Band pass signals and systems – Phase and group delay – Random variables – Random process – Stationary – Mean, Correlation and covariance function – Time averages and periodicity- Transmission of Random processes through a linear filter – Gaussian process.</td></tr>
<tr><td>2</td><td colspan="4">AMPLITUDE MODULATION</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Generation of AM - Linear modulators and nonlinear modulators - DSB-SC - Product modulator and Ring modulator - SSB-SC - Filter method, Phase shift method and Modified phase shift method - Generation of VSB Signals. Demodulation of AM - Envelope detection and coherent detection - Comparison of Amplitude modulation systems, Frequency translation, Frequency Division multiplexing, Super heterodyne receiver.</td></tr>
<tr><td>3</td><td colspan="4">ANGLE MODULATION</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Phase modulation, Frequency modulation, Narrowband and wideband FM, transmission bandwidth of FM signals, Generation of FM signal – Direct FM – indirect FM, Demodulation of FM signals - Phase discriminator method and ratio detector method - FM stereo multiplexing, PLL – Nonlinear model and linear model of PLL.</td></tr>
<tr><td>4</td><td colspan="4">NOISE IN CW MODULATION</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Noise – Narrowband noise – Envelope of sine wave plus narrow band noise, SNR for coherent reception with DSBSC Modulation, SSB Modulation – Noise in AM receivers using envelope detection – Noise in FM reception - Noise in pulse modulation systems - Comparison of performance of AM and FM systems.</td></tr>
<tr><td>5</td><td colspan="4">COMMUNICATION SYSTEM DESIGN</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Analog baseband signal transmission – signal distortion in baseband transmission – linear distortion – equalization – Nonlinear distortion and companding – Design of linear CW modulation systems – Design of angle modulation systems – Design of commercial radio broadcasting and reception - Design of commercial TV broadcasting and reception.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">60</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Simon Haykin, ‘Communication Systems’, John Wiley & sons, NY, 5th Edition, 2009.</td></tr>
<tr><td>2</td><td colspan="8">Sam Shanmugam. K, ‘Digital and Analog Communication Systems’, John Wiley & sons, Reprint: 2008.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Roddy and Coolen, ‘Electronic communications’, Prentice-Hall, New Delhi, 4th Edition, 2009.</td></tr>
<tr><td>2</td><td colspan="8">Taub and Schilling, ‘Principles of communication systems’, McGraw-Hill, New Delhi, 1995.</td></tr>
<tr><td>3</td><td colspan="8">Bruce Carlson et al, ‘Communication systems’, McGraw-Hill, 5th edition, 2009.</td></tr>
<tr><td>4</td><td colspan="8">Anokh Singh, ‘Principles of Communication Engineering’, S.Chand Pvt.Ltd, 1st edition (reprint 2006)</td></tr>
<tr><td>5</td><td colspan="8">T.G.Thomas, S.Chandrasekhar, ‘Analog Communication’, McGraw Hill, 2007.</td></tr>
<tr><td>6</td><td colspan="8">Kennedy, Davis, ‘Electronic Communication Systems’, McGraw Hill, 4th Edition, 1999.</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Semester V								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 504	EMBEDDED SYSTEMS	3	0	0	3	50	50	100
Objective(s)	To introduce the architecture, programming and interfacing of PIC microcontroller, learn the fundamentals of ARM Architecture and Programming and to introduce the concept of RTOS.							
1	INTRODUCTION TO EMBEDDED SYSTEMS				Total Hrs	9		
Characteristics of Embedded systems - Software embedded into system- General ideas of Processor and Memory organization - Processor and memory selection, Interfacing to Memory and I/O devices- Devices and Buses- Device Drivers and Interrupt Servicing mechanisms								
2	PIC MICROCONTROLLER				Total Hrs	9		
PIC Microcontrollers 16F877 -PIC development tools-CPU Architecture and Instruction set-Hardware architecture and pipelining-program memory consideration-Register file structure and addressing modes-Timer 2 use-Interrupt logic –Timer 2 scalar initialization-External interrupts and Timers- CCP Module.								
3	PIC MICROCONTROLLER PERIPHERAL FEATURES				Total Hrs	9		
I/O Port Expansion-Synchronous Serial Port (SSP)-Serial Peripheral Interface (SPI)-, I^2C Bus for peripheral chip access- Analog to Digital converter- UART – Baud Rate – Data Handling – Initialization, special features-Serial Programming – Parallel Slave Port.								
4	ARM ARCHITECTURE AND PROGRAMMING				Total Hrs	9		
Arcon RISC Machine – Architectural Inheritance – Core & Architectures - Registers – Pipeline - Interrupts – ARM organization - ARM processor family – Co-processors. Instruction set – Thumb instruction set – Instruction cycle timings - The ARM Programmer's model – ARM Development tools – ARM Assembly Language Programming and 'C'compiler programming.								
5	SOFTWARE DEVELOPMENT & RTOS				Total Hrs	9		
Round Robin, Round robin with Interrupts, Function Queue Scheduling Architecture, Algorithms- Task and Task States, Tasks and Data, Semaphores and Shared Data Operating System services – Message Queues – Timer function – Events – Memory Management, Interrupt Routines in an RTOS environment, Basic design using RTOS.								
Total hours to be taught						45		
Text book(s) :								
1	John B Peatman, 'Design with PIC Micro controllers', Pearson Education,4th Edition, 2004.							
2	Steve Furber, 'ARM System on chip Architecture', Addision Wesley, 2nd Edition, 2000.							
3	Rajkamal, 'Embedded Systems Architecture: Programming and Design', McGraw Hill, 2008.							
Reference(s) :								
1	David E. Simon, 'An Embedded Software Primer', Pearson Education, 2002.							
2	Wayne Wolf, 'Computers as Components: Principles of Embedded Computing System Design', Morgan Kaufman Publishers, 2nd Edition, 2008.							
3	Dr K.V.K.K..Prasad, 'Embedded /Real-Time systems: Concepts, Design & Programming', DreamTech Publications, 2003.							
4	Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, 'ARM System Developer's Guide Designing and Optimizing System Software', Elsevier Publications, 2007.							
5	Trevor Martin, 'The Insider's Guide To The Philips ARM7-Based Microcontrollers, An Engineer's Introduction to The LPC2100 Series', Hitex (UK) Ltd., 2006.							
6	Frank Vahid and Tony Givargi, 'Embedded System Design: A Unified Hardware/Software Introduction', John Wiley & Sons, Reprint 2009..							

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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 505</td><td>TRANSMISSION LINES AND WAVE GUIDES</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To learn the propagation of signals through lines at radio frequencies and radio propagation in guided systems. To become familiar with resonators.</td></tr>
<tr><td>1</td><td colspan="5">TRANSMISSION LINE THEORY</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Different types of transmission lines – Definition of Characteristic impedance - Definition of Propagation Constant. General Solution of the transmission line – physical significance of the equation and the infinite line – meaning of reflection coefficient – Wavelength and velocity of propagation-Waveform distortion – distortion less transmission line – The telephone cable – Inductance loading of telephone cables-Input impedance of lossless lines – reflection on a line not terminated in Zo - Transfer impedance – reflection factor and reflection loss.</td></tr>
<tr><td>2</td><td colspan="5">THE LINE AT RADIO FREQUENCIES</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Constants for the line of zero dissipation – voltages and currents on the dissipationless line. Input impedance of the dissipationless line. Standing waves and standing wave ratio on a line – One eighth wave line – The quarter wave line and impedance matching – the half wave line – Single stub impedance matching on a line.
The circle diagram for the dissipationless line – The Smith Chart – Application of the Smith Chart – Conversion from impedance to reflection coefficient and vice-versa. Impedance to Admittance conversion and vice versa – single stub matching with the smith chart and double stub matching.</td></tr>
<tr><td>3</td><td colspan="5">GUIDED WAVES</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics of TE and TM Waves – Transverse Electromagnetic waves – Velocities of propagation – Attenuation of TE, TM and TEM waves in parallel plane guides – Wave impedances.</td></tr>
<tr><td>4</td><td colspan="5">RECTANGULAR WAVEGUIDES</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Transverse Magnetic Waves in Rectangular Wave guides – Transverse Electric Waves in Rectangular Waveguides – characteristic of TE and TM Waves – Cutoff wavelength and phase velocity – Impossibility of TEM waves in waveguides – Dominant mode in rectangular waveguide – Attenuation of TE_{10} and TM_{11} modes in rectangular waveguides – Wave impedances – characteristic impedance – Excitation of modes.</td></tr>
<tr><td>5</td><td colspan="5">CIRCULAR WAVE GUIDES AND RESONATORS</td><td>Total Hrs</td><td>12</td></tr>
<tr><td colspan="8">Bessel functions – Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide – excitation of modes – Microwave Resonators - , Rectangular cavity resonators, circular cavity resonator, Q factor of a cavity resonator for TE101 mode.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>60</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">J.D.Ryder, ‘Networks, Lines and Fields’, Prentice-Hall, New Delhi, 2nd Edition, 2010.</td></tr>
<tr><td>2</td><td colspan="7">E.C. Jordan and K.G.Balmain, ‘Electro Magnetic Waves and Radiating System’, Prentice-Hall, New Delhi, 2nd Edition, 2009.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Ramo, Whineery and Van Duzer, ‘Fields and Waves in Communication Electronics’, John Wiley, 3rd Edition 2008.</td></tr>
<tr><td>2</td><td colspan="7">David M.Pozar, ‘Microwave Engineering’, John Wiley, 3rd Edition, 2007.</td></tr>
<tr><td>3</td><td colspan="7">David K.Cheng, ‘Field and Waves in Electromagnetism’, Pearson Education, 2nd Edition, 1989.</td></tr>
<tr><td>4</td><td colspan="7">John Daniel Kraus, Keith R.Carver, ‘Electromagnetics’, McGraw Hill, 2nd Edition, 1973.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 506</td><td colspan="2">DIGITAL SIGNAL PROCESSING (EC)</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To analyze, understand and apply the concepts of Digital Signal Processing to design DSP systems for given specifications and applications.</td></tr>
<tr><td>1</td><td colspan="5">FOURIER ANALYSIS OF DISCRETE TIME SIGNALS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Review of DTFT – Frequency Domain Sampling: Discrete Fourier Transform – Properties of DFT – Efficient computation of the DFT: FFT algorithms – Radix 2 FFT algorithms: Decimation in Time and Decimation in Frequency algorithms – Applications of FFT algorithms in Linear filtering and correlation.</td></tr>
<tr><td>2</td><td colspan="5">DESIGN OF ANALOG AND DIGITAL FILTERS</td><td colspan="2">Total Hrs</td><td>16</td></tr>
<tr><td colspan="9">Design of IIR filters from Analog filters – Butterworth filters – Chebyshev filters – Impulse Invariant technique – Bilinear Transformation - Design of FIR filters – Symmetric and Antisymmetric FIR filters – Design of Linear-Phase FIR filters using windows – Rectangular, Hamming and Hanning windows.</td></tr>
<tr><td>3</td><td colspan="5">ANALYSIS OF FINITE WORD LENGTH EFFECTS</td><td colspan="2">Total Hrs</td><td>8</td></tr>
<tr><td colspan="9">Representation of Numbers – Fixed point and Floating point Representation – Errors resulting from Rounding and Truncation – Quantization Process and Errors – Analysis of Coefficient Quantization effects - A/D conversion noise analysis - Quantization noise model – Signal to Quantization Noise Ratio – Round off effects in Digital filters – Limit cycle oscillations in Recursive systems – Scaling to prevent overflow.</td></tr>
<tr><td>4</td><td colspan="5">INTRODUCTION TO MULTIRATE DIGITAL SIGNAL PROCESSING</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Introduction – Decimation – Interpolation – Sampling Rate conversion by a Rational Factor – Implementation of sampling rate conversion using polyphase filter structures – Multistage Implementation of Sampling rate conversion – Sampling rate Conversion of Bandpass signals – Sampling rate conversion by an Arbitrary factor – Applications of Multirate signal Processing.</td></tr>
<tr><td>5</td><td colspan="5">DIGITAL SIGNAL PROCESSORS</td><td colspan="2">Total Hrs</td><td>12</td></tr>
<tr><td colspan="9">Introduction to programmable DSPs – TMS320C54X – Architecture – Assembly language Instructions – Application Programs.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">60</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">John G Proakis, Dimitris G Manolakis, ‘Digital Signal Processing Principles, Algorithms and Application’, Pearson, 4th Edition, 2007.</td></tr>
<tr><td>2</td><td colspan="8">B.Venkataramani & M.Bhaskar, ‘Digital Signal Processor Architecture, Programming and Application’, McGraw-Hill, 2002.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Alan V Oppenheim, Ronald W Schafer, John R Back, ‘Discrete Time Signal Processing’, Prentice-Hall, 2nd Edition 2000.</td></tr>
<tr><td>2</td><td colspan="8">S.K.Mitra,’Digital Signal Processing: A Computer based approach’, McGraw-Hill, 1998, New Delhi.</td></tr>
<tr><td>3</td><td colspan="8">P.Ramesh Babu, ‘Digital Signal Processing’, Scitech, 5th Edition.</td></tr>
<tr><td>4</td><td colspan="8">Johnny R.Johnson, ‘Introduction to Digital Signal Processing’, Prentice-Hall, 2002.</td></tr>
<tr><td>5</td><td colspan="8">P.P.Vaidyanathan, ‘Multirate Systems and Filter Banks’, Pearson Education, 1992.</td></tr>
<tr><td>6</td><td colspan="8">Avtar Singh, S.Srinivasan, ‘DSP Implementation using DSP microprocessor with Examples from TMS32C54XX’, Thamson / Brooks Cole Publishers, 2003.</td></tr>
<tr><td>7</td><td colspan="8">Sen M.Kuo, Woon – Seng Gan, ‘Digital Signal Processing Architectures, Implementations, and Applications’, Pearson Education, 2005.</td></tr>
<tr><td>8</td><td colspan="8">Andreas Antoniou, ‘Digital Filters – Analysis, Design and Applications’, McGraw Hill, 2nd edition, 1999.</td></tr>
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10 EC 507	EMBEDDED SYSTEMS LABORATORY	0	0	3	2	50	50	100
Objective(s)	To introduce the programming and interfacing of PIC microcontroller, ARM Processor using tools like ATMEL, INTEL and KEIL.							

LIST OF EXPERIMENTS

1. Read the key and display the key via ports using PIC microcontroller.
2. ADC and DAC Interface using embedded microcontroller.
3. I^2CRTC interface using embedded microcontroller.
4. 4 Seven segment LED display using I^2C based 16 bit Expander using PIC microcontroller.
5. LED and LCD Interface using embedded microcontroller.
6. Buzzer and relay interface using ARM processor.
7. Serial Communication.
8. Temperature Sensor Interface.
9. SPI based EEPROM Interface.
10. Flash controller programming- Data flash with erase , verify, fusing through ATMEL/INTEL tools.
11. Testing RTOS Environment and system programming using KEIL tools.
12. Project design and implementation.

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		L	T	P	C	CA	ES	Total
10 EC 508	LINEAR INTEGRATED CIRCUITS LABORATORY	0	0	3	2	50	50	100
Objective(s)	To study the characteristics and applications of operational amplifiers.							

LIST OF EXPERIMENTS

1. Inverting, Non inverting and differential amplifier.
2. Integrator and Differentiator.
3. Instrumentation amplifier.
4. Active Low pass and Band pass filters.
5. Comparators using op-amp - Schmitt Trigger.
6. Waveform Generators using op-amp - Astable and Monostable.
7. Phase shift and Wien bridge oscillators using op-amp.
8. Astable and Monostable multivibrators using NE555 Timer.
9. Characteristics of PLL.
10. Applications of PLL - Frequency Multiplier.
11. DC power supply using LM317 and LM723.
12. Study of SMPS control IC SG3524 / SG3525.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name		EC : B.E. Electronics and Communication Engineering			
Semester V								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 509	DIGITAL SIGNAL PROCESSING LABORATORY	0	0	3	2	50	50	100
Objective(s)	To simulate the concepts of Digital Signal Processing and to design DSP systems for given specifications and applications.							

LIST OF EXPERIMENTS

USING MATLAB

1. Generation of sequences (functional and random), Correlation and Convolution.
2. Sampling and effect of Aliasing.
3. Design of FIR & IIR filters.
4. Study of Quantization errors in DSP algorithm.
5. Multirate filters / Adaptive filters.
6. Equalization / Echo Cancellation.

