KONGU ENGINEERING COLLEGE
PERUNDURAI ERODE – 638 052
(Autonomous)

VISION

To be a centre of excellence for development and dissemination of knowledge in Applied Sciences, Technology, Engineering and Management for the Nation and beyond.

MISSION

We are committed to value based Education, Research and Consultancy in Engineering and Management and to bring out technically competent, ethically strong and quality professionals to keep our Nation ahead in the competitive knowledge intensive world.

QUALITY POLICY

We are committed to

- Providing value based quality education for the development of students as competent and responsible citizens.
- Contributing to the nation and beyond through research and development
- Continuously improving our services

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION

To be a centre of excellence for development and dissemination of knowledge in Electronics and Communication Engineering for the Nation and beyond.

MISSION

Department of Electronics and Communication Engineering is committed:

MS1: To impart industry and research based quality education for developing innovative electronics and communication engineers

MS2: To enrich the academic activities by continual improvement in the teaching learning process

MS3: To infuse confidence in the minds of students to develop as entrepreneurs

MS4: To develop expertise for consultancy activities by providing thrust for Industry Institute Interaction

MS5: To endeavour for constant upgradation of technical expertise for producing competent professionals to cater to the needs of the society and to meet the global challenges

2011 REGULATIONS

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of Electronics and Communication Engineering will

PEO1: Succeed in industry and higher education by applying knowledge of mathematics, science and engineering principles.

PEO2: Analyze, design and implement electronics based solutions to meet the real world problems, with constant update of domain knowledge

PEO3: Demonstrate Soft skills, Professional and Ethical values and an aptitude for lifelong learning needed for a successful professional career

MAPPING OF MISSION STATEMENTS (MS) WITH PEOs

MS\PEO	PEO1	PEO2	PEO3
MS1	3	3	2
MS2	2	3	2
MS3	2	3	2
MS4	3	2	1
MS5	2	3	3

1 – Slight, 2 – Moderate, 3 – Substantial

PROGRAM OUTCOMES (POs)

Graduates of Electronics and Communication Engineering will be able to :

a. An ability to apply knowledge of mathematics, science and engineering

b. An ability to design and conduct experiments, as well as to analyze and interpret data.

c. An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

d. An ability to function in multi disciplinary teams

e. An ability to identify, formulate and solve engineering problems

f. An understanding of professional and ethical responsibility.

g. An ability to communicate effectively

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.

i. A recognition of the need for and ability to engage in life-long learning

j. A knowledge of contemporary issues

k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

l. An ability to understand, design and develop Electronics and Communication based Products.

m. An aptitude to take up applied research and to become Entrepreneurs in Electronics and Communication Engineering by combining the skills of project management and finance

MAPPING OF PEOs WITH POs

PEO\PO	a	b	c	d	e	f	g	h	i	j	k	l	m
PEO1	3	-	-	1	3	-	-	2	-	-	-	-	1
PEO2	-	3	3	-	3	-	-	-	-	3	3	3	2
PEO3	-	-	3	2	-	3	3	1	3	3	-	-	3

1 – Slight, 2 – Moderate, 3 – Substantial

CURRICULUM BREAKDOWN STRUCTURE UNDER REGULATION 2011

Curriculum Breakdown Structure(CBS)	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic Sciences(BS)	16.3	450	30
Engineering Sciences(ES)	14.1	390	26
Humanities and Social Sciences(HS)	8.7	240	16
Program Core(PC)	49.4	1365	91
Program Electives(PE)	6.52	180	12
Project(s)/Internships(PR)	4.89	135	9
Total			**184**

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B.E. DEGREE IN ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – I

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11EL101	Technical English	3	0	0	3	50	50	100	HS
11MA101	Engineering Mathematics - I	3	1	0	4	50	50	100	BS
11PH101	Applied Physics	3	0	0	3	50	50	100	BS
11CY101	Applied Chemistry	3	0	0	3	50	50	100	BS
11ME101	Basics of Civil and Mechanical Engineering	3	0	0	3	50	50	100	ES
11ME102	Engineering Drawing	2	0	3	3	50	50	100	ES
	PRACTICAL								
11PH102	Physical Sciences Laboratory - I	0	0	3	1	50	50	100	BS
11ME103	Engineering Practices Laboratory	0	0	3	1	50	50	100	ES
				Total	**21**				

CA- Continuous Assessment, ESE- End Semester Examination
CBS – Curriculum Breakdown Structure

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CURRICULUM
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SEMESTER – II

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11EL201	Communication Skills	3	0	0	3	50	50	100	HS
11MA201	Engineering Mathematics - II	3	1	0	4	50	50	100	BS
11PH201	Materials Science	3	0	0	3	50	50	100	BS
11CY201	Environmental Science	3	0	0	3	50	50	100	BS
11CS101	Problem Solving and Programming	3	0	0	3	50	50	100	ES
11EE201	Circuit Theory	3	1	0	4	50	50	100	PC
	PRACTICAL								
11PH202	Physical Sciences Laboratory-II	0	0	3	1	50	50	100	BS
11CS102	Programming Laboratory	0	0	3	1	50	50	100	ES
11EE202	Circuits Laboratory	0	0	3	1	50	50	100	PC
				Total	**23**				

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B.E. DEGREE IN ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM
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SEMESTER – III

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11MA301	Engineering Mathematics – III	3	1	0	4	50	50	100	BS
11IT301	Data Structures	3	0	0	3	50	50	100	ES
11EC301	Digital Electronics	3	1	0	4	50	50	100	PC
11EC302	Electron Devices and Circuits -I	3	0	0	3	50	50	100	PC
11EC303	Electromagnetic Fields	3	1	0	4	50	50	100	PC
11EE301	Electrical Machines	3	1	0	4	50	50	100	ES
	PRACTICAL								
11EC305	Electron Devices and Circuits -I Laboratory	0	0	3	1	50	50	100	PC
11CS305	Data Structures and Algorithms Laboratory	0	0	3	1	50	50	100	ES
11EL202	Communication Skills Laboratory	0	0	3	1	50	50	100	HS
				Total	**25**				

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B.E. DEGREE IN ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM
(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – IV

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11MA403	Probability Theory and Random Process	3	1	0	4	50	50	100	BS
11EC401	Electron Devices and Circuits -II	3	1	0	4	50	50	100	PC
11EC402	Signals and Systems	3	1	0	4	50	50	100	PC
11EC403	Microprocessor and Microcontroller	3	0	0	3	50	50	100	PC
11EC404	Transmission Lines and Waveguides	3	1	0	4	50	50	100	PC
11EI402	Measurements and Instrumentation	3	0	0	3	50	50	100	ES
	PRACTICAL								
11EC405	Electron Devices and Circuits –II Laboratory	0	0	3	1	50	50	100	PC
11EC406	Microprocessor Microcontroller and Applications Laboratory	0	0	3	1	50	50	100	PC
11EC304	Digital Electronics Laboratory	0	0	3	1	50	50	100	PC
				Total	**25**				

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B.E. DEGREE IN ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM
(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – V

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11EC501	Electron Devices and Circuits -III	3	0	0	3	50	50	100	PC
11EC502	Digital Signal Processing	3	1	0	4	50	50	100	PC
11EC503	Linear Integrated Circuits	3	1	0	4	50	50	100	PC
11EC504	Advanced Microcontroller Architecture and its Applications	3	0	0	3	50	50	100	PC
11EC505	Communication Systems	3	1	0	4	50	50	100	PC
11EE503	Control Systems	3	1	0	4	50	50	100	PC
	PRACTICAL								
11EC506	Electronic Circuits and Linear IC Laboratory	0	0	3	1	50	50	100	PC
11EC507	Digital Signal Processing Laboratory	0	0	3	1	50	50	100	PC
11EC508	Advanced Microcontroller and Its Applications Laboratory	0	0	3	1	50	50	100	PC
				Total	**25**				

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B.E. DEGREE IN ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM
(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – VI

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11GE601	Economics and Management for Engineers	3	0	0	3	50	50	100	HS
11EC601	VLSI Design	3	1	0	4	50	50	100	PC
11EC602	Digital Communication	3	1	0	4	50	50	100	PC
11EC603	Antennas and Wave Propagation	3	1	0	4	50	50	100	PC
11IT502	Computer Communication Networks	3	0	0	3	50	50	100	ES
	Elective - I	3	0	0	3	50	50	100	PE
	PRACTICAL								
11EC604	Analog and Digital Communication Systems Laboratory	0	0	3	1	50	50	100	PC
11EC605	VLSI Laboratory	0	0	3	1	50	50	100	PC
11EC606	Networks Laboratory	0	0	3	1	50	50	100	ES
				Total	**24**				

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B.E. DEGREE IN ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM
(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – VII

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11GE701	Total Quality Management	3	0	0	3	50	50	100	HS
11EC701	Satellite Communication	3	0	0	3	50	50	100	PC
11EC702	Optical Communication	3	0	0	3	50	50	100	PC
11EC703	Microwave Engineering	3	0	0	3	50	50	100	PC
11EC704	Wireless Networks	3	0	0	3	50	50	100	PC
	Elective - II	3	0	0	3	50	50	100	PE
	PRACTICAL								
11EC705	Electronic System Design Laboratory	0	0	3	1	50	50	100	PC
11EC706	Optical and Microwave Laboratory	0	0	3	1	50	50	100	PC
				Total	**20**				

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B.E. DEGREE IN ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM
(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – VIII

Course Code	Course Title	Hours / Week			Credit	Maximum Marks			CBS
		L	T	P		CA	ESE	Total	
	THEORY								
11GE801	Professional Ethics and Human Values	3	0	0	3	50	50	100	HS
11EC801	Cellular and Mobile Communication	3	0	0	3	50	50	100	PC
	Elective - III	3	0	0	3	50	50	100	PE
	Elective - IV	3	0	0	3	50	50	100	PE
	PRACTICAL								
11EC802	Project work	0	0	18	9	100	100	200	PR
				Total	**21**				

CA - Continuous Assessment, ESE - End Semester Examination
CBS – Curriculum Breakdown Structure