USING TMS320C54

1. Study of basic programs (Addition, Subtraction, and Multiplication & Division).
2. Waveform generation.
3. Study of Sampling Theorem.
4. Calculation of FFT.
5. FIR and IIR Implementation
6. Multirate filters.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 510	CAREER COMPETENCY DEVELOPMENT III	0	0	2	0	100	00	100
Objective(s)	i. To improve the skill level of students. ii. To improve the employability of students							

1	Aptitude Skills	Hrs
a. Arithmetic ability : Partnership - Chain rule – Calendar – Permutation - Data Interpretation – Probability - Heights and Distance b. Verbal Reasoning : Logical Venn Diagrams - Logical Sequence of Words - Arithmetical reasoning - Data Sufficiency - Statement – Conclusion - Deriving condition from passages c. Nonverbal Reasoning : Rule detection - Cube and dice		8
2	Programming Skills	6
Data Structures : Tree - Graph Object Oriented Programming : Introduction to C++ - Classes and Objects – Constructors - Operator Overloading – Inheritance – Templates - File I/O		
3	Written Communication Skills	
Error correction in the usage of degrees of comparison, conditional clauses, numerical expressions and system international (SI) units. - Paragraph Writing. Evaluation I – Written Test		4 2
4	Oral Communication Skills	
Group Discussion Demo - Listening comprehension Lab Evaluation II – Group Discussion		2 2
5	Interview Skills (Association Session)	
Evaluation III - Technical Interview - Technical Interview I (Objective type questions from V th semester subjects) Evaluation IV - HR Interview - HR Interview I - Adaptability, Self development, Creativity		4 4
Total		32

Reference(s):

1	R.S.Aggarwal , “Quantitative Aptitude”, S.Chand & Company Ltd., New Delhi, Reprint 2007 (Twice) (Ch – 13, 14, 27, 30, 31, 34, 36, 37, 38, & 39) (unit – I)
2	R.S.Aggarwal , “A Modern Approach to verbal & Non–verbal Reasoning”, S.Chand & Company Ltd, New Delhi, 2008, Part I – Section I (Ch - 9,14,15 & 17) Part I–Section II (Ch – 5 & 6) Part II (Ch 12 & 14) (unit – I)
3	Mark Allen Weiss , “Data Structures and Algorithm Analysis in C”, Pearson Education 2002, Ch – 4, 9 (unit – II)
4	Herbert Schildt , “The Complete Reference C++” Tata MacGraw Hill, 2002 (Ch - 11, 12, 14, 15, 16,17, 18, 21)
5	CCD Guide by English Department of KSRCT, 2008 (Unit – III, IV & V)
6	HR Interview Guide by Training Cell, KSRCT, 2008.

EVALUATION CRITERIA

S.No.	Particular	Test Portion	Marks
1	Evaluation I Written Test	Unit I – OQ – 50, Unit II – OQ – 30 Unit III – OQ 20	50
2	Evaluation II - Group discussion	P – 5 Marks, C – 5 Marks, TS – 5 Marks	15
3	Evaluation III - Technical Interview	6 questions each 2½ Marks	15
4	Evaluation IV HR Interview	Creativity – 6 Marks (Adoptability – 7 Marks, Self development – 7 marks)	20
P–Presentation C–Content Q–Queries OQ–Objective type question T–Total TS–Team Skills			T = 100

Note :
1. Question paper and keys will be supplied by the training cell for written test for Evaluation I
2. Respective Departments will conduct Evaluation I, II, III & IV, correct and submit the marks obtained by the students to the Training Cell.
3. HODs will display about 50 topics for oral communication.
4. All training & tests will be conducted on odd Saturdays, Session of 2 periods in FN & Session of 2 periods in AN & Association Session.
5. 66 students may be divided into 10 groups of 6 each. Each group may be evaluated in 10 Minutes for GD.
6. 60 objective type questions, 10 questions from each of 6 subjects are to be prepared. 1 question from each subject at random to be asked carrying 2½ marks each (6 x 2½ = 15 marks) for Technical Interview. Each section is divided into 3 groups of 22 each.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 611	DIGITAL COMMUNICATION	3	1	0	4	50	50	100
Objective(s)	To learn the fundamentals of information theory and to study the various Pulse modulation and transmission techniques with various error control coding techniques.							
1	FUNDAMENTALS OF INFORMATION THEORY				Total Hrs	12		
Information, self Information, entropy - mutual information, differential mutual information, differential entropy, and mutual information for continuous ensembles - channel capacity, channel coding theorem, source coding – Huffman coding, Shannon Fano coding, Lempel Ziv coding, source coding theorem - information capacity theorem, implication of the information capacity theorem.								
2	PULSE MODULATION				Total Hrs	12		
Sampling process – PAM other forms of pulse modulation – Bandwidth – Noise trade off – Quantization – PCM Noise considerations in PCM Systems - TDM Digital multiplexers-Virtues, Limitations and modifications of PCM - Delta modulation – Linear prediction –differential pulse code modulation – Adaptive Delta Modulation.								
3	ERROR CONTROL CODING				Total Hrs	12		
Discrete memory less channels – Linear block codes - Cyclic codes - Convolutional codes – Maximum likelihood decoding of convolutional codes-Viterbi Algorithm, Trellis coded Modulation, Turbo codes.								
4	PASSBAND DATA TRANSMISSION				Total Hrs	14		
Introduction – Matched Filter- Error Rate due to noise - Pass band Transmission model- Generation, Detection, Signal space diagram, bit error probability and Power spectra of BPSK, QPSK, FSK and MSK schemes – Differential phase shift keying – Comparison of Digital modulation systems – Carrier and symbol synchronization.								
5	BASEBAND PULSE TRANSMISSION				Total Hrs	10		
Intersymbol Interference- Nyquist's criterion for Distortionless Base band Binary Transmission- Correlative level coding –Base band M-ary PAM transmission –Adaptive Equalization –Eye patterns – Line coding.								
Total hours to be taught						60		
Text book(s) :								
1	Simon Haykin, 'Digital Communications', Wiley, 4th Edition,Reprint, 2006.							
Reference(s) :								
1	Bernard Sklar ,'Digital Communications', Prentice Hall, 2nd Edition, 2006.							
2	Sam K.Shanmugam 'Analog & Digital Communication, Wiley, 2nd Edition, 1992.							
3	Taub & Schilling,'Principles of Digital Communication', McGraw-Hill 28th reprint, 2003.							
4	Simon Haykin, 'Communication Systems', Wiley, 5th Edition, 2001.							
5	John G.Proakis, 'Digital Communication', Tata McGraw Hill, 4th Edition, 1995.							
6	B.P.Lathi,Zhi Ding, 'Modern Digital and Analog Communication Systems', Oxford University Press, 4th Edition,2009.							
7	B.P.Lathi, 'Modern Digital and Analog Communication Systems', 2nd Edition, 2009.							

<table>
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<tr><td>Department</td><td colspan="2">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="3">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="8">Semester VI</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 612</td><td colspan="2">COMPUTER NETWORKS</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To introduce the functions of different layers of the ISO/OSI model. To learn the functions of TCP/IP.</td></tr>
<tr><td>1</td><td colspan="5">DATA COMMUNICATIONS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Guided , Unguided media – Line Coding – Dialup Modems.</td></tr>
<tr><td>2</td><td colspan="5">DATA LINK LAYER</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Error – detection and correction: – Introduction –Block coding – CRC – Flow Control and Error control: stop and wait – go back N ARQ – selective repeat ARQ- sliding window techniques – HDLC.
LAN: Ethernet IEEE 802.3 Random access, – IEEE 802.11–Bluetooth, Repeaters, SONET – Bridges.</td></tr>
<tr><td>3</td><td colspan="5">NETWORK LAYER</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Internetworking – IP addressing methods (IPv4 and IPv6) – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.</td></tr>
<tr><td>4</td><td colspan="5">TRANSPORT LAYER</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Process to Process Delivery – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.</td></tr>
<tr><td>5</td><td colspan="5">APPLICATION LAYER</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="8">Domain Name Space (DNS) – Simple Mail Transfer Protocol (SMTP) – File Transfer Protocol (FTP) – Hyper Text Transfer Protocol (HTTP) – World Wide Web (WWW) – Security – Cryptography – Ethical Hacking- Intrusion Detection.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="8">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="7">Behrouz A. Forouzan, Sophia Chung Fegan, ‘Data communication and Networking’, McGraw-Hill, 4th Edition, 2006.</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">Andrew S. Tanenbaum, David J.Whetherall, ‘Computer Networks’, Prentice Hall, 5th Edition, 2010.</td></tr>
<tr><td>2</td><td colspan="7">James .F. Kurose, ‘Computer Networking: A Top down Approach’, Pearson Education, 6th Revised Edition, 2012.</td></tr>
<tr><td>3</td><td colspan="7">Larry L.Peterson & Bruce S. Davie, ‘Computer Networks’, Morgan Kaufmann, 5th Edition, 2011.</td></tr>
<tr><td>4</td><td colspan="7">William Stallings, ‘Data and Computer Communication’, Prentice Hall, 9th Edition, 2010.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC 613</td><td>ANTENNAS AND WAVE PROPAGATION</td><td>3</td><td>1</td><td>0</td><td>4</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To study the basic antenna concepts and different types of antennas and wave propagation techniques.</td></tr>
<tr><td>1</td><td colspan="5">ANTENNA FUNDAMENTALS AND WIRE ANTENNAS</td><td>Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Introduction –Types of antennas-Radiation mechanism-current distribution-Radiation pattern-power density-radiation intensity-directivity-gain-antenna efficiency beam width—bandwidth-polarization-radiation efficiency-effective aperture-Friss equation and radar range equation-antenna temperature-Far field radiation-duality theorem. Linear wire antennas-Infinitesimal dipole-small dipole-finite length dipole-Half wavelength dipole.</td></tr>
<tr><td>2</td><td colspan="5">LOOP ANTENNAS AND ANTENNA ARRAYS</td><td>Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Loop Antennas: Radiation from small loop and its radiation resistance. Radiation from a loop with circumference equal to a wavelength and resultant circular polarization on axis. Helical antenna. Normal mode and axial mode operation. Antenna Arrays: Expression for electric field from two and three element arrays. Uniform linear array. Method of pattern multiplication. Binomial array.</td></tr>
<tr><td>3</td><td colspan="5">TRAVELLING WAVE (WIDEBAND) ANTENNAS</td><td>Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Radiation from a traveling wave on a wire. Analysis of Rhombic antenna. Design of Rhombic antennas. Coupled Antennas: Self and mutual impedance of antennas. Two and three element Yagi antennas. Log periodic antenna. Reason for feeding from end with shorter dipoles and need for transposing the lines. Effects of decreasing α.</td></tr>
<tr><td>4</td><td colspan="5">APERTURE AND LENS ANTENNAS</td><td>Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Radiation from an elemental area of a plane wave (Huygen's Source). Radiation from a rectangular aperture treated as an array of Huygen's sources. Equivalence of fields of a slot and complementary dipole. Relation between dipole and slot impedances. Method of feeding slot antennas. Thin slot in an infinite cylinder. Field on the axis of an E-Plane sectoral horn. Radiation from circular aperture. Patch and Microstrip antennas. Reflector type of antennas (dish antennas). Dielectric lens and metal plane lens antennas. Lumeberg lens.</td></tr>
<tr><td>5</td><td colspan="5">WAVE PROPAGATION</td><td>Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Fundamental equation for free space propagation-modes of propagation structure of atmosphere and characteristics-sky wave propagation-effects of Earths magnetic field-Application of Bartree magnetic ionic formula-Hartree formula-effective dielectric constant and conductivity of the ionosphere and collision frequency-lowest usable frequency-skip distance-Optimum working frequency-ionospheric Abnormalities-Multi hop propagations-Space wave propagation-Duct propagation.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">60</td></tr>
<tr><td colspan="9">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="8">John D.Kraus Ronald J.Marhefka, and Ahmad S.Khan, "Antennas and Wave Propagation", McGraw-Hill, 4th Edition, 2006, Special Indian Edition 2010.</td></tr>
<tr><td>2</td><td colspan="8">K.D.Prasad, 'Antenna and wave propagation', Satya Prakashan, 3rd Edition, 1999.</td></tr>
<tr><td colspan="9">Reference(s):</td></tr>
<tr><td>1</td><td colspan="8">Constantine A,Ballanis , 'Antenna Theory' , John Wiley & Sons, 3rd Edition , 2003.</td></tr>
<tr><td>2</td><td colspan="8">H.Griffiths,J.Encianas,A.Papiernik & Serge Drabowitch, 'Modern Antennas', Chapman & Hall, 1st Edition, 2010.</td></tr>
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<tr><td colspan="2">10 EC 614</td><td>VLSI DESIGN</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To learn the basic CMOS circuits and CMOS process technology. To learn the concepts of modeling a digital system using Hardware Description Language.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION TO MOS TRANSISTOR THEORY</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">MOS Transistors, CMOS Logic, Ideal I-V Characteristics, Simple MOS Capacitance Models, Detailed MOS Gate Capacitance Model, Non-ideal I-V effects, DC Transfer Characteristics.</td></tr>
<tr><td>2</td><td colspan="5">CMOS PROCESSING TECHNOLOGY</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">VLSI Design Flow, CMOS Fabrication and Layout, CMOS Technologies, Layout Design Rules, CMOS Process Enhancements. Technology Related CAD Issues, Fabrication & Packaging.</td></tr>
<tr><td>3</td><td colspan="5">DIGITAL DESIGN USING VERILOG HDL</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Typical Design Flow, Hierarchical Modeling Concepts, Modules and Ports, Gate Level Modeling, Dataflow Modeling, Behavioral Modeling Styles, Tasks and functions.</td></tr>
<tr><td>4</td><td colspan="5">VLSI CIRCUIT DESIGN AND CHARACTERISTION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">HDL Design of Decoder, Encoder, Equaling Detector, Comparator, Priority Encoder, D-Latch, D-FF, Half Adder, Full Adder and Ripple Carry Adder. Circuit Families, Conventional CMOS Latches and Flip-Flops, CPLD, Power Dissipation, Design Margin.</td></tr>
<tr><td>5</td><td colspan="5">TESTING AND VERIFICATION OF VLSI CIRCUITS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Logic Verification Principles, Silicon Debug Principles, Manufacturing Test Principles, Design for Testability, Boundary Scan, Testing in a University Environment.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Neil.H.E.Weste , David Harris and Ayan Banerjee, ‘ CMOS VLSI Design - A Circuits and Systems Perspective’, Pearson Education, 3rd Edition, 2009.</td></tr>
<tr><td>2</td><td colspan="8">Samir Palnitkar, ‘Verilog HDL – A Guide to Digital Design and Synthesis’, Pearson Education, 2nd Edition, 2011.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Neil.H.E.Weste & Kamran Eshraghian, ‘Principles of CMOS VLSI Design-A Systems Perspective’, Pearson Education, 2nd Edition, 2008.</td></tr>
<tr><td>2</td><td colspan="8">M.J.S.Smith , ‘Application Specific Integrated Circuits’, Pearson Education, 2008.</td></tr>
<tr><td>3</td><td colspan="8">Douglas A.Pucknell and Kamran Eshraghian, ‘Basic VLSI Design’, Prentice Hall, 3rd Edition, 2001.</td></tr>
<tr><td>4</td><td colspan="8">Wayne Wolf, ‘Modern VLSI Design’, Pearson Education, 2003.</td></tr>
<tr><td>5</td><td colspan="8">John P.Uyemura, ‘Introduction to VLSI Circuits and Systems’, John Wiley and Sons, 2006.</td></tr>
<tr><td>6</td><td colspan="8">J. Bhaskar, ‘ Verilog HDL Primer’, BS Publications, 2002.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 HS 001</td><td>PROFESSIONAL ETHICS</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To create an awareness on Ethics and Human Values and instill Moral and Social Values in Students.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Ethics defined – Engineering as a profession – Core qualities of professional practitioners – Theories of right action – Major ethical issues – Three types of inquiry – Kohlberg’s stages of moral development – Carol Gilligan theory – Moral dilemmas – Moral autonomy – Value based ethics.</td></tr>
<tr><td>2</td><td colspan="5">ENGINEERING AS SOCIAL EXPERIMENTATION</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Comparison with standard experiments – Relevant information – Learning from the past – Engineers as managers, consultants and leaders – Accountability – Role of codes – Code of ethics for engineers; introduction, rules of practice and professional obligations – The space shuttle challenger case study.</td></tr>
<tr><td>3</td><td colspan="5">ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK</td><td>Total hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Safety and Risk – Types of risks – Safety and the engineer – Designing for safety – Risk Benefit analysis – Accidents - The three mile Island disaster case study – The Chernobyl disaster case study.</td></tr>
<tr><td>4</td><td colspan="5">RESPONSIBILITIES AND RIGHTS</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Collegiality – Two senses of loyalty – Professional rights and responsibilities – Conflict of Interest – Collective Bargaining – Confidentiality – Acceptance of bribes / gifts – Occupational crimes – Whistle Blowing.</td></tr>
<tr><td>5</td><td colspan="5">GLOBAL ISSUES</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Globalization – Cross Cultural Issues – The Bhopal gas tragedy case study – Computer ethics – Weapons development – Intellectual property rights (IPR)</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Govindarajan M, Natarajan S, Senthil Kumar V.S, “Engineering Ethics”, Prentice Hall of India (P) Ltd, New Delhi, 10th Reprint 2009.</td></tr>
<tr><td colspan="9">Reference(s):</td></tr>
<tr><td>1</td><td colspan="8">Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.</td></tr>
<tr><td>2</td><td colspan="8">Govindan K.R., and Sendhil Kumar S., “Professional Ethics and Human Values”, Anuradha Publications, Chennai, 2007.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 6P1</td><td>COMMUNICATION LABORATORY I</td><td>0</td><td>0</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To study the fundamentals of Modulation/Demodulation, Sampling and to study the various radiation pattern of antennas.</td></tr>
<tr><td colspan="8">LIST OF EXPERIMENTS</td></tr>
<tr><td colspan="8">1. AM Modulation and Demodulation.
2. FM Modulation and Demodulation.
3. Pulse Code Modulation & Demodulation.
4. Sampling and TDM.
5. Digital Modulation (ASK, PSK, FSK).
6. Delta Modulation.
7. Pulse Modulation (PPM, PWM).
8. Channel Coding.
9. Line Coding.
10. Radiation pattern of Yagi-uda antenna.
11. Radiation pattern of loop antenna.
12. Spectrum measurement for filters.</td></tr>
</table>

***** Simulation using Simulink/MATLAB to be done wherever applicable.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Semester VI								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 6P2	VLSI LABORATORY	0	0	3	2	50	50	100
Objective(s)	To learn the programming and simulation of various systems using back-end and front-end EDA tools.							