LIST OF ELECTIVES						
Course Code	**Course Title**	**L**	**T**	**P**	**C**	**CBS**
11EC011	Medical Electronics	3	0	0	3	PE
11EC012	Soft Computing	3	0	0	3	PE
11EC013	Computer Architecture and Interfacing	3	0	0	3	PE
11EC014	Speech Signal Processing	3	0	0	3	PE
11EC015	High Speed Networks	3	0	0	3	PE
11EC016	Optoelectronic Devices	3	0	0	3	PE
11EC017	Digital Image Processing	3	0	0	3	PE
11EC018	RF Communications	3	0	0	3	PE
11EC019	Embedded System Design	3	0	0	3	PE
11EC020	Electromagnetic Interference and Compatibility	3	0	0	3	PE
11EE603	Power Electronics	3	0	0	3	PE
11CS302	Object Oriented Programming with C++	3	0	0	3	PE
11CS402	Operating Systems	3	0	0	3	PE
11CS603	.Net Technologies	3	0	0	3	PE
11IT013	Java Technologies	3	0	0	3	PE
11IT016	System Software	3	0	0	3	PE
11MA011	Numerical Methods and Linear Programming	3	0	0	3	PE
11GE011	Entrepreneurship Development	3	0	0	3	PE
11MT012	Micro Electro Mechanical Systems	3	0	0	3	PE
11MT801	Automotive Electronics	3	0	0	3	PE

11EL101 TECHNICAL ENGLISH

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **17**

Grammar and Vocabulary: Word formation with prefixes and suffixes – Synonyms and Antonyms – Verb Patterns – Tenses (simple and compound tenses) - Simple, Compound and Complex Sentences - Voice – Use of Conditionals - Comparative Adjectives (affirmative and negative) – Expanding Nominal compounds - Articles - Use of Prepositions – Identifying Odd Words – Acronyms.

MODULE – II **13**

Listening: Listening for General Content – 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- Listening to fill up gapped texts.

Writing: Introduction 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 - analysing / interpreting the data – Personal letter - Formal letter writing (Inviting Guest Speakers, letter to the editor, letter for seeking practical training, and letter for undertaking project works in industries) – editing (punctuation, spelling and grammar) – Recommendations & Suggestions.

MODULE- III **15**

Reading: 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.

Speaking: Verbal and Non Verbal Communication - Pronunciation drills/ Tongue Twisters – Formal and Informal English - Oral practice – Developing Confidence - Introducing Oneself - Asking for or Eliciting Information - Describing Objects – Offering Suggestions and Recommendations – expressing opinions (agreement / disagreement.

TOTAL : 45

TEXT BOOK

1. "English for Engineers and Technologists", Combined Edition, Volume. I & II, Orient Longman, Oxford University Press, New Delhi, 2006.

REFERENCE BOOKS

1. Aysha Viswamohan, "English for Technical Communication", Tata McGraw-Hill, New Delhi, 2008.
2. Rizvi M Ashraf, "Effective Technical Communication", Fifth Edition, Tata McGraw- Hill, New Delhi, 2007.
3. Mark Ibbotson, "Cambridge English for Engineering", Cambridge University Press, New Delhi, 2009.
4. Rama Krishna Rao, A, "Learning English: A Communicative Approach" Orient Black Swan, Hyderabad, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Improve their vocabulary and appropriate usage of words in different academic and professional contexts.

CO2: Familiarize with different rhetorical functions of technical English.

CO3: Develop strategies that could be adopted while reading texts.

CO4: Speak effectively in English and career related situations.

CO5: Acquire knowledge in academic and professional writing.

Mapping of COs with POs

COs/POs	a	b	c	d	e	F	g	h	i	j	k	l	m
CO1				3		3	3						
CO2				3		3	3						
CO3				3		3	3						
CO4				3		3	3						
CO5				3		3	3						

3 – Substantial, 2 – Moderate, 1 – Slight

11MA101 ENGINEERING MATHEMATICS – I

(Common to all Engineering and Technology branches)

3 1 0 4

MODULE – I **15**

Matrices: Linear independent and dependent of vectors – Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of eigen values and eigen vectors (without proof) – Cayley – Hamilton theorem (without proof).

Diagonalisation: Similarity transformation (concept only) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Nature of quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE – II **15**

Differential Calculus: Curvature – Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature. Involutes and evolutes – Envelopes – Properties of envelopes and evolutes.

Functions of several variables: Functions of two variables – Partial derivatives – Total differential – Maxima and minima – Constrained maxima and minima – Lagrange's multiplier method – Jacobians.

MODULE - III **15**

Differential Equations: Linear differential equations of Second and higher order with constant coefficients when the R.H.S is e^{ax}, x^n, $n > 0$, Sinax, Cosax, $e^{ax}x^n$, $e^{\alpha x}$ Sinβx, $e^{\alpha x}$ Cosβx, x^n Sinαx and x^n Cosαx– Differential Equations with variable coefficients (Cauchy's form). Method of variation of parameters - Simultaneous first order linear equations with constant coefficients.

Applications of Differential Equations: Solution of specified differential equations connected with electric circuits, simple harmonic motion (Differential equations and associated conditions need to be given).

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Kandasamy. P, Thilagavathy. K and Gunavathy. K, "Engineering Mathematics For First Year B.E/B.Tech", Reprint Edition 2011, S.Chand and Co., New Delhi.
2. Veerarajan. T., "Engineering Mathematics, (for first year), Reprint Edition 2011, Tata McGraw-Hill New Delhi.