LIST OF EXPERIMENTS

1. Study of FPGA Architecture.
2. Design Entry and simulation of combinational logic circuits (adders, multipliers, decoder, encoder, multiplexer). Functional verification and concepts of concurrent and sequential execution to be highlighted.
3. Design Entry and simulation of sequential logic circuits (flip-flops, counters, shift registers). Functional verification and concepts of concurrent and sequential execution to be highlighted.
4. Synthesis, P&R and Post P&R simulation for all the blocks/codes developed in Expt.No.2 and No.3 given above. Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignment to be taught in this experiment.
5. Generation of configuration/fuse files for all the blocks/codes developed as part of Expt.No.2/Expt.No.3 FPGA devices must be configured and hardware tested for the Blocks/codes developed as part of Expt.No.2 and No.3.
6. Schematic design of digital logic circuits.
7. Implementation of ALU using FPGA.
8. Implementation of traffic light controller using FPGA.
9. DC and Transient analysis of CMOS inverter/D-latch using SPICE tool.
10. DC and Transient analysis of NAND/NOR using SPICE tool.
11. Layout of a simple CMOS inverter, parasitic extraction and simulation.
12. Schematic Entry and SPICE simulation of MOS differential amplifier. Determination of gain, bandwidth, output impedance and CMRR**.**

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering	Programme Code & Name			EC: B.E. Electronics and Communication Engineering			
Semester VI								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 6P3	COMPUTER NETWORKS LABORATORY	0	0	3	2	50	50	100
Objective(s)	To simulate and implement different networking protocols.							

LIST OF EXPERIMENTS

1. PC to PC Communication.

   Parallel Communication using 8 bit parallel cable.

   Serial communication using RS 232C.

2. Ethernet LAN protocol.

   To create scenario and study the performance of CSMA/CD protocol through simulation.

3. Token bus and Token ring protocols.

   To create scenario and study the performance of token bus and token ring protocols through simulation.

4. Wireless LAN protocols.

   To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.

5. Implementation and study of stop and wait protocol.
6. Implementation and study of Go back-N and selective repeat protocols.
7. Implementation of distance vector routing algorithm.
8. Implementation of Link state routing algorithm.
9. Implementation of Data encryption and decryption.
10. Transfer of files from PC to PC using Windows / Unix socket programming.
11. Implementation of IP subnet.
12. Implementation of Error Detecting Codes

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Semester VI								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 TP 0P4	CAREER COMPETENCY DEVELOPMENT IV	0	0	2	0	100	00	100
Objective(s)	i. To improve the skill level of students. ii. To improve the employability of students.							

1	Company type written test in Aptitude, Written Communication Skills	Hrs
Company based questions – Questions from Aptitude, Written communication and Comprehension. Evaluation I Written Test		6 2
2	Company type written test in Verbal and Non-verbal Reasoning Skills	
Company based questions – Questions from Verbal and Non-verbal reasoning. Evaluation II Written Test		6 2
3	Programming Skills	
Company based questions from C language, Data structures and Object Oriented Programming. Evaluation III Written Test		6 2
4	Interview Skills(Association Session)	
Technical Interview – Questions from core subjects HR Interview - Flexibility, Achievement orientation, Decisiveness Evaluation IV – Technical & HR Interview.		4+4
	Total	32

Reference(s):

1	R.S.Aggarwal , "Quantitative Aptitude", S.Chand & Company Ltd., New Delhi, Reprint 2007 (Twice) (unit – I)
2	CCD Guide by English Department of KSRCT, 2008 (Unit – I)
3	R.S.Aggarwal , "A Modern Approach to verbal & Non – verbal Reasoning", S.Chand & Company Ltd, New Delhi, 2008, (unit – II)
4	Yashwant Kanetkar, " Let us 'C' ", BPB Publications, New Delhi, 2002 (unit – III)
5	Herbert Schildt, " The Complete Reference C++ ", TMH, 2003 (unit – III)
6	Mark Allen Weiss , "Data Structures and Algorithm Analysis in C", Pearson Education 2002.(unit – III)
7	Company question papers(Unit I-III)
6	HR Interview Guide by Training cell (unit IV)

EVALUATION CRITERIA

S.No.	Particular	Test Portion	Marks
1	Evaluation I, Written Test	Unit 1 – Aptitude – 50 OQs, Written Communication & Comprehension – 50 OQs	25
2	Evaluation II Written Test	Unit II – Verbal Reasoning – 50 OQs, Non-verbal Reasoning – 50OQs	25
3	Evaluation III Written Test	Unit III – C Language-50OQs, Data Structures – 25 OQs, OOPs – 25 OQs	20
4	Evaluation IV Technical & HR Interview	Unit IV Technical Interview - 6 questions (each question 2.5 marks) HR Interview – Flexibility(5 marks), Achievement orientation(5 marks), Decisiveness(5 marks).	15 15
P – Presentation C – Content OQ – Objective type question T – Total			T = 100

Note :
1. Question paper and keys will be supplied by the training cell for written test for Evaluation I, II & III
2. Respective Departments will conduct Evaluation I, II, III & IV, correct and submit the marks obtained by the students to the Training Cell.
3. All training & Evaluation tests will be conducted on odd Saturdays, Session of 2 periods in FN & Session of 2 periods in AN & Association Session.
4. 60 Interview type questions, 10 questions from each of 6 subjects of VIth Semester are to be prepared.
   1 question from each subject at random to be asked carrying 2½ marks each (6 x 2½ = 15 marks) for Technical Interview. Each section is divided into 3 groups of 22 each.

<table>
<tr><td colspan="8">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td colspan="2">Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E Electronics and Communication Engineering</td></tr>
<tr><td colspan="9">Semester VII</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC 711</td><td>OPTICAL COMMUNICATION</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To learn the structure of optical fibers, fiber modes and optical signal losses. To understand the functioning of various optical sources, detectors and components in optical networking</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION TO OPTICAL FIBERS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Evolution of fiber optic system – Element of an Optical Fiber Transmission link – Ray Optics – Optical Fiber Modes and Configurations – Mode theory of Circular Wave guides – Overview of Modes – Key Modal concepts – Linearly Polarized Modes – Single Mode Fibers – Graded Index fiber structure-fiber materials, fiber fabrication techniques.</td></tr>
<tr><td>2</td><td colspan="5">SIGNAL DEGRADATION IN OPTICAL FIBERS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides – Information Capacity determination – Group Delay - Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers – Polarization Mode dispersion, Intermodal dispersion– Mode Coupling – Design Optimization of SM fibers – RI profile and cut – off wavelength, non linear effects.</td></tr>
<tr><td>3</td><td colspan="5">FIBER OPTICAL SOURCES</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Direct And indirect Band gap materials – LED structures – Light source materials – Quantum efficiency and LED power, Modulation of a LED, laser Diodes – Modes and Threshold condition – External Quantum efficiency – Resonant frequencies – Laser Diode structures and Radiation Patterns, modulation of laser diodes-Temperature effects, light sources and transmitters for free space communication.</td></tr>
<tr><td>4</td><td colspan="5">FIBER OPTICAL RECEIVERS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">PIN and APD diodes – photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise – Fundamental Receiver Operation – preamplifiers-types - High impedance, Trans impedance amplifiers, Error Sources – Receiver configuration – Probability of Error ,principle of coherent detection,power and rise time budget.</td></tr>
<tr><td>5</td><td colspan="5">OPTICAL NETWORKING PRINCIPLES AND COMPONENTS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">WDM optical networks, SONET/SDH/FDDI optical networks, layered optical network architecture, Optical couplers, filters, isolators, switches, optical amplifiers: erbium doped fiber amplifiers, semiconductor optical amplifiers.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text Book(s):</td></tr>
<tr><td>1</td><td colspan="8">Gerd Kaiser, ‘Optical Fiber Communications’, Fourth Edition, Tata McGraw Hill Publishers,2010.</td></tr>
<tr><td colspan="9">Reference(s):</td></tr>
<tr><td>1</td><td colspan="8">John. M. Senior, ‘Optical Fiber Communications- Principles And Practice’, Pearson, Third Edition. 2010.</td></tr>
<tr><td>2</td><td colspan="8">Govind P.Agarval, ‘Fiber-Optic Communication Systems’, Third edition, John Wilely & Sons, 2004.</td></tr>
<tr><td>3</td><td colspan="8">Rajiv Ramasamy and Kumar. N. Sivarajan,Galen.H.Sasaki, ‘Optical networks-A practical perspective’, Third Edition, Morgan Kauffman, 2010.</td></tr>
</table>

K.S.Rangasamy College of Technology - Autonomous Regulation								R2010
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Semester VII								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 712	WIRELESS COMMUNICATIONS	3	0	0	3	50	50	100
Objective(s)	To study the basic concepts in cellular networks. To study modulation techniques and radio propagation. To understand the different multiple access concepts. To study the different wireless standards.							
1	CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS				Total Hrs	9		
Introduction to wireless communication: Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications. Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, trunking and grade of service, Improving Coverage and capacity in Cellular systems.								
2	MOBILE RADIO PROPAGATION				Total Hrs	9		
Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.								
3	MODULATION TECHNIQUES FOR MOBILE COMMUNICATION				Total Hrs	9		
Modulation Techniques: Minimum Shift Keying, Gaussion MSK, Spread Spectrum Modulation,M-ary QAM, M-ary FSK, Orthogonal Frequency Division Multiplexing principle-transceiver implementation Performance of Digital Modulation in Slow-Flat Fading Channels and Frequency Selective Mobile Channels.								
4	EQUALIZATION,DIVERSITY AND MULTIPLE ACCESS TECHNIQUES				Total Hrs	9		
Equalization: Survey of Equalization Techniques, Linear Equalization, Non-linear Equalization, Algorithms for Adaptive Equalization. Diversity Techniques, RAKE receiver.. Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Introduction to MIMO systems.								
5	WIRELESS STANDARDS				Total Hrs	9		
Second Generation, Third Generation and Fourth Generation Wireless Standards, Blue tooth, GSM, GPRS, CDMA in IS-95/CDMA2000, Wi-Fi, WiMax.								
Total hours to be taught						45		
Text Book(s) :								
1	T.S.Rappaport, 'Wireless Communications: Principles and Practice', Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2009.							
2	Andreas.F.Molisch, 'Wireless Communications', Second Edition, Wiley and IEEE, 2010.							
Reference(s) :								
1	R. Blake, 'Wireless Communication Technology', Thomson Delmar, 2004.							
2	W.C.Y.Lee, 'Mobile Communications Engineering: Theory and applications', Second Edition, McGraw-Hill International, 2009.							
3	Stephen G. Wilson, ' Digital Modulation and Coding', Pearson Education, 2008.							
4	DavidTse and Pramod Viswanath, 'Fundamentals of Wireless communication', Cambridge university press, 2005.							
5	Van Nee.R and Ramji Prasad, 'OFDM for wireless multimedia Communication',Artech house,2000.							

K.S.Rangasamy College of Technology - Autonomous Regulation							R 2010	
Department	Electronics and Communication Engineering		Program code & Name		EC : B.E. Electronics and Communication Engineering			
Semester VII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 713	MICROWAVE ENGINEERING	3	1	0	4	50	50	100
Objective(s)	To understand the working of Microwave components and analyze them with high frequency parameters. To learn the functioning of Microwave sources, integrated circuits and measurements.							
1.	MICROWAVE PASSIVE DEVICES				Total Hrs	12		
Introduction to S parameters, properties of S Matrix, relationship between Y-Z & ABCD Parameters with S parameters, Terminations, Attenuators, Phase Shifters, Directional Couplers, Hybrid Junctions, Power Dividers, Microwave Propagation in Ferrites, Faraday Rotation, Microwave Devices Employing Faraday Rotation, Circulators.								
2.	MICROWAVE VACCUM TUBES				Total Hrs	12		
Klystrons, Reentrant Cavities, Velocity-Modulation Process, Bunching Process, Output Power and Beam Loading, Multicavity Klystron Amplifiers, Beam-Current Density, Output Current Output Power of Two-Cavity Klystron, Output Power of Four-Cavity Klystron, Reflex Klystrons, Velocity Modulation, Power Output and Efficiency, Electronic Admittance, Helix Traveling-Wave Tubes (TWTs), Slow-Wave structures, Amplification Process, Convection Current, Axial Electric Field, Wave Modes, Gain Consideration, MICROWAVE CROSSED-FIELD TUBES: Magnetron Oscillators, Cylindrical Magnetron, Coaxial Magnetron, Tunable Magnetron, Ricke diagram.								
3.	MICROWAVE SOLID STATE DEVICES AND CIRCUITS				Total Hrs	12		
Transit time limitations in transistors, microwave transistors, power frequency limitations, microwave field effect transistors, HEMT, Gunn diodes - Two-Valley Model Theory, Modes of Operation, LSA Diodes, InP Diodes, CdTe Diodes, Microwave Generation and Amplification, Microwave Generation, Microwave Amplification, AVALANCHE TRANSIT-TIME DEVICES: Introduction, Read Diode, Avalanche Multiplication, Carrier Current $I_o(t)$ and External Current $I_e(t)$, Output Power and Quality Factor, IMPATT Diodes, Principles of Operation, Power Output and Efficiency, TRAPATT Diodes, Principles of Operation, Power Output and Efficiency, BARITT Diodes, Principles of Operation, Parametric Amplifiers, Applications.								
4.	STRIP LINES and MONOLITHIC MICROWAVE INTEGRATED CIRCUITS				Total Hrs	12		
Microstrip Lines, Characteristic Impedance of Microstrip Lines, Losses in Microstrip Lines, Quality Factor Q of Microstrip Lines, Parallel Strip Lines, Distributed Lines, Characteristic Impedance, Attenuation Losses, Coplanar Strip Lines, Shielded Strip Lines, MONOLITHIC MICROWAVE INTEGRATED CIRCUITS: Introduction, Materials, Substrate Materials, Conductor Materials, Dielectric Materials, Resistive Materials, Monolithic Microwave Integrated-Circuit Growth, MMIC Fabrication Techniques, Fabrication Example.								
5.	MICROWAVE MEASUREMENTS				Total Hrs	12		
Measuring Instruments – VSWR meter, Power meter, Spectrum Analyser, Network Analyser – principles; Measurement of Impedance, frequency, power, VSWR, Q factor, dielectric constant, S-Parameter.								
Total hours to be taught						60		
Text book (s):								
1.	Robert E.Collin, 'Foundations for Microwave Engineering', Second Edition, Wiley, Reprint 2009. (Unit 1).							
2.	Samuel Y.Liao, 'Microwave Devices and Circuits', Third Edition, Prentice Hall of India, 2008. (Unit 2, 3, 4).							
3.	Annapurna Das and Sisir K.Das, 'Microwave Engineering', Tata McGraw-Hill, 2007. (Unit 5).							
Reference(s):								
1.	David M.Pozar, 'Microwave Engg', John Wiley & Sons, Third Edition, 2008.							
2.	P.A.Rizzi, 'Microwave Engg. (Passive ckts)', Prentice Hall of India, 1988.							

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<tr><td colspan="2">10 EC 714</td><td>ASIC DESIGN</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To acquire knowledge to design and integrate a circuit for a particular application.</td></tr>
<tr><td>1</td><td colspan="4">INTRODUCTION TO ASICS, CMOS LOGIC AND ASIC LIBRARY DESIGN</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">ASIC design flow- Types of ASICs - CMOS Design rules - Combinational Logic Cell – Sequential logic cell - Data path logic cell: Data path elements - Transistors as Resistors- Logical effort –Library cell design - Library architecture.</td></tr>
<tr><td>2</td><td colspan="4">PROGRAMMABLE ASICS, PROGRAMMABLE ASIC LOGIC CELLS AND PROGRAMMABLE ASIC I/O CELLS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Anti fuse - Static RAM - EPROM and EEPROM technology - PREP benchmarks - Actel ACT - Xilinx LCA – Altera FLEX - Altera MAX DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks.</td></tr>
<tr><td>3</td><td colspan="4">PROGRAMMABLE ASIC INTERCONNECT, PROGRAMMABLE ASIC DESIGN SOFTWARE AND LOW LEVEL DESIGN ENTRY</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Actel ACT -Xilinx LCA - Xilinx EPLD – Altera MAX 9000 - Altera FLEX –Design systems - Logic Synthesis - Half gate ASIC -Schematic entry - Low level design language - PLA tools -EDIF- CFI design representation.</td></tr>
<tr><td>4</td><td colspan="4">LOGIC SYNTHESIS AND SIMULATION</td><td colspan="2">Total Hrs</td><td colspan="2">6</td></tr>
<tr><td colspan="9">Verilog and logic synthesis - Types of simulation - Fault simulation.</td></tr>
<tr><td>5</td><td colspan="4">ASIC CONSTRUCTION, FLOOR PLANNING, PLACEMENT AND ROUTING</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Physical design flow -System partitioning - FPGA partitioning - Partitioning methods - Floor planning - Placement - Global routing - Detailed routing - Special routing - Circuit extraction - DRC.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="7">Text Book</td><td colspan="2"></td></tr>
<tr><td>1</td><td colspan="8">M.J.S .Smith, ‘Application Specific Integrated Circuits’, Pearson Education, 2009.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Farzad Nekoogar and Faranak Nekoogar, ‘From ASICs to SOCs: A Practical Approach’, Prentice Hall, 2003.</td></tr>
<tr><td>2</td><td colspan="8">Wayne Wolf, ‘FPGA-Based System Design‘, Prentice Hall, 2009.</td></tr>
<tr><td>3</td><td colspan="8">R.Rajsuman, ‘System-On-A-Chip Design and Test’, Artech House, 2000.</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering	Programme Code & Name			EC : B.E. Electronics and Communication Engineering			
Semester VII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 HS 002	TOTAL QUALITY MANAGEMENT	3	0	0	3	50	50	100
Objective(s)	To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management, statistical approach for quality control, ISO and QS Certification process and its need for the industries.							
1	INTRODUCTION					Total Hrs		9
Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Quality Council, Quality Statements, Deming Philosophy, Barriers to TQM Implementation.								
2	TQM PRINCIPLES					Total Hrs		9
Customer satisfaction, Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement, Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership, Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures-Basic Concepts, Strategy.								
3	STATISTICAL PROCESS CONTROL (SPC)					Total Hrs		9
The tools of quality, Statistical Fundamentals, Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New Management tools.								
4	TQM TOOLS					Total Hrs		9
Benchmarking, Reasons to Benchmark, Benchmarking Process, Quality Circle, Quality Function Deployment (QFD). House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM), Concept, Improvement Needs, FMEA–Stages, Types.								
5	QUALITY SYSTEMS					Total Hrs		9
Need for ISO 9000 Quality Systems, ISO 9001:2008 ISO 14000 Quality Systems, Elements Concepts, Implementation, Documentation, Quality Auditing, Requirements and Benefits, Non Conformance report, Case Studies on Educational System.								
Total hours to be taught						45		
Text book (s) :								
1	Dale H.Besterfiled, et al., “Total Quality Management”, Pearson Education Asia, 1999. (Indian reprint 2002).							
Reference(s) :								
1	James R.Evans & William M.Lidsay, “The Management and Control of Quality”, (5th Edition), South-Western (Thomson Learning), 2002.							
2	Feigenbaum.A.V. “Total Quality Management”, McGraw Hill, 1991.							
3	Jayakumar.V, “Total Quality Management” Lakshmi Publications, 2006.							
4	Suburaj, Ramasamy “Total Quality Management”, Tata McGraw Hill, 2005.							

K.S.Rangasamy College of Technology - Autonomous Regulation								R2010
Department	Electronics and Communication Engineering		Programme Code & Name		EC : B.E Electronics and Communication Engineering			
Semester VII								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 7P1	COMMUNICATION LABORATORY II	0	0	3	2	50	50	100

LIST OF EXPERIMENTS

Experiments pertaining to Fiber optics, Optical Communication and Fiber optic sensors:

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers, OTDR Principle.
2. LED & Photo Diode Characteristics.
3. PI Characteristic of laser diodes-Threshold current determination and temperature effects.
4. Gain characteristic of APDs-determination of breakdown voltage and average gain of APD.
5. Analog transmission Characteristic of a fiber optical link – Determination of operating range and system bandwidth for glass and Plastic fiber links.
6. Determination of maximum bit rate of a digital fiber optical link– Glass and optic fiber links.

Microwave Experiments

1. Gain and Radiation Pattern Measurement of Horn Antenna.
2. Determination of mode characteristic of Reflex Klystron Oscillator
3. VSWR, Impedance Measurement.
4. Characteristic of Directional Couplers and Multiport Junction.
5. Gunn diode characteristics.
6. Study of Microstrip components (Filters, Antennas, etc..)

K.S.Rangasamy College of Technology - Autonomous Regulation								R2010
Department	Electronics and Communication Engineering	Programme Code & Name			EC : B.E Electronics and Communication Engineering			
Semester VII								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 7P2	SYSTEM DESIGN LABORATORY	0	0	3	2	80	20	100

LIST OF EXPERIMENTS

1. Design of a 4-20mA transmitter for bridge type transducer.

(or)

2. Design of process control timer.

3. Design of modem.

(or)

4. PCB layout design using CAD.

5. Microcontroller based system design.

(or)

6. DSP based system design.

7. ASIC based system design.

(or)

8. MATLAB based system design.

Note:

- 5 out of 8 systems must be designed by each group of students.
- Groups will be allotted by the faculty in charge

<table>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 7P3</td><td>PROJECT WORK - PHASE I</td><td>0</td><td>0</td><td>4</td><td>2</td><td>100</td><td>00</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To impart practical knowledge to the students and also to make them to carry out the technical procedures in their project work. To provide an exposure to the students to refer, read and review the research articles, journals and conference proceedings relevant to their project work and placing this as their beginning stage for their final presentation</td></tr>
<tr><td>Methodology</td><td colspan="7">• A committee is constituted with the project coordinator, project guide and HOD/Senior professor in the department
• Three reviews have to be conducted by the committee
• Problem should be selected by every batch of students
• Students must do a literature survey collecting a minimum of 10 papers related to their work
• Report has to be prepared by the students as per the format
• Preliminary implementation can be done if possible
• Internal evaluation has to be done based on the three reviews for 100 marks</td></tr>
</table>

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Semester VII								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 TP 0P5	CAREER COMPETENCY DEVELOPMENT V	0	0	2	0	100	00	100
Objective(s)	i. To encourage the all round development of students by focusing on soft skills. ii.To improve the employability of students.							

		Hrs
1	Company type written test in Aptitude, Written Communication Skills	
Software and Core company based questions - Questions from Quantitative Ability, Analytical reasoning, Logical reasoning, Written communication, Programming and Technical Skills. Evaluation I Written Test		6 2
2	Group Discussion	
Strategies in GD – Team work – Body Language – Mock GDs – Video Samples Evaluation II – Group Discussion		6 2
3	Interview Skills(Technical Interview)	
Keyword discussions on core subjects -Complex problem solving in programming and core subjects - Mock Technical Interviews Evaluation III Technical Interview		6 2
4	Interview Skills(HR Interview)	
Kinds of HR Interviews – Corporate culture – Mock Interviews – Video Samples Evaluation IV – HR Interview.		6 2
	Total	32

Reference(s):

1	R.S.Aggarwal , "Quantitative Aptitude", S.Chand & Company Ltd., New Delhi, Reprint 2007 (Twice) (unit – I)
2	CCD Guide by English Department of KSRCT, 2008 (Unit – I)
3	R.S.Aggarwal , "A Modern Approach to verbal & Non – verbal Reasoning", S.Chand & Company Ltd, New Delhi, 2008, (unit – I)
4	Company question papers(unit I)
5	Yashavant Kanetkar, " Let us 'C' ", BPB Publications, New Delhi, 2002 (unit – I)
6	Herbert Schildt, " The Complete Reference C++ ", TMH, 2003 (unit – I)
7	HR Interview Guide by Training cell (unit IV)

EVALUATION CRITERIA

S.No.	Particular	Test Portion	Marks
1	Evaluation I Written Test	Unit I – Questions from Software and core companies	40
2	Evaluation II	Unit II - Group Discussion	20
3	Evaluation III	Unit III – Technical Interview	20
4	Evaluation IV	Unit IV - HR Interview	20
Total			T = 100

Note :

1. Question papers and keys will be supplied by the training cell for written test for Evaluation I
2. Respective Departments will conduct Evaluation II, III & IV, correct and submit the marks obtained by the students to the Training Cell.
3. All training & Evaluation tests will be conducted on odd Saturdays, Session of 2 periods in FN & Session of 2 periods in AN & Association Session.
4. Each section is divided into groups and conduct Aptitude test, mock group discussions, interviews in every alternate Saturdays.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name		EC : B.E. Electronics and Communication Engineering			
Semester VIII								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC 811	TELECOMMUNICATION SWITCHING TECHNIQUES	3	0	0	3	50	50	100
Objective(s)	To study the concepts of multiplexing, digital hierarchy and digital switching. To understand the need for network synchronization and its issues, ISDN, DSL/ADSL and statistical modeling of telephone traffic.							

1	MULTIPLEXING	Total Hrs	9

Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings.
SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring.

2	DIGITAL SWITCHING	Total Hrs	9

Switching Functions, Space Division Switching, Time Division Switching, two-dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SSN07 signaling.

3	NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT	Total Hrs	9

Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

4	DIGITAL SUBSCRIBER ACCESS	Total Hrs	9

ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems and Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

5	TRAFFIC ENGINEERING AND ANALYSIS	Total Hrs	9

Traffic Characterization: Arrival Distributions, Holding Time Distributions, Network traffic load and parameters-Grade of service and blocking probability-Incoming traffic and service time Characterization, Loss Systems, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

Total hours to be taught	45

Text Book(s):

1	John.C. Bellamy, 'Digital Telephony',John Wiley & Sons, 3rd edition, 2009.

Reference(s):

1	Viswanathan.T., 'Telecommunication Switching System and Networks', Prentice Hall of India Ltd., 2006.
2	Flood J.E., 'Telecommunications switching traffic and networks', Pearson education Ltd, 2007.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Program code & Name			EC : B.E. Electronics and Communication Engineering		
Semester VIII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 HS 003	PRINCIPLES OF MANAGEMENT	3	0	0	3	50	50	100
Objective(s)	Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge in international aspect of management.							
1.	HISTORICAL DEVELOPMENT				Total Hrs	9		
Definition of Management – Science or Art – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organization.								
2.	PLANNING				Total Hrs	9		
Nature & Purpose – Types of Plans – Steps involved in Planning – Objectives – Setting Objectives – process of Management by Objectives – Strategies, Policies & Planning Premises – Forecasting – Decision making.								
3.	ORGANISING				Total Hrs	9		
Nature and purpose – Formal and informal organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and Staff authority – Benefits and limitations – De-Centralization and Delegation of Authority – Staffing – Selection process – Techniques – HRD – Managerial Effectiveness.								
4.	DIRECTING				Total Hrs	9		
Scope – Human Factors – Leadership – Types of Leadership – Motivation – Hierarchy of needs – Motivation Theories – Motivational Techniques – Job Enrichment – Communication – process of Communication – Barriers and Breakdown – Effective Communication – Electronic media in Communication.								
5.	CONTROLLING				Total Hrs	9		
System and process of Controlling – Requirements for effective control – the Budget as Control Technique – Information Technology in Controlling – Use of computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management.								
Total hours to be taught						45		
Text book (s):								
1.	Harold Kooritz & Heinz Weihrich, 'Essentials of Management', Tata McGraw-Hill, 1998.							
2.	Joseph L Massie, 'Essentials of Management', Prentice Hall of India, (Pearson) Fourth Edition, 2003.							
Reference(s):								
1.	Tripathy PC And Reddy PN, 'Principles of Management', Tata McGraw Hill, 1999.							
2.	Decenzo David, Robbin Stephen A, 'Personnel and Human Reasons Management', Prentice Hall of India, 1996.							
3.	JAF Stomer, Freeman R. E and Daniel R 'Gilbert Management', Pearson Education, Sixth Edition, 2004.							
4.	Fraidoon Mazda, 'Engineering Management', Addison Wesley, 2000.							
5.	Prasad L.M, 'Principles of Management', Sultan Chand & Sons Ltd, 2003.							