REFERENCE BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, New Delhi, 2007.
2. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House, New Delhi, 2007.
3. Bali N.P and Manish Goyal, "Text Book of Engineering Mathematics", 3rd Edition, Laxmi Publications, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Identify and solve algebraic Eigen value problems from practical area

CO2: Understand the geometric aspects of curvature, maxima and minima concepts as elegant applications of differential equations.

CO3: Solve differential equations of certain types and to handle application in engineering fields

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	M
CO1	3	2		3								1	
CO2	3	2		3								1	3
CO3	3	2		3								1	3

3 – Substantial, 2 – Moderate, 1 – Slight

11PH101 APPLIED PHYSICS

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Acoustics : Classification of sound – Characteristics of musical sound – Weber-Fechner law – Absorption Coefficient – Reverberation – Reverberation time – Sabine's formula (growth & decay) – Factors affecting acoustics of buildings (reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies.

Ultrasonics : Introduction – Production – Magnetostriction effect – Magnetostrictive generator - Inverse piezoelectric effect - Piezoelectric generator - Detection of ultrasonics - Properties – Cavitation - Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non destructive testing – Ultrasonic pulse echo system - Medical applications – A, B and C Scan displays – Ultrasonic imaging technique.

MODULE – II **15**

Lasers: Introduction – Principle of spontaneous emission and stimulated emission - Population inversion, Pumping, Einstein's Coefficients (A&B) - Types of lasers – Nd:YAG, CO_2, Semiconductor lasers: Homojunction and Heterojunction – Laser Applications – Industrial applications – Laser welding, Laser cutting, Laser drilling – Holography – Construction and reconstruction of images.

Fiber Optics and Applications: Principle – Classification based on materials, Modes of propagation, Refractive index profile - Crucible-crucible technique of fiber fabrication - Light sources for fiber optics – Detectors - Fiber optical communication links - Losses in optical fibers – Fiber optic sensors – Temperature, displacement, voltage and magnetic field measurement.

MODULE - III **15**

Quantum Physics and Applications: Black body radiation – Planck's theory (derivation)– Deduction of Wien's displacement law and Rayliegh – Jean's Law from Planck's theory – Compton effect – Theory and experimental verification - Matter waves – Uncertainty principle - Experimental verification – Schroedinger's wave equations – Time independent and time dependent equation – Physical Significance of wave function – Particle in a box (One dimensional) - Optical microscope – Limitations of optical microscopy - Scanning electron microscope - Transmission electron microscope.

TOTAL : 45

TEXT BOOKS

1. Avadhanalu M N and Kshirsagar P G, "A Text Book of Engineering Physics", S.Chand & company Ltd, New Delhi, 2007.
2. Palanisamy P K, "Engineering Physics", Scitech Publications, Chennai, 2008.

REFERENCE BOOKS

1. Gaur R K and Gupta S L , "Engineering Physics", Dhanpat Rai and Sons, New Delhi, 2006.
2. Rajendran V, "Engineering Physics", Prentice Hall of India, New Delhi, 2008.
3. Rajagopal K, "Textbook of Engineering Physics", Part I, PHI Learning Pvt. Ltd., New Delhi, 2008.
4. Personick S D, "Fibre Optics, Technology and Applications", Khanna Publishers New Delhi, 1987.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Get an insight into design of acoustically good buildings and applications of laser in engineering and technology

CO2: Gain basic knowledge in Fiber optic concepts and fiber optic communication link

CO3: Understand the applications of quantum physics to optical and electrical phenomena

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3		1		1							2	
CO2	3	1	1									2	
CO3	3											2	

3 – Substantial, 2 – Moderate, 1 – Slight

11CY101 APPLIED CHEMISTRY

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Water: Introduction - Sources of water - impurities in water - Types of water - Water quality standards - Water quality parameters (Discussion not required) - Hardness of water- Expression of hardness - Units of hardness –Estimation of Hardness of water by EDTA method – Determination of alkalinity - Disadvantages of using hard water - Boiler troubles due to hard water - scale and sludge formation – Boiler corrosion – caustic embrittlement- priming and foaming-Softening of water- External treatment methods - Lime soda, zeolite and demineralization process (principle, process, advantages and disadvantages only) Internal treatment process - colloidal, carbonate, calgon and phosphate conditioning (brief discussion only) - desalination by reverse osmosis method.

Electrochemistry: Introduction - Cells – Representation of a galvanic cell - EMF measurements and its applications – Electrode potential - Nernst Equation – Reference electrodes (hydrogen and calomel electrodes) – Electrochemical series and its applications – Conductometric titrations (strong acid Vs strong base only) - Batteries – Lead acid and Ni-Cd batteries.

MODULE – II **15**

Corrosion and its Control: Introduction – Mechanism of dry and wet corrosion – galvanic corrosion - concentration cell corrosion – Galvanic series - Factors influencing rate of corrosion – corrosion control methods - Sacrificial anode and impressed current cathodic method – Corrosion inhibitors - Protective coatings - classifications - Pretreatment of metal surface - Metallic coating -electroplating and electrolessplating (General discussion) - Hot dipping (Tinning and galvanising) - Nonmetallic coating - surface conversion coating (phosphate coating and anodized coating) - Organic coating - paints – constituents and their function – Special paints (Fire retardant, temperature indicating, water repellant and luminescent paints)

Combustion: Introduction – Calorific Values – Gross and net – Theoretical calculation of minimum air for combustion (Theoretical aspects only) – flue gas analysis – Orsat's method - Explosive range and Spontaneous Ignition Temperature.

MODULE - III **15**

Fuels: coal – proximate and ultimate analysis – their importance – metallurgical coke - Otto-Hoffman byproduct method - Liquid fuel - refining of petroleum - Straight run, cracked and polymer petrol – Manufacture of synthetic petrol - polymerization (thermal and catalytic methods) - Hydrogenation of coal (Fisher Tropsch and Bergius methods) - knocking - octane number – improving octane number by additives – Diesel – cetane number – Gaseous fuels (Water gas, producer gas and biogas)

Polymers: Introduction – Nomenclature of polymers – functionality – polymerization - types – addition, condensation and co-polymerization with examples – Effect of polymer structure on properties (strength, plastic deformation, crystallinity and chemical resistance) - plastics – types (thermo and thermosetting plastics) - individual polymers - Polyethylene, polypropylene, PVC, Teflon, Bakelite and epoxy resin (preparation, properties and uses only) - Compounding of plastics-Fabrication of plastics (compression, injection and extrusion moulding methods) – conducting polymers

TOTAL : 45

TEXT BOOK

1. Jain PC and Monica Jain, "Engineering Chemistry", 15th Edition, Dhanpat Rai publication Co., New Delhi, 2008.

REFERENCE BOOKS

1. Dara S.S., "A Text Book of Engineering Chemistry", S.Chand & Co. Ltd., New Delhi, 2006.
2. Sharma B.K., "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., Meerut, 2001.
3. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill, New Delhi, 2008.
4. Krishnamurthy N., "Engineering Chemistry", 2nd Edition, PHI Learning private Limited, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Acquire basic knowledge of Water treatment.
CO2: Understand the principles of electro chemistry, electrochemical cells, EMF series and energy storing devices.
CO3: Understand the types and prevention methods of corrosion
CO4: Understand the developments in polymers and plastics

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3						2						
CO2	3						2						
CO3	3						2						
CO4	3						2						

3 – Substantial, 2 – Moderate, 1 – Slight

11ME101 BASICS OF CIVIL AND MECHANICAL ENGINEERING

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **7**

Construction Materials: Introduction – Civil Engineering – Materials – bricks – stones – sand – cement – concrete – steel sections – Site selection for foundations – Bearing capacity – loads – Types of foundations – requirements.

MODULE – II **7**

Elements of Structures: Superstructure – brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Types of Bridges and Dams.

MODULE - III **8**

Elements of Surveying: Surveying – Objects – types – classification – principles – measurements of distances – Determination of areas –Building area calculation – illustrative examples – Basics of Interior and Landscaping.

PART–B: BASIC MECHANICAL ENGINEERING

MODULE – I Metal Forming and Joining Processes **7**

Foundry: Introduction- patterns – molding –casting - cupola furnace.

Forming: Introduction-Classification- Rolling, extrusion, and drawing.

Welding: Introduction-Classification - TIG, MIG welding, Gas welding, soldering and brazing.

Machining process: Introduction-Classification – lathe and drilling machines.

MODULE – II Boilers and Power Plants **8**

Steam Boilers: Introduction-Classification- Working Principle of Cochran boiler, Babcock and Wilcox boiler- Benson boiler - Boiler Mountings and accessories.

Power Plants: Classification of power plants – working principle of steam, Diesel, Hydro-electric and Nuclear Power plants- Merits and Demerits.

MODULE – III IC Engines, Refrigeration and Air-conditioning **8**

IC Engines: Classification-components - Working principle of Petrol and Diesel Engines- Four stroke and two stroke cycles- Comparison of four stroke and two stroke engines. Working principle of carburetor, fuel pump and multi point fuel injector.

Refrigeration and Air Conditioning System: Terminology of Refrigeration and Air conditioning, Properties of refrigerant - Principle of vapour compression and absorption system - Layout of typical domestic refrigerator - Window and Split type room Air conditioner.

TOTAL : 45

TEXT BOOKS

1. Palanichamy, M S., "Basic Civil Engineering", Tata McGraw-Hill, New Delhi, 2006.
2. Shanmugam, G, "Basic Mechanical Engineering", 4th Edition, Tata McGraw-Hill, New Delhi, 2011.

REFERENCE BOOKS

1. Rao, M.S., "Basics of Civil Engineering", Dhanpat Rai and Co, New Delhi, 2006.
2. Venugopal, K and Prabhu Raja, V, "Basic Mechanical Engineering", Sixth Edition, Anuradha Publishers, Kumbakonam, 2005.
3. Rao, P N, "Manufacturing Technology: Foundry, Forming And Welding", Tata McGraw-Hill, New Delhi, 2008.
4. Rajan, T.S, "Basic Mechanical Engineering, 3rd Edition, New Age International Publishers, NewDelhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Get exposed to the basics of civil and mechanical engineering areas like construction materials, construction practices, surveying, pumps, boilers, I.C engines, power plants, refrigeration and air conditioning.