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<tr><td rowspan="2">Course Code</td><td rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC 8P1‘</td><td>PROJECT WORK - PHASE II</td><td>0</td><td>0</td><td>16</td><td>8</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To improve the academic and technical skills of the students, choosing the project in one of the technical areas, they have learnt during the course. To make the students learn to work in teams, gain confidence to solve real world problems related to their area, make presentations and manage a project.</td></tr>
<tr><td>Methodology</td><td colspan="8">• A committee is constituted with the project coordinator, project guide and HOD/Senior professor in the department.
• Three reviews have to be conducted by the committee
• Each review has to be evaluated for 100 marks.
• Attendance is compulsory for all reviews. If a student fails to attend review for some valid reason, one or more chance may be given.
• A senior professor from other departments may be included in the committee for final review
• The report should be submitted as per the format by the students during the first week of April.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E11</td><td>MEDICAL ELECTRONICS</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To study the methods of recording various biopotentials and the measurement of various parameters. To learn the various diagnostic and therapeutic equipments, Telemetry and Telemedicine.</td></tr>
<tr><td>1</td><td colspan="4">ELECTRO-PHYSIOLOGY AND BIOPOTENTIAL RECORDING</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">The origin of Biopotentials; biopotential electrodes; biological amplifiers; ECG, EEG,EMG, PCG, EOG – lead systems and recording methods, typical waveforms and signal characteristics.</td></tr>
<tr><td>2</td><td colspan="4">BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENTS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">pH, pO2, pCO2, pHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters, differential count.</td></tr>
<tr><td>3</td><td colspan="4">ASSIST DEVICES</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Cardiac pacemakers, DC Defibrillators, Dialyser, Heart-Lung machine, Hearing aids.</td></tr>
<tr><td>4</td><td colspan="4">PHYSICAL MEDICINE AND BIO-TELEMETRY</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Diathermies – Short-wave, ultrasonic and microwave type and their applications, medical stimulator, Telemetry principles, frequency selection, Bio-telemetry, radio pill and tele-stimulation, electrical safety.</td></tr>
<tr><td>5</td><td colspan="4">RECENT TRENDS IN MEDICAL INSTRUMENTATION</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Thermograph, endoscopy unit, Laser in medicine, Surgical diathermy, cryogenic application, introduction to telemedicine.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">John G.Webster, ‘Medical Instrumentation Application and Design’, John Wiley and Sons, 4th Edition, 2010.</td></tr>
<tr><td>2</td><td colspan="8">Lesile Cromwell, ‘Biomedical instrumentation and measurement’, Prentice Hall, 2007.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Khandpur, R.S. ‘Handbook of Biomedical Instrumentation’, McGraw-Hill, 2nd Edition, 2003.</td></tr>
<tr><td>2</td><td colspan="8">Joseph.J, Carr and John M.Brown, ‘Introduction to Biomedical Equipment Technology’, Pearson Education, 4th Edition, 2008.</td></tr>
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<tr><td>10 EC E12</td><td colspan="2">ADVANCED SIGNAL PROCESSING</td><td>3</td><td>1</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To learn the concepts of multirate signal processing, power spectrum estimation, various filter banks, wavelets and their system design.</td></tr>
<tr><td>1</td><td colspan="5">MULTIRATE SIGNAL PROCESSING</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Decimation – Interpolation – Sampling Rate Conversion by rational factor – direct form FIR Filter structures – Polyphase Filter structure – Time variant filter Structure – Multistage Implementation of sampling rate conversion – Sampling rate conversion of bandpass signals - Sampling rate conversion by arbitrary factor – Applications of Multirate signal processing: QMF subband coding and Transmultiplexer.</td></tr>
<tr><td>2</td><td colspan="5">LINEAR PREDICTION AND OPTIMUM LINEAR FILTERS</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Innovation representation of stationary random process – Forward and Backward Linear prediction – error filters –AR lattice and ARMA lattice ladder filter-Wiener filters for Filtering and Prediction.</td></tr>
<tr><td>3</td><td colspan="5">POWER SPECTRUM ESTIMATION</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Periodogram – Use of DFT in power spectrum estimation-Nonparametric Methods: Bartlett, Welch and Blackman Tukey methods – Parametric Methods: Yule walker, Burg, Unconstrained Least square and sequential Estimation methods – Selection of AR model order – MA and ARMA models for power spectrum estimation Eigen analysis algorithms.</td></tr>
<tr><td>4</td><td colspan="5">FILTER BANK AND WAVELETS</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Quadrature Mirror Filter- Paraunitary Filter Banks- Biorthogonal Linear Phase Filter banks – Uniform M Channel Filter banks – Tree Structured Filter Banks- Wavelet Transform- Filter Banks and Wavelet – Properties of Wavelets – Scaling Function – Construction of wavelets- Examples of Wavelet Systems.</td></tr>
<tr><td>5</td><td colspan="5">REGULARITY, MOMENTS AND WAVELET SYSTEM DESIGN</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">K Regular scaling Filters – Vanishing Wavelet Moments – Daubechies Method for zero Moment wavelet design- Nonmaximal regularity wavelet design- Relation of zero wavelet – movements to smoothness-vanishing scaling Function Moments- Coiflets and related wavelet Systems – Applications of Wavelets.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td colspan="2">60</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">John G.Proakis and Dimitris G.Manolakis, ‘Digital Signal Processing Principles, Algorithms and Applications’, Pearson Prentice Hall, 4th Edition, 2007.</td></tr>
<tr><td>2</td><td colspan="8">N.J.Fliege, ‘Multirate Digital Signal Processing: Multirate Systems-Filter Banks-Wavelets’, Wiley, 1999.</td></tr>
<tr><td>3</td><td colspan="8">C.Sidney Burrus, Ramesh A Gopinath and Haitao Guo,’ Introduction to Wavelets and wavelet Transforms - A Primer’, Prentice Hall, 1998.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Rabiner and Crochier, ‘Multirate Signal Processing’, Prentice Hall, 1987.</td></tr>
<tr><td>2</td><td colspan="8">Raghuveer M Rao,Ajit Bopardikar, ’Wavelet Transforms-Introduction to Theory & Applications’, Pearson Education, 1999.</td></tr>
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<tr><td colspan="2">10 EC E13</td><td colspan="2">TELEVISION AND VIDEO ENGINEERING</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To learn the fundamentals of Television transmission and reception, introduce the basic concepts of Advanced Television systems.</td></tr>
<tr><td>1</td><td colspan="5">FUNDAMENTALS OF TELEVISION</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Aspect ratio-Image continuity-Number of scanning lines-Interlaced scanning-Picture resolution-Camera tubes-Image Orthicon-Vidicon- Plumbicon- Silicon Diode Array Vidicon- Solid-state Image scanners- Monochrome picture tubes- Composite video signal- video signal dimension-horizontal sync. Composition-vertical sync. Details functions of vertical pulse train- Scanning sequence details. Picture signal transmission- positive and negative modulation- VSB transmission- Sound signal transmission-Standard channel bandwidth.</td></tr>
<tr><td>2</td><td colspan="5">MONOCHROME TELEVISION TRANSMITTER AND RECEIVER</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">TV transmitter-TV signal Propagation- Interference- TV Transmission Antennas-Monochrome TV receiver- RF tuner- UHF, VHF tuner-Digital tuning techniques-AFT–IF subsystems-AGC Noise cancellation-Video and sound inter-carrier detection-Vision IF subsystem- DC re-insertion-Video amplifier circuits-Sync operation- typical sync processing circuits-Deflection current waveforms, Deflection oscillators- Frame deflection circuits-requirements- Line deflection circuits-EHT generation-Receiver antennas.</td></tr>
<tr><td>3</td><td colspan="5">ESSENTIALS OF COLOUR TELEVISION</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Compatibility- Colour perception-Three colour theory- Luminance, Hue and saturation-Colour television cameras-Values of luminance and colour difference signals-Colour television display tubes-Delta-gun Precision-in-line and Trinitron colour picture tubes- Purity and convergence- Purity and static and Dynamic convergence adjustments- Pincushion-correction techniques-Automatic degaussing circuit- Gray scale tracking-colour signal transmission- Bandwidth-Modulation of colour difference signals-Weighting factors-Formation of chrominance signal.</td></tr>
<tr><td>4</td><td colspan="5">COLOUR TELEVISION SYSTEMS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">NTSC colour TV systems-SECAM system- PAL colour TV systems- Cancellation of phase errors-PAL-D Colour system-PAL coder-PAL-Decoder receiver-Chromo signal amplifier-separation of U and V signals-colour burst separation-Burst phase Discriminator-ACC amplifier-Reference Oscillator-Ident and colour killer circuits-U and V demodulators- Colour signal matrixing-Sound in TV.</td></tr>
<tr><td>5</td><td colspan="5">ADVANCED TELEVISION SYSTEMS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Satellite TV technology-Geo Stationary Satellites-Satellite Electronics-Domestic Broadcast System-Cable TV-Cable Signal Sources-Cable Signal Processing, Distribution & Scrambling- Video Recording-VCR Electronics-Video Home Formats- Video Disc recording and playback-DVD Players-TeleText Signal coding and broadcast receiver- Digital television-Transmission and reception –Projection television-Flat panel display TV receivers-LCD and Plasma screen receivers-3DTV-EDTV.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">R.R.Gulati, ‘Modern Television Practice, Principles, Technology and servicing’, New Age International, 3rd Edition, 2006.</td></tr>
<tr><td>2</td><td colspan="8">R.R.Gulati, ‘Monochrome & Color Television’, New Age International, 2nd Edition, 2007.</td></tr>
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<tr><td>1</td><td colspan="8">A.M Dhake, ‘Television and Video Engineering’, McGraw-Hill, 2nd Edition, 16th Reprint, 2006.</td></tr>
<tr><td>2</td><td colspan="8">S.P.Bali, ‘Color Television, Theory and Practice’, McGraw-Hill, 13th Reprint, 2007.</td></tr>
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<tr><td colspan="2">10 EC E14</td><td>ADVANCED MICROPROCESSORS</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To introduce various advanced microprocessors, the architecture and programming of advanced RISC processors and PC hardware units.</td></tr>
<tr><td>1</td><td colspan="5">80186, 80286, 80386 AND 80486 MICROPROCESSORS</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">80186 Architecture, Enhancements of 80186 – 80286 Architecture – Real and Virtual Addressing Modes – 80386 Architecture – Special Registers – Memory Management – Memory Paging Mechanism – 80486 Architecture – Enhancements – Cache Memory Techniques – Exception Handling – Comparison of Microprocessors (8086 – 80186 – 80286 – 80386 – 80486).</td></tr>
<tr><td>2</td><td colspan="5">PENTIUM MICROPROCESSORS</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Pentium Microprocessor Architecture – Special Pentium Registers – Pentium Memory Management – New Pentium Instructions – Pentium Pro Microprocessor Architecture – Special features – Pentium II Microprocessor Architecture – Pentium III Microprocessor Architecture – Pentium III Architecture – Pentium IV Architecture – Comparison of Pentium Processors.</td></tr>
<tr><td>3</td><td colspan="5">RISC PROCESSORS I</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">PowerPC620 – Instruction fetching – Branch Prediction – Fetching – Speculation, Instruction dispatching – dispatch stalls – Instruction Execution – Issue stalls- Execution Parallelism – Instruction completion – Basics of P6 micro architecture – Pipelining – our-of-order core pipeline – Memory subsystem.</td></tr>
<tr><td>4</td><td colspan="5">RISC PROCESSORS II(SUPERSCALAR PROCESSORS)</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Intel i960 – Intel IA32- MIPS R8000 – MIPS R10000 – Motorola 88110 – Ultra SPARC processor- SPARC version 8 – SPARC version 9.</td></tr>
<tr><td>5</td><td colspan="5">PC HARDWARE OVERVIEW</td><td>Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Functional Units & Interconnection, New Generation Mother Boards 286 to Pentium 4 Bus Interface- ISA- EISA- VESA- PCI- PCIX. Peripheral Interfaces and Controllers, Memory and I/O Port Addresses.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="8">B.B.Brey, ‘The Intel Microprocessor 8086/8088, 80186/80188,80286,80386,80486 Pentium, Pentium Pro, Pentium II, Pentium III, Pentium IV & Core 2 with 64 Extensions; Architecture, Programming and Interfacing’, Pearson, 8th Edition, 2008.</td></tr>
<tr><td>2</td><td colspan="8">John Paul Shen, Mikko H.Lipasti, ‘Modern Processor Design’, McGraw Hill, 2005.</td></tr>
<tr><td>3</td><td colspan="8">B.Govindarajulu, ‘IBM PC and clones Hardware, Trouble Shooting and Maintenance’, McGraw Hill, 2nd Edition, 13th Reprint 2008.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Douglas V.Hall, ‘Microprocessors and Interfacing’, McGraw Hill, Revised 2nd Edition, 2006.</td></tr>
<tr><td>2</td><td colspan="8">Mohamed Rafiquzzaman, ‘Microprocessors and Microcomputer Based System Design’, CRC Press, 2nd Edition, 2007.</td></tr>
<tr><td>3</td><td colspan="8">A.K.Ray, K.M. Bhurchandi, ‘Advanced Microprocessors and Peripherals’, McGraw Hill, 2nd Edition, 2006.</td></tr>
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<tr><td colspan="2">Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="9">Elective I</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td colspan="2" rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E15</td><td colspan="2">NUMERICAL METHODS</td><td>3</td><td>1</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">This course gives a complete procedure for solving different kinds of problems occuring in engineering numerically. At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses.</td></tr>
<tr><td>1</td><td colspan="4">SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="9">Linear interpolation methods (method of false position) – Newton’s method – Statement of fixed point theorem – Fixed point iteration: x=g(x) method – Solution of linear system by Gaussian elimination and Gauss-Jordon methods - Iterative methods: Gauss Jacobi and Gauss-Seidel methods - Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method.</td></tr>
<tr><td>2</td><td colspan="4">INTERPOLATION AND APPROXIMATION</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="9">Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton’s forward and backward difference formulas.</td></tr>
<tr><td>3</td><td colspan="4">NUMERICAL DIFFERENTIATION AND INTEGRATION</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="9">Derivatives from difference tables – Divided differences and finite differences –Numerical integration by trapezoidal and Simpson’s 1/3 and 3/8 rules – Romberg’s method – Two and Three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpsons’s rules.</td></tr>
<tr><td>4</td><td colspan="4">INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="9">Single step methods: Taylor series method – Euler and modified Euler methods – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne’s and Adam’s predictor And correcto methods.</td></tr>
<tr><td>5</td><td colspan="4">BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS</td><td colspan="2">Total Hrs</td><td colspan="3">12</td></tr>
<tr><td colspan="9">Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>60</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">C.F. Gerald and P.O. Wheatley ‘Applied Numerical Analysis’, Pearson, 7th Edition, 2004.</td></tr>
<tr><td>2</td><td colspan="8">E. Balagurusamy, ‘Numerical Methods’, McGraw Hill, 1st Edition, 2000.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">P. Kandasamy, K. Thilagavathy and K. Gunavathy, ‘Numerical Methods’, S.Chand & Co.Ltd., 2006.</td></tr>
<tr><td>2</td><td colspan="8">R.L. Burden and T.D. Faires, ‘Numerical Analysis’, Brooks-Cole, 9th Edition, 2010.</td></tr>
</table>

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name			EC : B.E. Electronics and Communication Engineering		
Elective I								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC E16	FOUNDATIONS FOR NANOELECTRONICS	3	0	0	3	50	50	100
Objective(s)	To understand the concepts of Quantum Mechanics, Simple Harmonic Oscillators, Statistical Mechanics and Applications of Nanoelectronics.							
1	INTRODUCTION TO QUANTUM MECHANICS				Total Hrs	9		
Particles, waves, probability amplitudes, Schrodinger equation, wave packets solutions, operators, expectation values, Eigen functions, piecewise constant potentials.								
2	SIMPLE HARMONIC OSCILLATORS AND APPROXIMATIONS				Total Hrs	9		
SHM Operators, SHM wave packet solutions, Quantum LC circuit, WKB approximations, variational methods.								
3	SYSTEMS WITH TWO AND MANY DEGREES OF FREEDOM				Total Hrs	9		
Two level systems with static and dynamic coupling, problems in more than one dimensions, electromagnetic field quantization, density of states.								
4	STATISTICAL MECHANICS				Total Hrs	9		
Basic concepts, microscopic, quantum systems in equilibrium, statistical models applied to metals and semiconductors.								
5	APPLICATIONS				Total Hrs	9		
Hydrogen and Helium atoms, electronic states, Atomic force microscope, Nuclear Magnetic Resonance, carbon nanotube properties and applications.								
Total hours to be taught						45		
Text book (s) :								
1	Hagelstein, Peter L., Stephen D. Senturia, and Terry P. Orlando, 'Introduction to Applied Quantum and Statistical Physics', Wiley, 2004.							
2	Rainer Waser, 'Nanoelectronics and Information Technology', Wiley-VCH, 2nd Edition, 2005.							
3	Michael A. Nielsen and Isaac L. Chuang, 'Quantum Computation and Quantum Information', Cambridge University Press, 2000.							
Reference(s) :								
1	Neil Gershenfeld, 'The Physics of Information Technology', Cambridge University Press, 2000.							
2	Adrian Ionesu and Kaustav Banerjee eds., 'Emerging Nanoelectronics: Life with and after CMOS', Vol I, II, and III, Kluwer Academic, 2005.							

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<tr><td colspan="6">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td colspan="3">R 2010</td></tr>
<tr><td>Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="3">EC : B.E. Electronics and Communication Engineering</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC E17</td><td colspan="3">MICRO ELECTROMECHANICAL SYSTEMS</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To study the fundamentals of MEMS Systems, Mechanics for Microsystems, Electrostatics and Application of MEMS, introduce Optical and RF MEMS.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION TO MEMS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">MEMS and Microsystems, Miniaturization, Typical products, Micro sensors, Micro actuation, MEMS with micro actuators, Microaccelorometers and Micro fluidics, MEMS materials, Micro fabrication.</td></tr>
<tr><td>2</td><td colspan="5">MECHANICS FOR MEMS DESIGN</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Elasticity, Stress, strain and material properties, Bending of thin plates, Spring configurations, torsional deflection, Mechanical vibration, Resonance, Thermo mechanics – actuators, force and response time, Fracture and thin film mechanics.</td></tr>
<tr><td>3</td><td colspan="5">ELECTRO STATIC DESIGN AND SYSTEM ISSUES</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Electrostatics: basic theory, electro static instability. Surface tension, gap and finger pull up, Electro static actuators, Comb generators, gap closers, rotary motors, inch worms, Electromagnetic actuators. bistable actuators. Electronic Interfaces, Feed back systems, Noise, Circuit and system issues.</td></tr>
<tr><td>4</td><td colspan="5">MEMS APPLICATION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Case studies – Capacitive accelerometer, Piezo electric pressure sensor, Micro fluidics application, Modeling of MEMS systems, CAD for MEMS.</td></tr>
<tr><td>5</td><td colspan="5">INTRODUCTION TO OPTICAL AND RF MEMS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Optical MEMS, - System design basics – Gaussian optics, matrix operations, resolution. Case studies, MEMS scanners and retinal scanning display, Digital Micro mirror devices. RF Memes – design basics, case study – Capacitive RF MEMS switch, performance issues.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book (s) :</td></tr>
<tr><td>1</td><td colspan="8">Stephen Senturia, ‘Microsystem Design’, Springer, 2001.</td></tr>
<tr><td>2</td><td colspan="8">N.P.Mahalik, ‘MEMS’, McGraw hill, 2007.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Nadim Maluf,Kirt Williams, ‘An introduction to Microelectromechanical systems Engineering’, Artech House Inc, 2nd Edition, 2004.</td></tr>
<tr><td>2</td><td colspan="8">Mohamed Gad-el-Hak, Editor, ‘The MEMS Handbook’, CRC press, 2002.</td></tr>
<tr><td>3</td><td colspan="8">Tai-Ran Hsu, ‘MEMS & Microsystems: Design, Manufacture and Nanoscale Engineering’, John Wiley & sons, 2nd Edition, 2008.</td></tr>
<tr><td>4</td><td colspan="8">Chang Liu, ‘Foundation of MEMS’, Pearson education, 2nd Edition, 2011.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E21</td><td colspan="2">DIGITAL IMAGE PROCESSING</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To study the image fundamentals and mathematical transforms necessary for image processing. To study the image enhancement techniques and image restoration procedures.</td></tr>
<tr><td>1</td><td colspan="5">DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.</td></tr>
<tr><td>2</td><td colspan="5">IMAGE ENHANCEMENT TECHNIQUES</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing – Sharpening filters – Homomorphic filtering.</td></tr>
<tr><td>3</td><td colspan="5">IMAGE RESTORATION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Model of Image Degradation/restoration process – Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.</td></tr>
<tr><td>4</td><td colspan="5">IMAGE COMPRESSION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Lossless compression: Variable length coding – LZW coding – Bit plane coding- predictive coding-DPCM.
Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEG,Basics of Vector quantization.</td></tr>
<tr><td>5</td><td colspan="5">IMAGE SEGMENTATION AND REPRESENTATION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Edge detection – Thresholding - Region Based segmentation – Boundary representation: chair codes-Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors –Simple descriptors- Texture</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="9">Text Book(s):</td></tr>
<tr><td>1</td><td colspan="8">Rafael C Gonzalez, Richard E. Woods, ‘Digital Image Processing’, Prentice Hall, 3rd Edition, 2008.</td></tr>
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<tr><td>1</td><td colspan="8">Rafael C Gonzalez, Richard E Woods, ‘Digital Image Processing’, Pearson Education, 3rd Edition 2006.</td></tr>
<tr><td>2</td><td colspan="8">A.K. Jain, ‘Fundamentals of Digital Image Processing’, Prentice Hall of India, New Delhi, 2011.</td></tr>
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<tr><td colspan="2">10 EC E22</td><td colspan="2">VLSI SIGNAL PROCESSING</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To study the algorithmic transformation for high speed using pipelining, retiming and parallel processing techniques. To learn strength reduction techniques and transforms.</td></tr>
<tr><td>1</td><td colspan="4">DSP SYSTEMS, PIPELINING AND PARALLEL PROCESSING</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Introduction To DSP Systems -Typical DSP algorithms; Iteration Bound – data flow graph representations, loop bound and iteration bound, Longest path Matrix algorithm; Pipelining and parallel processing – Pipelining of FIR digital filters, parallel processing, pipelining and parallel processing for low power.</td></tr>
<tr><td>2</td><td colspan="4">RETIMING, AND UNFOLDING TECHNIQUES</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Retiming - definitions and properties; retaining techniques; Unfolding –Algorithm for Unfolding, properties of unfolding, Applications of unfolding.</td></tr>
<tr><td>3</td><td colspan="4">FOLDING</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Folding transformation, Register minimization techniques, Register minimization in folded Architectures, Folding of Mutilate systems.</td></tr>
<tr><td>4</td><td colspan="4">FAST CONVOLUTION</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Introduction, Cook – Toom Algorithm, Modified Cook – Toom Algorithm, iterated convolution, cyclic convolution, Design of Fast convolution Algorithm.</td></tr>
<tr><td>5</td><td colspan="4">ALGORITHMIC STRENGTH REDUCTION IN FILTERS AND TRANSFORMS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Parallel FIR filters – DCT and inverse DCT, Parallel Architectures for rank order filters.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Keshab K.Parhi, ‘VLSI Digital Signal Processing systems, Design and implementation’, John Wiley, Indian reprint, 2007.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">U. Meyer – Baese, ‘Digital Signal Processing with Field Programmable Arrays’, Springer, Second Edition, Indian Reprint, 2007.</td></tr>
<tr><td>2</td><td colspan="8">S.Y. Kuang, H. J. White house, T. Kailath, ‘VLSI and Modern Signal Processing’, Prentice Hall, 1985.</td></tr>
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Elective II								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC E23	RADAR AND NAVIGATIONAL AIDS	3	0	0	3	50	50	100
Objective(s)	To understand the principles of navigation, in addition to the basic ideas and learning aids related to navigation							