Mapping of COs with POs

COs/POs	a	b	c	d	e	F	g	h	i	j	k	l	m
CO1	3	2	2	3	1							1	

3 – Substantial, 2 – Moderate, 1 – Slight

11ME102 ENGINEERING DRAWING

(Common to all Engineering and Technology branches)

2 0 3 3

Concepts (Not for Exam)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

MODULE – I **15**

Projections of Points, Lines, Planes and Solids:

General principles of orthographic projection – First angle projection – Layout of views – Projection of points, located in all quadrant and straight lines located in the first quadrant – Determination of true lengths and true inclinations and location of traces – Projection of polygonal surface and circular lamina inclined to both reference planes.

Projections of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

MODULE – II **15**

Sectioning and development of solids:

Sectioning of solids- prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cone with cutout, perpendicular and inclined to the horizontal axis.

MODULE- III **15**

Isometric projection and Perspective projection :

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

Conversion of isometric projection into orthographic projection.

Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL: 45

TEXT BOOKS

1. Venugopal K. and Prabhu Raja V. "Engineering Graphics", New Age International (P) Limited, New Delhi, 2008.
2. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD", Tata McGraw Hill, New Delhi, 2008.

REFERENCE BOOKS

1. Bhatt N.D, "Engineering Drawing", 46th Edition, Charotar Publishing House, Anand, 2003.
2. Gopalakrishnana K.R., "Engineering Drawing", Volume. I & II, Subhas Publications, Bangaluru, 2006.
3. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw-Hill, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Develop graphical skill for the design of engineering products.

CO2: Understand the existing national standards related to technical drawing.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	2										3	
CO2	3	2										3	

3 – Substantial, 2 – Moderate, 1 – Slight

11PH102 PHYSICAL SCIENCES LABORATORY – I

(Common to all Engineering and Technology branches)

0 0 3 1

PART-A: APPLIED PHYSICS LABORATORY

(Any five experiments)

LIST OF EXPERIMENTS /EXERCISES

1. (a) Particle size determination using Diode Laser.
   (b) Determination of Laser parameters – Wavelength and angle of divergence.
   (c) Determination of acceptance angle in an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
5. Determination of dispersive power of a prism using spectrometer.
6. Determination of Young's modulus of the material – non uniform bending.

PART-B: APPLIED CHEMISTRY LABORATORY

(Any five experiments)

LIST OF EXPERIMENTS /EXERCISES

1. Estimation of Total, Temporary and Permanent hardness of water by EDTA method.
2. Estimation of Ca^{2+} and Mg^{2+} hardness separately by EDTA method.
3. Estimation of Alkalinity of a water Sample.
4. Conductometric titration - Mixture of acids.
5. Estimation of Hydrochloric acid using PH meter.
6. Estimation of Ferrous ion by Potentiometric titration.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Get a basic idea of diode and LASER.

CO2: Familiarize the concepts of Ultrasonic

CO3: Get a basic idea about the analysis of hardness,amount of Ca2+ and Mg2+ , presence of alkalinity in water.

CO4: Get a basic idea about the handling of instruments like pH meter and conductivity meter for the estimation of unknown concentration of acids.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3		2	1							2	
CO2	3	3		2	1							2	
CO3	3	3		2	1							2	
CO4	3	3		2	1							2	

3 – Substantial, 2 – Moderate, 1 – Slight

11ME103 ENGINEERING PRACTICES LABORATORY

(Common to all Engineering and Technology branches)

0 0 3 1

PART-A: CIVIL & MECHANICAL

LIST OF EXPERIMENTS

1.FITTING

Tools & Equipments – Practice in Filing and Drilling.

Making Vee Joints, Square, dovetail joints, Key Making.

2. PLUMBING

Tools & Equipments - Pipe connection for a bath room, Pipe connection for multi-storey building, Pipe connection with different components like valves, tap, coupling, union, reducers, elbows etc.

Plumbing work with metal, PVC and flexible hoses (Threading, joining of pipes)

3.CARPENTRY

Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.

Making of Pen stand, Box, etc. from plywood. (Use of modern power tools for cutting)

4.SHEET METAL

Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.

5.WELDING

Tools and equipments - Arc and Gas welding of butt joint, Lap Joint and Tee Fillet..

REFERENCES / MANUALS / SOFTWARE:

1. Suyambazhahan, S, "Engineering Practices Laboratory Manual", PHI Learning, NewDelhi, 2010.
2. John, K. C., "Mechanical Workshop Practice", Second Edition, PHI Learning, NewDelhi, 2009.

PART-B: ELECTRICAL & ELECTRONICS

1. Safety aspects of Electrical wiring.
2. Wiring circuit for a lamp using single and two way switches (stair case).
3. Wiring circuit for fluorescent lamp.
4. Study of Electronic components and equipment – Resistor-colour coding, measurement of AC Signal parameter (Peak-Peak, RMS Value, Frequency and Power factor) using CRO
5. Assembling electronic components on a small PCB (Etching, Fabrication and Testing)
6. Measurement of earth resistance and insulation resistance of an electrical equipment
7. Study of Telephone, FM radio & Transducers.
8. Study of Mixie, Iron box, Ceiling & Table Fans.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Get exposed to the basics of various engineering practices in Civil,Mechanical, Electrical and Electronics Engineering

Mapping of COs with POs

COs/POs	a	b	c	d	e	F	g	h	i	j	k	l	m
CO1	3	3	2	2	1							2	

3 – Substantial, 2 – Moderate, 1 – Slight

11EL201 COMMUNICATION SKILLS

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Focus on language: Cause and effect expressions - indicators of purpose and function - connectives -imperatives - modal verbs - infinitives and gerunds - reporting verbs - homonyms - commonly confused (mispronounced and misspelt) words - phrasal verbs - British and American Vocabulary.- rules for writing SI [system international] units - concord.

MODULE – II **15**

Listening: Listening practice - Radio / TV news - documentaries - listening to short and long conversations in different domains of activity/ live speech - new inventions, products, announcements, casual conversation, and academic lectures.

Writing: Formal letter writing (letter of application - job application) , Business (calling for quotation, placing orders , letter of complaint) - structure of memorandum and technical reports (reports on visits made to industries, report on an accident in the factory, meeting report) – notices - agenda - instructions - e-mails - Preparing Checklist- note taking and note making.

MODULE- III **15**

Speaking: Communication – accuracy, fluency, appropriateness – levels of formality – oral practice activities related to professional skills – role play using different functions (persuasion, negotiation, giving directions and guidance) – conversational etiquette (greetings, making requests, permission, accepting, denying, declining, politeness strategies, turn-taking, body language) – making speeches – describing people, place, things and events.

Reading: Reading comprehension – guided note- making – providing a suitable title - identifying main points, supporting ideas – evaluating the style (argumentative / descriptive etc) – drawing inferences separating facts from opinions – interpreting text in different genres.

TOTAL : 45

TEXT BOOK

1. Department of Science and Humanities, Anna University, Chennai. “English for Engineers and Technologists”, Combined Edition Volumes (I & II), Orient Longman, Oxford University Press, New Delhi, 2006.

REFERENCE BOOKS

1. Kiranmai. Dutt P, Geetha Rajeevan and Prakash, C. L. N., “A Course in Communication Skills”, Cambridge University Press, New Delhi, 2007.
2. Meenakshi Raman and Sangeetha Sharma, “Technical Communication”, Oxford University Press, New Delhi, 2006.
3. Sangeetha Sharma and Binod Mishra, “Communication Skills for Engineers and Scientists”, PHI Learning, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Improve their vocabulary and appropriate usage of words.

CO2: Familiarize with different rhetorical functions of technical English.

CO3: Speak effectively in English in real-life and career-related situations.

CO4: Acquire knowledge in academic and professional writing.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1				2			3		2				
CO2				2			3		2				
CO3				2			3		2				
CO4				2			3		3				

3 – Substantial, 2 – Moderate, 1 – Slight

11MA201 ENGINEERING MATHEMATICS – II

(Common to all Engineering and Technology branches)

3 1 0 4

MODULE – I **15**

Multiple Integrals: Double integration in Cartesian 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).

Vector Calculus: Gradient, divergence and curl – Line, surface integral (Concept Only) and volume integrals (Concept Only) – Green's, Gauss divergence and Stoke's theorems (without proof) – Verification of the above theorems and evaluation of integrals using them (Simple problems only).

MODULE – II **15**

Analytic Functions: Functions of a complex variable – Analytic functions – Necessary conditions and Sufficient conditions (excluding proof) – Cauchy– Riemann equations — Properties of analytic function (Statement only) – Harmonic functions – Construction of Analytic functions – Conformal mapping: $w = z + a$, az, $\frac{1}{z}$ - Bilinear transformation.

Complex Integration: Cauchy's theorem (without proof) – Cauchy's integral formula – Taylor and Laurent's series (without proof) – Singularities – Classification – Cauchy's residue theorem (Statement only) – Contour integration – circular and semi-circular contours (excluding poles on real axis).

MODULE – III **15**

Laplace Transforms: 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 transforms: Inverse Transform of elementary functions – Partial fraction method – Convolution theorem (without proof) – Solution of linear ODE of second order with constant coefficients .

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Kandasamy. P, Thilagavathy. K and Gunavathy. K, "Engineering Mathematics For First Year B.E/B.Tech", Reprint Edition 2011, S.Chand and Co., New Delhi.
2. Veerarajan. T., "Engineering Mathematics, (for first year), Reprint Edition 2011, Tata McGraw-Hill New Delhi.

REFERENCE BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, New Delhi, 2007.
2. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", Third Edition, Narosa Publishing House, New Delhi, 2007.
3. Bali. N.P and Manish Goyal, "Text Book of Engineering Mathematics", Third Edition, Laxmi Publications, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand double, triple and higher order integrations

CO2: Understand the basics of vector calculus and classical theorems.

CO3: Understand the concept of Laplace transform and their properties, applying to solve differential equations.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	I	j	k	l	m
CO1	3	2	1		2							1	
CO2	3	2	1		2							1	
CO3	3	2	1		2							1	
CO4	3	2	1		2							1	

3 – Substantial, 2 – Moderate, 1 – Slight

11PH201 MATERIALS SCIENCE

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Crystal Physics: Introduction – Lattice – Unit cell – Crystal systems – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Crystal imperfections : Point, line and surface imperfections.