1	RANGE EQUATION AND TYPES OF RADAR	Total Hrs	9
Basic Radar, Radar equation, Radar parameters, Block diagram, Radar frequencies. Types of Radar: CW, Doppler, MTI, FMCW, Pulsed, Tracking Radar. DSP in Radar (MTD1)			
2	RADAR SYSTEM CONCEPTS	Total Hrs	9
Different type of Noise, Noise figure, LNA. False alarm & Missed detection, Radar cross section, TR, ATR, Types of Displays -Color CRT, Bright displays, synthetic video displays, A scope, PPI..			
3	SIGNAL PROCESSING AND ANTENNAS	Total Hrs	9
Detection of radar signals in Noise and clutter, detection of non fluctuating target in noise, Matched filter, Matched filter response to delayed Doppler shifted signals, Radar measurements. Types of Antennas: Parabolic, Cassegrain and Electronically steered phased array antennas.			
4	RADIO NAVIGATION AND LANDING AIDS	Total Hrs	9
General principles, Radio compass (NDB), ADF, VOR, DME, Hyperbolic Navigation DECCA, OMEGA, LORAN, Mechanics of Landing: Instrument Landing System, Microwave Landing System.			
5	SATELLITE NAVIGATION AND HYBRID NAVIGATION SYSTEM	Total Hrs	9
Basics of Satellite Navigation, Introduction to Global Positioning System., System Description, Basic principles, position, velocity determination, Signal structure- DGPS, Integration of GPS & INS			
Total hours to be taught			45

Text book(s) :	
1	M.I.Skolnik, 'Introduction to Radar Systems', Tata McGraw Hill, 2007.
2	Myron Kyton and W.R.Fried, 'Avionics Navigation Systems', 2nd Edition, John Wiley & Sons, 1997.
Reference(s) :	
1	Nagaraja, 'Elements of Electronic Navigation', Tata McGraw Hill, 2nd Edition, 2000.
2	Albert Helfrick. D, 'Principles of Avionics', Avionics communications Inc., 2000.
3	Nathansan, 'Radar design principles-Signal processing and environment', PHI, 2nd Edition, 2007.
4	Hofmann-Wellenhof, Hlichlinegger and J.Collins, 'GPS Theory and Practice', 5th Edition, Springer International Edition, 2007.
5	Roger J.Sullivan, 'Radar foundations for Imaging and advanced concepts', PHI, 2004.
6	Mark.A.Richards, 'Fundamentals of Radar Signal Processing', Tata McGraw Hill, 2005.
7	Bassem R.Mahafza, 'Radar systems analysis & Desgin using Matlab', Chapman & Hall/CRC, 2000.

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		L	T	P	C	CA	ES	Total
10 EC E24	OPERATIONS RESEARCH	3	0	0	3	50	50	100
Objective(s)	To study the principles and techniques of operation research and apply these techniques in decision making for work accomplishment							
1	INTRODUCTION				Total Hrs	10		
Basic concepts and scope of OR – Phases of OR Linear programming (LP): Formulation of LP Problems – Limitations of LP – Solutions to LPP – Graphical Solution –Standard LP form and its Basic solutions – The simplex algorithm – Artificial Variable Technique – Big M method, Two phase method – Variants of the Simplex Method – Degeneracy, unbounded solution, infeasible solution – Application for business and Industrial problems.								
2	DUALITY				Total Hrs	10		
Primal – Dual models – Dual Simplex method. Transportation model: Mathematical formulation of the problem – Methods for finding an initial solution – North West corner method, Least cost method, Vogel's approximation method (VAM) – Test for optimality – Variants of the Transportation Problem. Assignment model: Mathematical Formulation of the problem – Solution of an Assignment Problem – Hungarian Algorithm – Variants of the Assignment problem – Traveling Salesman								
3	INTEGER LINEAR PROGRAMMING				Total Hrs	10		
Types- Concept of a Cutting Plane – Gomary's cutting plane method – Branch and bound method. Dynamic programming: Concepts – Terminology – Bellman's Principle of optimality – Application in Network, Allocation and Inventory.								
4	PROJECT MANAGEMENT				Total Hrs	10		
PERT and CPM: Concept of Network – PERT, CPM -Construction of Network – Critical path analysis – Probability in PERT analysis – Cost trade-off analysis.Theory of games: Two person zero sum game – Pure strategies – Mixed strategies – Games withdominance – Solution methods of games without saddle point – algebraic method, arithmetic method,matrix method and Graphical method..								
5	INVENTORY CONTROL				Total Hrs	10		
Deterministic model – Costs – Decision variables – EOQ –Instantaneous receipt of goods with and without shortages – Non-instantaneous receipt of goods without shortages - Price breaks – Probabilistic inventory model – Single period without setup cost – Inventory systems- Lead time – Safety stock – ROL, ROP determination. Queuing: Characteristics of Queuing system – Symbols and Kendall's notation – Poisson arrival and exponential service – Single and multi channel model – Infinite population.								
Total hours to be taught						50		
Text book(s) :								
1	Sharma.J.K., 'Operations Research : Theory and applications', Macmillan India Ltd., Reprint, 2003.							
Reference(s) :								
1	Hamdy A.Taha, 'Operations Research – An Introduction', Seventh Edition, Prentice Hall of India Pvt Ltd., 2002.							
2	Don. T. Philips, Ravindran, A and James Solnerg, 'Operations Research: Principles and Practice', John Wiley and Sons, 1986.							
3	Bobby Srinivasan and Sandblom. C.L, 'Quantitative Analysis for Business Decisions', Mc Graw Hill Book Co, 1989.							
4	Chanrasekara Rao, K, Shanti Lata Misra, 'Operations Research', Alpha Science International Ltd, 2005.							

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10 EC E25	ROBOTICS	3	0	0	3	50	50	100
Objective(s)	To learn the fundamentals of robots and its basic components, programming language, design and application of robotics,							
1	SCOPE OF ROBOTS			Total Hrs		9		
The scope of industrial Robots - Definition of an industrial robot - Need for industrial robots - applications.								
2	ROBOT COMPONENTS			Total Hrs		9		
Fundamentals of Robot Technology - Automation and Robotics - Robot anatomy -Work volume - Prescision of movement - End effectors - Sensors.								
3	ROBOT PROGRAMMING			Total Hrs		9		
Robot Programming - Methods - interlocks textual languages. Characteristics of Robot level languages, characteristic of task level languages.								
4	ROBOT WORK CELL			Total Hrs		9		
Robot Cell Design and Control - Remote Center compliance - Safety in Robotics.								
5	FUTURE TRENDS			Total Hrs		9		
Advanced robotics, Advanced robotics in Space - Specific features of space robotics systems - long-term technical developments, Advanced robotics in under – water operations. Robotics Technology of the Future - Future Applications.								
Total hours to be taught						45		
Text book(s) :								
1	Barry Leatham - Jones, ‘Elements of industrial Robotics’, Pitman, 1987.							
2	Mikell P.Groover, Mitchell Weiss, Roger N.Nagel Nicholas G.Odrey, ‘Industrial Robotics Technology, Programming and Applications’, McGraw Hill Book Company, 2008.							
Reference(s) :								
1	Fu K.S. Gonzaleaz R.C. and Lee C.S.G., ‘Robotics Control Sensing, Vision and Intelligence’, McGraw Hill International Editions, 1987.							
2	Bernard Hodges and Paul Hallam, ‘Industrial Robotics’, British Library Cataloging in Publication, 1990.							
3	Deb, S.R., ‘Robotics Technology and flexible automation’, Tata Mc GrawHill, 2010.							

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		L	T	P	C	CA	ES	Total
10 EC E26	RF MICROELECTRONICS	3	0	0	3	50	50	100
Objective(s)	To understand the analysis and design of RF front end systems including the circuits, blocks and architecture.							
1	RF CHARACTERISTICS OF PASSIVE COMPONENTS				Total Hrs	9		
RF characteristics of chip resistor, capacitor and inductors, semiconductor realization of resistors, capacitors, inductors, transformers. Coaxial, stripline, and microstrip line design guidelines and behavior at RF.								
2	MOS CHARACTERISTICS AT RF				Total Hrs	9		
Long and Short channel approximations, bandwidth estimation techniques, open and short circuit time constant procedures, high frequency amplifiers.								
3	AMPLIFIER DESIGN				Total Hrs	9		
Series shunt amplifiers, tuned amplifiers, neutralization, feedback and RF stability criteria, gain and phase margins, compensation techniques Class A,B,C,D,E,Fpower amplifier definitions, PA characteristics, RF PA design examples.								
4	LNAS AND MIXERS				Total Hrs	9		
Noise definitions and noise models, two port noise parameters of MOSFET, LNA topologies, noise match and power match design considerations, linearity and large signal performance of LNAs,Mixer fundamentals, nonlinear mixers, multiplier based mixers, sub-sampling mixers.								
5	OSCILLATORS, PHASE LOCKED LOOPS				Total Hrs	9		
Colpitts oscillator, Ring Oscillators, VCOs, Linearized PLL models, noise properties of PLLs, phase detectors, loop filters, charge pumps, PLL design examples, detailed considerations of phase noise.								
Total hours to be taught						45		
Text book(s) :								
1	Thomas Lee, 'The Design of Radio Frequency CMOS Integrated Circuits',Cambridge University Press, Second Edition, 2007.							
2	Behzad Razavi, 'RF Microelectronics', John Wiley, 2006.							
Reference(s) :								
1	Reinhold Ludwig, Pavel Bretchko,'RF Circuit Design-Theory and Applications', Pearson Education,2002.							
2	Ulrich Rohde, 'RF/Microwave Circuit Design for Wireless Applications', John Wiley, 2000.							

<table>
<tr><td colspan="8">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td colspan="2">Department</td><td colspan="2">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="3">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="9">Elective II</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td><td></td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E27</td><td>SPACE TIME COMMUNICATION</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To understand the multiple antenna propagation, capacity of channels, space diversity, coding and receivers. To learn ST OFDM, SPREAD SPECTRUM AND MIMO and ST co-channel interference migration.</td></tr>
<tr><td>1.</td><td colspan="5">MULTIPLE ANTENNA PROPAGATION AND ST CHANNEL CHARACTERIZATION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Wireless channel, Scattering model in macro cells, Channel as a ST random field, Scattering functions, Polarization and field diverse channels, Antenna array topology, Degenerate channels, reciprocity and its implications, Channel definitions, Physical scattering model, Extended channel models, Channel measurements, sampled signal model, ST multiuser and ST interference channels, ST channel estimation</td></tr>
<tr><td>2.</td><td colspan="5">CAPACITY OF MULTIPLE ANTENNA CHANNELS AND SPATIAL DIVERSITY</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Capacity of frequency flat deterministic MIMO channel: Channel unknown to the transmitter, Channel known to the transmitter, capacity of random MIMO channels, Influence of ricean fading, fading correlation, XPD and degeneracy on MIMO capacity, Capacity of frequency selective MIMO channels, Diversity gain, Receive antenna diversity, Transmit antenna diversity, Diversity order and channel variability, Diversity performance in extended channels, Combined space and path diversity ,Indirect transmit diversity, Diversity of a space-time-frequency selective fading channel.</td></tr>
<tr><td>3.</td><td colspan="5">MULTIPLE ANTENNA CODING AND RECEIVERS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Coding and interleaving architecture, ST coding for frequency flat channels, ST coding for frequency selective channels, Receivers(SISO,SIMO,MIMO),Iterative MIMO receivers, Exploiting channel knowledge at the transmitter: linear pre-filtering, optimal pre-filtering for maximum rate, optimal pre-filtering for error rate minimization, selection at the transmitter, Exploiting imperfect channel knowledge.</td></tr>
<tr><td>4.</td><td colspan="5">ST OFDM , SPREAD SPECTRUM AND MIMO MULTIUSER DETECTION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">SISO-OFDM modulation, MIMO-OFDM modulation, Signaling and receivers for MIMO-OFDM,SISO-SS modulation, MIMO-SS modulation, Signaling and receivers for MIMO-SS.MIMO-MAC,MIMO-BC, Outage performance for MIMO-MU,MIMO-MU with OFDM,CDMA and multiple antennas.</td></tr>
<tr><td>5.</td><td colspan="5">ST CO-CHANNEL INTERFERENCE MITIGATION AND PERFORMANCE LIMITS IN MIMO CHANNELS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">CCI characteristics, Signal models, CCI mitigation on receive for SIMO,CCI mitigating receivers for MIMO,CCI mitigation on transmit for MISO, Joint encoding and decoding, SS modulation, OFDM modulation, Interference diversity and multiple antennas, Error performance in fading channels, Signaling rate vs PER vs SNR, Spectral efficiency of ST doing/receiver techniques, System Design, Comments on Capacity.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1.</td><td colspan="8">A. Paulraj, Rohit Nabar, Dhananjay Gore, ‘Introduction to Space Time Wireless Communication Systems’, Cambridge University Press, 2003.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1.</td><td colspan="8">David Tse and Pramod Viswanath, ‘Fundamentals of Wireless Communication’, Cambridge University Press, 2005.</td></tr>
<tr><td>2.</td><td colspan="8">Sergio Verdu, ‘ Multi User Detection’, Cambridge University Press, 1998.</td></tr>
<tr><td>3.</td><td colspan="8">Andre Viterbi, ‘Principles of Spread Spectrum Techniques’, Addison Wesley 1995.</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
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Elective II								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC E28	SOFT COMPUTING	3	0	0	3	50	50	100
Objective(s)	To study the fuzzy models and optimization methods to soft computation. To learn the architecture, training and application of different types of neural networks							
1	FUZZY SET THEORY				Total Hrs	9		
Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.								
2	OPTIMIZATION				Total Hrs	9		
Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.								
3	NEURAL NETWORKS				Total Hrs	9		
Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.								
4	NEURO FUZZY MODELING				Total Hrs	9		
Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.								
5	APPLICATIONS OF COMPUTATIONAL INTELLIGENCE				Total Hrs	9		
Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.								
Total hours to be taught						45		
Text book(s) :								
1	J.S.R.Jang, C.T.Sun and E.Mizutani, 'Neuro-Fuzzy and Soft Computing', Pearson Education 2009.							
2	N.P.Padhy, 'Artificial Intelligence and Intelligent Systems', Oxford University Press, 2006.							
Reference(s) :								
1	Timothy J.Ross, 'Fuzzy Logic with Engineering Applications', McGraw-Hill, 2009.							
2	Davis E.Goldberg, 'Genetic Algorithms: Search, Optimization and Machine Learning', Addison Wesley, N.Y., 1999.							
3	S. Rajasekaran and G.A.V.Pai, 'Neural Networks, Fuzzy Logic and Genetic Algorithms-Synthesis and Applications', PHI, 2007.							
4	R.Eberhart, P.Simpson and R.Dobbins, 'Computational Intelligence - PC Tools', AP Professional, Boston, 1996.							
5	Dr.S.N.Sivanandam and S.N.Deepa, 'Principles of Soft Computing', Wiley India, 2007.							
6	Amit Konar, 'Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain', CRC Press, 2008.							

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<tr><td colspan="9">Elective III</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td colspan="3" rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E31</td><td colspan="3">PATTERN RECOGNITION</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To study the problems and perspectives from supervised to unsupervised learning. To understand the use of sencilarity information from data representation. To perform Learning, Recognition and classification tasks.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION</td><td colspan="2">Total Hrs</td><td colspan="2">7</td></tr>
<tr><td colspan="9">Pattern and features – Training and learning in pattern recognition systems – Pattern recognition approaches – Statistical pattern recognition – Syntactic pattern recognition – Neural pattern recognition – Reasoning driven pattern recognition – Discriminant functions – Linear and Fisher’s discriminant functions.</td></tr>
<tr><td>2</td><td colspan="5">STATISTICAL PATTERN RECOGNITION</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Gaussian model – Supervised learning – Parametric estimation – Maximum likelihood estimation – Bayesian parameter estimation – Perceptron algorithm – LMSE algorithm – Problems with Bayes approach – Pattern classification by distance functions – Maximum distance pattern classifier.</td></tr>
<tr><td>3</td><td colspan="5">CLUSTER ANALYSIS</td><td colspan="2">Total Hrs</td><td colspan="2">10</td></tr>
<tr><td colspan="9">Unsupervised learning – Clustering for unsupervised learning and classification – C-means algorithm – Hierarchical clustering procedures – Graph theoretic approach to pattern clustering – Validity of clustering solutions</td></tr>
<tr><td>4</td><td colspan="5">SYNTACTICS PATTERN RECOGNITION</td><td colspan="2">Total Hrs</td><td colspan="2">7</td></tr>
<tr><td colspan="9">Elements of formal grammar – String generation as pattern description – Recognition of syntactic description – Parsing – Stochastic grammar and applications – Graph based structural representation.</td></tr>
<tr><td>5</td><td colspan="5">FEATURES EXTRACTION AND RECENT ADVANCES</td><td colspan="2">Total Hrs</td><td colspan="2">12</td></tr>
<tr><td colspan="9">Entropy minimization – Karhunen –Loeve transformation – Neural network structures for pattern recognition – Unsupervised learning – Self organizing networks – Fuzzy pattern classifiers – Genetic algorithms – Application to pattern recognition.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Earl Gose, Richard Johnsonbaugh, Steve Jost, ‘Pattern Recognition and Image Analysis’, Prentice Hall of India Private Ltd., 2005.</td></tr>
<tr><td>2</td><td colspan="8">Duda R.O. and Hart P.E., ‘Pattern Classification and Scene Analysis’, Wiley, New York, 2nd Edition, 2001.</td></tr>
<tr><td>3</td><td colspan="8">Morton Nadler and Eric Smith P., ‘Pattern Recognition Engineering’, John Wiley and Sons, New York, 1993.</td></tr>
<tr><td>4</td><td colspan="8">Tou and Gonzalez R, ‘Patten Recognition Principles’, Addison Wesley, 1977.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Robert J, Schalkoff, ‘Pattern Recognition: Statistical, Structural and Neural Approaches’, John Wiley & Sons Inc., New York, 2005.</td></tr>
<tr><td>2</td><td colspan="8">Melanie Mitchell, ‘An Introduction to Genetic Algorithms’, Prentice Hall of India Private Ltd., New Delhi, 1998.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E32</td><td>BIO SIGNAL PROCESSING</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To understand the concepts of signals and filtering techniques in biomedical systems
To learn the removal of artifacts and interference by signal averaging and filtering</td></tr>
<tr><td>1</td><td colspan="5">SIGNALS AND FILTERING TECHNIQUES</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Characteristics of some dynamic biomedical systems ,signal conversion. Filters – IIR FIR, Integer filters, Homomorphic filters-Generalized linear filters, Homomorphic deconvolution and application. Matched filter – Detection of spikes and wave complexes .</td></tr>
<tr><td>2</td><td colspan="5">SIGNAL AVERAGING AND FILTERING FOR REMOVAL OF ARTIFACTS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Random noise , structured noise and physiological interference . Stationary and nonstationary processes . Time – Domain filters – Moving average filter ,synchronous averaging artifacts. Frequency domain filters – optimal filters-Wiener filter , adaptive filter for removal of interference . Application – ECG, Maternal – Fetal ECG , Muscle contraction interference</td></tr>
<tr><td>3</td><td colspan="5">FREQUENCY DOMAIN ANALYSIS OF NON-STATIONARY SIGNALS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Fourier spectrum, Estimation of PSD function – Periodogram , averaging, estimation of autocorrelation function.Measures derived from power spectral density and application Time variant systems , Fixed segmentation ,Adaptive segmentation, Adaptive filter for segmentation . Application – ECG , PCG and Heart rate variability</td></tr>
<tr><td>4</td><td colspan="5">BIOSIGNAL CLASSIFICATION AND DIAGNOSTIC DECISION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Diagnostic of bundle-branch block – Illustration, Pattern classification, Supervised classification, Unsupervised pattern classification, probabilistic models and statistical decision. Training test steps , Neural Network and application</td></tr>
<tr><td>5</td><td colspan="5">NON LINEAR FILTERING TECHNIQUES</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Non linear signal processing – state space reconstruction – Lyapnov exponents,correlation dimension, Entropy non linear diagnostics. Empirical non linear filter – non linear noise reduction, comparison of NNR and ICA.Model based filtering – non linear model parameter estimation, state space model based filtering.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Willis J Tompkins, ‘Bio Medical Digital Signal Processing’, Prentice Hall of India, New Delhi, 2004.</td></tr>
<tr><td>2</td><td colspan="8">Rangaraj.M.Rangayyan, ‘Biomedical signal analysis- A case study approach’, Wiley Interscience/IEEE Press, 2009</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Gari D. Clifford, Francisco Azuaje, Patrick E McSharry , ‘Advanced Methods and tools for ECG Data Analysis’, Artech house,2006.</td></tr>
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<tr><td>10 EC E33</td><td colspan="2">DSP ARCHITECTURE WITH FPGA</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To study FPGA technology for DSP systems and pipelined and parallel IIR filters. To study scaling and round off effects in digital filters. To design bit level arithmetic multiplier. To learn strength reduction techniques.</td></tr>
<tr><td>1</td><td colspan="5">FPGA TECHNOLOGY FOR DSP SYSTEMS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Overview of Digital Signal Processing, FPGA technology, DSP technology requirements, Design implementation.</td></tr>
<tr><td>2</td><td colspan="5">PIPELINED AND PARALLEL RECURSIVE AND ADAPTIVE FILTERS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Pipeline interleaving in Digital filters, parallel Processing for IIR filter, combined pipelining and parallel processing for IIR filters, low power IIR filter design using pipelining and parallel processing</td></tr>
<tr><td>3</td><td colspan="5">SCALING AND ROUND OFF NOISE</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Scaling and round off noise – scaling operation, round off noise, state variable description of digital filters, scaling and round off noise competition, round off noise in pipelined IIR filters.</td></tr>
<tr><td>4</td><td colspan="5">BITLEVEL ARITHMETIC MULTIPLIER</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Bit-Level Arithmetic Architectures- parallel multipliers with sign extension, parallel carry-ripple array multipliers, parallel carry-save multiplier, 4x 4 bit Baugh- Wooley carry-save multiplication, design of Lyon’s bit-serial multipliers using Horner’s rule, bit-serial FIR filter, CSD representation, CSD multiplication using Horner’s rule for precision improvement.</td></tr>
<tr><td>5</td><td colspan="5">NUMERICAL STRENGTH REDUCTION, WAVE PIPELINING AND LOW POWER PRINCIPLES</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Numerical Strength Reduction – sub expression elimination, multiple constant multiplications, iterative matching, Two-phase clock generator, clock skew in edge triggered single-phase clocking, two-phase clocking, wave pipelining</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Keshab K.Parhi, ‘VLSI Digital Signal Processing systems, Design and implementation’, John Wiley, Indian reprint, 2008.</td></tr>
<tr><td>2</td><td colspan="8">U. Meyer – Baese, ‘Digital Signal Processing with Field Programmable Arrays’, Springer, Second Edition, Indian Reprint, 2007.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">S.Y. Kuang, H. J. White house, T. Kailath, ‘VLSI and Modern Signal Processing’, Prentice Hall, 1985.</td></tr>
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<tr><td colspan="2">10 EC E34</td><td>EMBEDDED SYSTEM DESIGN</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To learn the fundamentals of designing an embedded systems programming. To understand the concepts of low power operation of MSP430 microcontroller including RISC CPU and on-chip peripherals.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION OF EMBEDDED SYSTEM DESIGN</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Embedded System product Development Life cycle (EDLC), Hardware development cycles- Specifications, Component selection, Schematic Design, PCB layout, fabrication and assembly. Product enclosure Design and Development. Embedded System Development Environment – IDE, Cross compilation, Simulators/Emulators, Hardware Debugging. Hardware testing methods like Boundary Scan, In Circuit Testing (ICT) etc.</td></tr>
<tr><td>2</td><td colspan="5">PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C,C++ AND JAVA:</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Software programming in assembly language (ALP) and in high level language ‘C’, ‘C’ programming elements: header and source files and preprocessor directives Program elements: macros and functions, Program elements: data types, data structures, modifiers, statements, loops and pointers, Object oriented programming Embedded programming in Java ,Optimization of Memory needs. Program models, Data flow graph models, State machine programming models for event controlled programs, Modeling of multiprocessor systems, UML modeling.</td></tr>
<tr><td>3</td><td colspan="5">MSP430 RISC CPU ARCHITECTURE</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Low power embedded systems, Approaches to Embedded Systems, Small Microcontrollers, Memory, Functional Block Diagram, Central Processing Unit, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Examples, Reflections on the CPU and Instruction Set, Resets, Clock System.</td></tr>
<tr><td>4</td><td colspan="5">FUNCTIONS, INTERRUPTS, AND LOW-POWER MODES</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Development Environment, the C Programming Language, Assembly Language, Access to the Microcontroller for Programming and Debugging. Demonstration Boards, Hardware-Functions and Subroutines, Storage for Local Variables, Passing Parameters to a Subroutine and Returning a Result, Mixing C and Assembly Language, Interrupts, Interrupt Service Routines, Issues Associated with Interrupts. Low-Power Modes of Operation</td></tr>
<tr><td>5</td><td colspan="5">ONCHIP PERIPHERALS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Digital Input and Output: I/O ports programming using C and assembly, Liquid Crystal Displays. Driving an LCD from an MSP430x4xx, Simple Applications of the LCD.
Watchdog Timers, comparator, op-Amp,Basic Timer , Real-Time Clock,ADC,DAC,SD16,DMA.
Case studies of applications of MSP430-data acquisition system, wired sensor network</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Shibu K.V., ‘Introduction to Embedded Systems’, Tata McGraw Hill, 2009.</td></tr>
<tr><td>2</td><td colspan="8">Raj Kamal, ‘Embedded system Architecture &programming’, Tata McGraw Hill, 2008.</td></tr>
<tr><td>3</td><td colspan="8">John H. Davies, ‘MSP430 Microcontroller Basics’, Elsevier, 2010 (Indian edition available).</td></tr>
<tr><td>4</td><td colspan="8">MSP430 Teaching CD-ROM, ‘Texas Instruments’,2008.(http://www.uniti.in)</td></tr>
<tr><td>5</td><td colspan="8">Tim Wilmshurst, ‘ An Introduction to the Design Of Small-Scale Embedded Systems’, Palgrave, 2001.</td></tr>
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<tr><td colspan="2">10 EC E35</td><td>LINEAR ALGEBRA</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To study linear equations, vector spaces, linear transformations, canonical forms, inner product spaces, symmetric matrices and applications of linear algebra.</td></tr>
<tr><td>1</td><td colspan="5">LINEAR EQUATIONS AND VECTOR SPACES</td><td colspan="2">Total Hrs</td><td>11</td></tr>
<tr><td colspan="9">Linear equations: Fields; system of linear equations, and its solution sets; elementary row operations and echelon forms; matrix operations; invertible matrices, LU-factorization Vector Spaces: Vector spaces; subspaces; bases and dimension; coordinates; summary of row-equivalence; computations concerning subspaces</td></tr>
<tr><td>2</td><td colspan="5">LINEAR TRANSFORMATIONS</td><td colspan="2">Total Hrs</td><td>8</td></tr>
<tr><td colspan="9">Linear Transformations: Linear transformations; algebra of linear transformations; isomorphism; representation of transformations by matrices; linear functionals; transpose of a linear transformation</td></tr>
<tr><td>3</td><td colspan="5">CANONICAL FORMS</td><td colspan="2">Total Hrs</td><td>8</td></tr>
<tr><td colspan="9">Canonical Forms: Characteristic values; annihilating polynomials; invariant subspaces; direct-sum decompositions; invariant direct sums; primary decomposition theorem; cyclic bases; Jordan canonical form. Iterative estimates of characteristic values</td></tr>
<tr><td>4</td><td colspan="5">INNER PRODUCT SPACES</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Inner Product Spaces: Inner products; inner product spaces; orthogonal sets and projections; Gram-Schmidt process; QR-factorization; least-squares problems; unitary operators</td></tr>
<tr><td>5</td><td colspan="5">SYMMETRIC MATRICES AND APPLICATIONS OF LINEAR ALGEBRA</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Symmetric Matrices and Quadratic Forms: Digitalization; quadratic forms; constrained optimization; singular value decomposition Applications of Linear Algebra in DSP, Image Processing, Digital Communication</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Gilbert Strang, ‘Linear Algebra and its Applications’, 4th edition, Thomson Learning Asia, 2008</td></tr>
<tr><td>2</td><td colspan="8">David C. Lay, ‘Linear Algebra and its Applications’, 4th edition, Pearson Education (Asia) Pte. Ltd, 2009.</td></tr>
<tr><td>3</td><td colspan="8">Bernard Kolman and David R. Hill, ‘Introductory Linear Algebra with Applications,’ Pearson Education (Asia) Pte. Ltd, 8th edition, 2009.</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering	Programme Code & Name			EC : B.E. Electronics and Communication Engineering			
Elective III								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC E36	OPTOELECTRONIC DEVICES	3	0	0	3	50	50	100
Objective(s)	To know the basics of solid state Physics and understand the concepts of detection and switching devices							
1	ELEMENTS OF LIGHT AND SOLID STATE PHYSICS				Total Hrs	9		
Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State and Semiconductor Junction Devices.								
2	DISPLAY DEVICES AND LASERS				Total Hrs	9		
Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, LED, Plasma Displays, Liquid Crystal Displays, Numeric Display, Laser Emission, Absorption, Radiation, Population Inversion, Optical feedback, Threshold condition, Semiconductor lasers.								
3	DETECTION DEVICES				Total Hrs	9		
Photo detector, Thermal detector, Photo Conductors, Photo diodes, Photo Multiplier Tube, Solar Cell, Detector Performance.								
4	OPTOELECTRONIC MODULATOR AND SWITCHING DEVICES				Total Hrs	9		
Introduction, Analog and Digital Modulation, Electro-optic modulators, Acousto-optic modulators, Interferometric modulators, Semiconductor Optical Amplifiers, Optical Switching and Logic Devices.								
5	OPTOELECTRONIC INTEGRATED CIRCUITS				Total Hrs	9		
Introduction, hybrid and Monolithic Integration- Li Nbo3 devices, Active Couplers, Integrated transmitters and Receivers, Guided wave devices.								
Total hours to be taught						45		
Text book(s) :								
1	Jasprit Singh, 'Opto Electronics – An Introduction to materials and Devices', McGraw-Hill International Edition, 1998.							
Reference(s) :								
1	S.C. Gupta, 'Optoelectronic Devices and Systems', PHI, 1st edition, 2005.							
2	Bhattacharya, 'Semiconductor Opto Electronic Devices', Prentice Hall of India, 2nd Edition, 2011.							
3	J.Wilson and J.Haukes, 'Opto Electronics – An Introduction', Prentice Hall of India Pvt., Ltd., New Delhi, 1995.							
4	Tamir.T,Grifel and Henry.L.Bertoni, 'Guided wave Optoelectronics: Device Characterisation, Analysis and Design', Plenum Press, 1995.							

<table>
<tr><td colspan="7">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td>Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="8">Elective III</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td><td></td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC E37</td><td>RF MEMS CIRCUIT DESIGN</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="8">To learn the physical and substrate properties of RF circuit. To study types of MEM switches, phase shifters, filters and resonators</td></tr>
<tr><td>1</td><td colspan="4">PHYSICAL PROPERTIES</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Physical and practical aspects of RF circuit design. Impedance mismatch effects in RF MEMS</td></tr>
<tr><td>2</td><td colspan="4">SUBSTRATE PROPERTIES</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">RF/Microwave substrate properties. Micro machined- enhanced elements. MEM switches. Resonators. MEMS modeling.</td></tr>
<tr><td>3</td><td colspan="4">RECONFIGURABLE CIRCUIT ELEMENTS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Reconfigurable circuit elements. Resonator MEMS switch Tunable CPW resonator. MEMS microswitch arrays. Reconfigurable antenna.</td></tr>
<tr><td>4</td><td colspan="4">MEMS PHASE SHIFTERS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">MEMS phase shifters. Types of phase shifters. Switched delay line phase shifters. Distributed MEMS phase shifters.</td></tr>
<tr><td>5</td><td colspan="4">MEMS FILTERS AND RESONATORS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">RF MEMS filters. Modeling of mechanical filters and resonators. SAW filters. Micromachined filters for millimeter wave applications.</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="8">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">H.J.D.Santos, ‘RF MEMS Circuit Design for Wireless Communications’, Artech House, 2002.</td></tr>
<tr><td>2</td><td colspan="8">G.M.Rebeiz , ‘RF MEMS Theory , Design and Technology’, John wiley & sons,2012.</td></tr>
<tr><td>3</td><td colspan="8">V.K.Varadan etal, ‘RF MEMS and their Applications’, Wiley, 2003.</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering	Programme Code & Name	EC : B.E. Electronics and Communication Engineering					
Elective III								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC E38	CRYPTOGRAPHY AND NETWORK SECURITY	3	0	0	3	50	50	100
Objective(s)	To Know concepts of modern symmetric key ciphers and number theory, the network security tools and understanding the system level security used. To learn the basics of symmetric key encipherment.							
1	NUMBER THEORETIC AND ALGEBRAIC ALGORITHMS				Total Hrs	9		
Introduction – Integer Arithmetic Modular Arithmetic – matrices – Linear congruence - Substitution ciphers – Transposition ciphers – Stream cipher - Block ciphers – Algebraic structure – GF(2) field; ECG, EEG,EMG, PCG, EOG – lead systems and recording methods, typical waveforms and signal characteristics.								
2	MODERN SYMMETRIC KEY CIPHERS				Total Hrs	9		
Modern block ciphers – Modern stream ciphers – DES – AES – Multiple uses of modern block ciphers and stream cipher.								
3	ASYMMETRIC KEY ENCIPHERMENT				Total Hrs	9		
Mathematics of cryptography – Primarily Testing – Factorization – Chinese Remainder Theorem – Quadratic congrivence – Exponentiation & Logarithm – RSA Rabin – Elgamal – Elliptic curve								
4	INTEGRITY AUTHENTICATION AND KEY MANAGEMENT				Total Hrs	9		
Message integrity – random oracle model – message authentication – SHA-512 – WHIRL POOL - Digital signature schemes – password – challenge response – zero knowledge – Biometrics – Keberos – symmetric key management – public key distribution – stenography .								
5	NETWORK SECURITY				Total Hrs	9		
Security at the Application Layer: E-mail – PGP – S/MIME – Security at the transport layer: SSL and TLS – Security at the network layer: IPsec, Two Security Protocol – Security Association – Internet Key Exchange – ISAKMP								
Total hours to be taught						45		
Text book(s) :								
1	Behrouz A. Ferouzan, 'Cryptography & Network Security', Tata McGraw Hill,2nd Edition,2011.							
2	W.Stallings, 'Cryptography & Network Security: Principles and Practice', Prentice Hall of India, 4th Edition, 2007.							
Reference(s) :								
1	Douglas R.Stlinson, 'Cryptography Theory and Practice', CRC Press series on Discrete Mathematics and its application 1995.							
2	Charlie Kaufman, Radia Perlman, Mike Speciner, 'Network Security Private Communication in a Public World', Pearson Education, Second Edition, 2003.							

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<tr><td colspan="2">Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="9">Elective IV</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td colspan="3" rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E41</td><td colspan="3">PRINCIPLES OF MEDICAL IMAGING</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To understand the concepts of various imaging modalities and image quality. To learn mathematical preliminaries for image reconstruction</td></tr>
<tr><td>1</td><td colspan="5">ACQUISITION OF IMAGES</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Introduction to Imaging Techniques - Single crystal scintillation camera - Principles of scintillation camera operation - multiple crystal scintillation camera- solid state camera - rectilinear scanner- Emission computed Tomography- Radiography: Digital Radiography.</td></tr>
<tr><td>2</td><td colspan="5">MATHEMATICAL PRELIMINARIES FOR IMAGE RECONSTRUCTIONS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Image Reconstruction from Projections in Two dimensions - Mathematical Preliminaries for Two and Three dimensional Image Reconstructions- Radon Transform- Projection Theorem-central slice Theorem- Sinogram – Two Dimensional Projection Reconstruction - Three Dimensional Projection Reconstruction - Iterative Reconstruction Techniques- Fourier Reconstruction.</td></tr>
<tr><td>3</td><td colspan="5">FLUROSCOPY, CT, IMAGES QUALITY</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Digital fluoroscopy - Automatic Brightness controlcinefluorography - Principles of computed Tomographic Imaging - Reconstruction algorithms – Scan motions- X-ray sources Influences of Images quality: Unsharpness - contrast- Image Noise-,Image distortion -Artifacts.</td></tr>
<tr><td>4</td><td colspan="5">MAGNETIC RESONANCE IMAGING AND SPECTROSCOPY</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Fundamentals of Magnetic Resonance overview - Pulse sequences - spatial encoding of magnetic Resonance Imaging signal - Motion suppression Techniques - Contrast Agents - tissue contrast in MRI - MR Angiography, spectroscopy - chemical shift Imaging.</td></tr>
<tr><td>5</td><td colspan="5">ULTRA SOUND, NEURO MAGNETIC IMAGING</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="9">Ultra sound: Presentation modes -Time required to obtain Images - System components, signal processing - dynamic Range - Ultrasound Image Artifacts - Quality control, Origin of Doppler shift - Limitations of Doppler systems. Neuro magnetic Imaging: Background - Models and Image Reconstruction - Instrumentation.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">William R.Hendee, E.Russell Ritenour, ‘Medical Imaging Physics’, A John Wiley & sons, Inc., Publication, Fourth Edition, 2002.(Units I,III,IV,V)</td></tr>
<tr><td>2</td><td colspan="8">Z.H.Cho.,J-oie,P.Jones and Manbir Singh, ‘Foundations of Medical Imaging’, John Wiley and sons Inc.,1993.(Units II &V)</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Avinash C.Kak, Malcolm Shaney, ‘Principles of Computerized Tomographic Imaging’, IEEE Press, New york,1998.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E42</td><td colspan="3">SPEECH PROCESSING</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To understand the fundamentals of speech and signal processing, predictive coding techniques, speech recognition, speech codec standards and applications.</td></tr>
<tr><td>1</td><td colspan="5">NATURE AND CLASSSIFICATION OF SPEECH SIGNALS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Nature of speech signal- Speech production mechanism. Classification of speech sounds. Digital modeling of speech signals. Significance of short-time analysis</td></tr>
<tr><td>2</td><td colspan="5">LINEAR PREDICTION OF SPEECH SIGNALS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Linear predictive coding of speech- linear prediction problem in time domain, normal equations, Relationship of linear prediction to autocorrelation and spectral domains</td></tr>
<tr><td>3</td><td colspan="5">SPEECH PROCESSING IN TIME AND FREQUENCY DOMAIN</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Time domain and frequency domain methods for speech processing- methods for extracting the time-domain parameters. Zero crossings. Auto correlation function. pitch estimation. Short - time Fourier analysis. Filter bank analysis. Format extraction and pitch extraction. Analysis-synthesis systems</td></tr>
<tr><td>4</td><td colspan="5">ANALYSIS OF SPEECH SIGNALS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Homomorphic speech analysis- Cepstral analysis, formant and pitch estimation. Applications to speech recognition and speaker identification. Basic pattern recognition methods, codebooks, HMM’s</td></tr>
<tr><td>5</td><td colspan="5">STANDARDS OF SPEECH SIGNALS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Speech codec standards and applications- Standards for low bit rate vocoders; Vocoder attributes. Encoders and decoders of G723.1, G726, G727, G728, G729 standard vocoders. Basics of voice over IP. Voice quality measures in IP networks</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">T.F.Quatieri, ‘Discrete-time Speech Signal Processing: principles and practice’, pearson education, 2008.</td></tr>
<tr><td>2</td><td colspan="8">L.R.Rabiner AND R.W.Schafer, ‘Digital processing of speech signals’, Prentice Hall,2009.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">L.Hanza etal, ‘Voice Compression and Communications’, Wiley/IEEE, 2001.</td></tr>
<tr><td>2</td><td colspan="8">Hersent etal, ‘IP Telephony Packet Based Multimedia Communication Systems’, Pearson, 2002.</td></tr>
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<tr><td colspan="2">10 EC E43</td><td colspan="3">MULTIMEDIA COMMUNICATION TECHNOLOGY</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To understand the concept of digital multimedia system through image, audio and video processing. To study the various compression techniques for audio and video signals.</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION TO MULTIMEDIA SYSTEMS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Components of multimedia system. Desirable features. Applications of multimedia systems. Introduction to different types. Multimedia storage device</td></tr>
<tr><td>2</td><td colspan="5">DIGITAL AUDIO PROCESSING</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Digital audio representation and processing-time domain and transform domain representations. Coding standards, transmission and processing of digital audio. Musical instrument synthesizers</td></tr>
<tr><td>3</td><td colspan="5">STILL IMAGE COMPRESSION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Still image coding-JPEG. Discrete cosine Transform. Sequential and Progressive DCT based encoding algorithms, lossless coding, hierarchical coding. Basic concepts of discrete wavelet transform coding and embedded image coding algorithms. Introduction to JPEG 2000</td></tr>
<tr><td>4</td><td colspan="5">DIGITAL VEDIO ENCODING AND DECODING</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Feature of MPECG 1, structure of encoding and decoding process, MPEG 2 enhancements, different blocks of MPEG video encoder</td></tr>
<tr><td>5</td><td colspan="5">DIGITAL VIDEO COMPRESSION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Content based video coding-overview of MPEG 4 video, motion estimation and compensation. Different coding techniques and verification models. Block diagram of MPECG 4 video encoder and decoder. An overview of H261 and H263 video coding techniques</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Y.Q.Shi & H.Sun, ‘Image and Video Compression for Multimedia Engineering’, CRC Press, 2000.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">S.V.Raghavan & S,K,Tripathi, ‘Networked Multimedia Systems’, Prentice Hall, 1998.</td></tr>
<tr><td>2</td><td colspan="8">J.F.K.Buford, ‘Multimedia Systems’, Pearson, 2004.</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>10 EC E44</td><td colspan="2">ARM ARCHITECTURE AND PROGRAMMING</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">To introduce the architecture and programming of ARM processor. To introduce the CPU core of ARM processors and its applications</td></tr>
<tr><td>1</td><td colspan="4">ARM ARCHITECTURE</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">RISC machine-ARM programmer’s model-Development tools-ARM assembly language programming- ARM organization-ARM instruction execution-ARM implementation-ARM coprocessor interface</td></tr>
<tr><td>2</td><td colspan="4">ARM INSTRUCTION SET</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">ARM instruction set. Floating point architecture-Expressions-Conditional statements- loops-Functions and procedures-Use of memory- Run time environment</td></tr>
<tr><td>3</td><td colspan="4">THUMB INSTRUCTION SET</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Thumb instruction set-Thumb programmer’s model-Thumb branch instruction-Thumb data processing instruction-data transfer instruction-implementation.ARM memory interface-Advanced Microcontroller Bus Architecture (AMBA)-ARMulator -JTAG boundary scan test architecture-ARM Debug architecture. Embedded trace.</td></tr>
<tr><td>4</td><td colspan="4">ARM PROCESSOR CORE</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">Memory hierarchy-Architectural support for operating systems-Memory size and speed-Cache memory management-Operating systems-ARM processor chips.ARM7TDMI-ARM8-ARM9TDMI-ARM10TDMI</td></tr>
<tr><td>5</td><td colspan="4">EMBEDDED ARM APPLICATIONS</td><td colspan="2">Total Hrs</td><td colspan="2">9</td></tr>
<tr><td colspan="8">ARM MMU architecture-The ARM710T.ARM740T.ARM810.The ARM920T and ARM940T-The ARM946E-S and ARM966E-S.ARM1020E-The VLSI ISDN Subscriber Processor. The Ericsson-VLSI Bluetooth Baseband Controller-The ARM7500-The ARM7100</td></tr>
<tr><td colspan="7">Total hours to be taught</td><td colspan="2">45</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="7">S.Furber, ‘ARM System-on-Chip Architecture’, Pearson –Third Impression, 2010.</td></tr>
<tr><td>2</td><td colspan="7">Andrew N. Sloss, D. Symes, C.Wright, ‘ARM System Developer’s Guide, Designing and optimizing Systems Software’, Elsevier Reprinted 2012.</td></tr>
<tr><td>3</td><td colspan="7">David Seal, ‘ARM Architecture Reference Manual’, Addison-Wesley, 2nd Edition, 2001.</td></tr>
<tr><td>4</td><td colspan="7">Wayne Wolf, ‘Computers as Components: Principles of Embedded Computing System Design’, Morgan Kaufman Publishers, 2001.</td></tr>
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<tr><td colspan="9">Elective IV</td></tr>
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<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E45</td><td>AVIONICS</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">To provide the basic principles and operation of modern avionic system. To study navigation system and their types</td></tr>
<tr><td>1</td><td colspan="5">INTRODUCTION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Introduction to aircraft – Axes system – Parts, importance and role of Avionics – systems which interface directly with pilot – Aircraft state sensor systems – Navigation systems – External world sensor systems – task automation systems. Avionics architecture evolution. Avionics Data buses - MIL STD 1553, ARINC 429, ARINC 629.</td></tr>
<tr><td>2</td><td colspan="5">RADIO NAVIGATION</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Types of Radio Navigation – ADF, DME, VOR, LORAN, DECCA, OMEGA. ILS, MLS</td></tr>
<tr><td>3</td><td colspan="5">INERTIAL AND SATELLITE NAVIGATION SYSTEMS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Inertial sensors – Gyroscopes, Accelerometers, Inertial navigation systems – Block diagram, Platform and strap down INS. Satellite Navigation - GPS</td></tr>
<tr><td>4</td><td colspan="5">AIR DATA SYSTEMS AND AUTOPILOT</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Air data quantities – Altitude, Airspeed, Mach no., Vertical speed, Total Air temperature, Stall warning, Altitude warning. Autopilot – basic principles – longitudinal and lateral autopilot.</td></tr>
<tr><td>5</td><td colspan="5">AIRCRAFT DISPLAYS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Display technologies – LED, LCD, CRT, Flat Panel Display. Primary Flight parameter displays - Head Up Display, Helmet Mounted Display, Night vision goggles, Head Down Display, MFD, MFK, Virtual cockpit.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="9">Text book(s) :</td></tr>
<tr><td>1</td><td colspan="8">Albert Helfrick. D, ‘Principles of Avionics’, Avionics communications Inc., 7th Edition 2012.</td></tr>
<tr><td>2</td><td colspan="8">Collinson, R.P.G, ‘Introduction to Avionics’, Chapman and Hall, 3rd Edition, 2011.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">Middleton, D.H, ‘Avionics Systems’, Longman Scientific and Technical, Longman Group UK Ltd, England, 1989.</td></tr>
<tr><td>2</td><td colspan="8">Spitzer, C.R., ‘Digital Avionics Systems’, Prentice Hall, Englewood Cliffs, N.J., USA 1993.</td></tr>
<tr><td>3</td><td colspan="8">Spitzer, C.R, ‘The Avionics Handbook’, CRC Press, 2000.</td></tr>
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K.S.Rangasamy College of Technology - Autonomous Regulation								R 2010
Department	Electronics and Communication Engineering		Programme Code & Name		EC : B.E. Electronics and Communication Engineering			
Elective IV								
Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
10 EC E46	VIRTUAL INSTRUMENTATION	3	0	0	3	50	50	100
Objective(s)	This course gives an extensive information and application of virtual instrumentation for all types of measurement systems and analysis.							

1	INTRODUCTION	Total Hrs	9
Virtual Instrumentation: Historical perspective, advantages, blocks diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems.			
2	VI PROGRAMMING TECHNIQUES	Total Hrs	9
VIs and sub-VIs, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.			
3	DATA ACQUISITION BASICS	Total Hrs	9
Introduction to data acquisition on PC, Sampling fundamentals, Input/Output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements.			
4	VI CHASSIS AND COMMON INSTRUMENT	Total Hrs	9
Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI.			
5	APPLICATIONS	Total Hrs	9
Instrument Control, Development of process database management system, Simulation of systems using VI, Development of Control system, Industrial Communication, Image acquisition and processing, Motion control.			
Total hours to be taught			45

Text book (s):

1. Garry M. Johnson,Richard Jennings, 'Lab VIEW Graphical Programming', TataMcGraw Hill,4th Edition, 2006.
2. Jim kring,Jeffrey Travis, 'LabVIEW for everyone', Pearson education, 3rd Edition,2011.

References(s) :

1. Kevin James, 'PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control', Newnes, 2011.
   Control', Newnes, 2000.
2. Barry Paton, 'Sensor, Transducers and Lab VIEW', Prentice Hall, 2000.
3. 'Lab VIEW Basics I and II Manual', National Instruments, August, 2010.
4. NI Educational laboratory virtual instrumentation suite (NI), User Manual, August 2010.

<table>
<tr><td colspan="8">K.S.Rangasamy College of Technology - Autonomous Regulation</td><td>R 2010</td></tr>
<tr><td colspan="2">Department</td><td colspan="3">Electronics and Communication Engineering</td><td colspan="2">Programme Code & Name</td><td colspan="2">EC : B.E. Electronics and Communication Engineering</td></tr>
<tr><td colspan="9">Elective IV</td></tr>
<tr><td colspan="2" rowspan="2">Course Code</td><td colspan="3" rowspan="2">Course Name</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="2">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td colspan="2">10 EC E47</td><td colspan="3">DSP PROCESSOR ARCHITECTURE AND PROGRAMMING</td><td>3</td><td>0</td><td>0</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td colspan="2">Objective(s)</td><td colspan="7">Introduction to DSP Processors, Architecture of TMS320C5X and TMS320C3X Processor and introduction about DSP family processors.</td></tr>
<tr><td>1</td><td colspan="5">FUNDAMENTALS OF PROGRAMMABLE DSPs</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Multiplier and Multiplier accumulator – Modified Bus Structures and Memory access in P-DSPs – Multiple access memory – Multi-port memory – VLIW architecture- Pipelining – Special Addressing modes in P-DSPs – On chip Peripherals.</td></tr>
<tr><td>2</td><td colspan="5">TMS320C5X PROCESSOR</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Architecture – Assembly language syntax - Addressing modes – Assembly language Instructions – Pipeline structure, Operation – Block Diagram of DSP starter kit – Application Programs for processing real time signals.</td></tr>
<tr><td>3</td><td colspan="5">TMS320C3X PROCESSOR</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Architecture – Data formats - Addressing modes – Groups of addressing modes- Instruction sets - Operation – Block Diagram of DSP starter kit – Application Programs for processing real time signals – Generating and finding the sum of series, Convolution of two sequences, Filter design.</td></tr>
<tr><td>4</td><td colspan="5">ADSP PROCESSORS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Architecture of ADSP-21XX and ADSP-210XX series of DSP processors- Addressing modes and assembly language instructions – Application programs –Filter design, FFT calculation.</td></tr>
<tr><td>5</td><td colspan="5">ADVANCED PROCESSORS</td><td colspan="2">Total Hrs</td><td>9</td></tr>
<tr><td colspan="9">Architecture of TMS320C54X: Pipe line operation, Code Composer studio - Architecture of TMS320C6X - Architecture of Motorola DSP563XX – Comparison of the features of DSP family processors.</td></tr>
<tr><td colspan="8">Total hours to be taught</td><td>45</td></tr>
<tr><td colspan="9">Text Book(s) :</td></tr>
<tr><td>1</td><td colspan="8">B.Venkataramani and M.Bhaskar, ‘Digital Signal Processors - Architecture, Programming and Applications’,Tata McGraw Hill Publishing Company Limited,2008.</td></tr>
<tr><td colspan="9">Reference(s) :</td></tr>
<tr><td>1</td><td colspan="8">User guides Texas Instrumentation, Analog Devices, and Motorola.</td></tr>
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