Conducting Materials: Conductors – Classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – Carrier concentration in metals.

MODULE – II **15**

Semiconducting Materials: Intrinsic semiconductor – Carrier concentration derivation – Extrinsic semiconductors – Carrier concentration derivation in n-type and p-type semiconductors – Hall effect – Determination of Hall coefficient – Applications - Semiconductor devices – Solar cells - LDR.

Magnetic and Dielectric Materials: Types of magnetic materials – Domain theory – Hysteresis – Soft and hard magnetic materials - Magnetic devices – Transformer core - Magneto optical recording - Dielectric constant - Qualitative study of polarization – Frequency and temperature dependence of polarization – Dielectric loss – Dielectric breakdown – Uses of dielectric materials (capacitor and transformer) – Ferro electric materials.

MODULE- III **15**

Smart Materials : Metallic glasses: Preparation, properties and applications - Shape memory alloys (SMA): Characteristics, properties, applications, advantages and disadvantages of SMA – Superconductors: Properties – Types of superconductors – BCS theory of superconductivity(Qualitative) - High T_c superconductors – Applications of superconductors – SQUID – cryotron - magnetic levitation.

Nano Materials: Synthesis: Lithographics – Vapour phase physical and chemical deposition methods - Colloidal and solgel methods - Properties of nanoparticles and applications - Carbon nanotubes: Structure – Properties – Fabrication by Laser ablation – Applications.

TOTAL : 45

TEXT BOOKS

1. Kittel. Charles, “Introduction to Solid State Physics”, Seventh Edition, John Wiley & sons, Singapore, 2007.
2. Poole. Charles P and Ownen. Frank J., “Introduction to Nanotechnology”, Wiley India, 2007. (For Module III).

REFERENCE BOOKS

1. Pillai. S O, “Solid State Physics”, Fifth Edition, New Age International, New Delhi, 2003.
2. Rajendran. V, “Engineering Physics”, Prentice Hall of India, New Delhi, 2008.
3. Palanisamy. P K, “Engineering Physics - II”, SciTech publications (India), Chennai 2008.
4. Raghavan. V, “Materials Science and Engineering: A first course”, Fifth Edition, Prentice Hall of India, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Gain basic knowledge in concepts like crystal physics, conducting and superconducting materials

CO2: Understand the concepts of semiconducting materials, devices, magnetic and dielectric materials

CO3: Acquire basic knowledge of Smart materials,Nano materials and its application

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	1			1							1	
CO2	3	1			1							1	
CO3	3	1			1							1	

3 – Substantial, 2 – Moderate, 1 – Slight

11CY201 ENVIRONMENTAL SCIENCE

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Introduction to Environmental Studies and Natural Resources: Introduction to Environmental Science – Forest resources: Use and over-exploitation, deforestation, case studies. – Water resources: Use and over-utilization of surface and ground water, dams - benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture - effects of modern agriculture, fertilizer and pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, case studies – Land resources: Land as a resource – Conservation Practices - Role of an individual in conservation of natural resources. **Ecosystems:** Concept of an ecosystem – Structural features – Functional attributes (Food chain and Food web only) – Introduction, types, characteristic features, structure and functions of the (a) Forest ecosystem (b) Aquatic ecosystems (ponds, rivers and oceans). **Biodiversity:** Introduction to Biodiversity – Definition - genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic, option values and ecosystem service value– Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife – Endangered and endemic species of India – In-situ and Ex-situ conservation of biodiversity.

MODULE – II **15**

Pollution: Definition – Causes, effects and control measures of: (a) Air pollution - Climate change, global warming, acid rain, ozone layer depletion (b) Water pollution (c) Soil pollution (d) Radioactive Pollution - Solid waste Management - Disaster management: floods, earthquake, cyclones and landslides - Role of an individual in prevention of pollution - Case studies. **Water Treatment methods**: Treatment of Water for Domestic Supply (Screening, Aeration, Sedimentation with Coagulation, Filtration and Disinfection methods) - Break point chlorination –Estimation of dissolved oxygen, BOD and COD - Bacteriological examination of water - Sewage treatment (Primary, Secondary & Tertiary methods) - Miscellaneous methods of Sewage treatments (Oxidation Ponds, Aerated Lagoons, Oxidation ditch, Anaerobic Lagoons, Septic tanks) – Methods of Sewage treatment by activated sludge process – Introduction to industrial waste water treatment using Reverse Osmosis Technology- Self purification of Natural Waters - Membrane Technology for wastewater treatment - Activated carbon in pollution abatement of wastewater.

MODULE- III **15**

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people - case studies – Environmental ethics - Issues and possible solutions - Wasteland reclamation – Consumerism and waste products – Environment Production Act – Air (Prevention and control of pollution) Act – Water (Prevention and control of pollution) Act – Wildlife protection Act – Forest conservation Act – Issues involved in enforcement of environmental legislation – Public awareness. **Human Population and the Environment:** Introduction - Population growth - Variation of population based on age structure - Variation among nations – Population explosion – Family welfare programme – Environment and human health – Human Rights – Value Education – HIV / AIDS – Women and Child welfare – Role of Information Technology in Environment and human health – Case studies.

TOTAL : 45

TEXT BOOK

1 Anubha Kaushik, and Kaushik C P, "Environmental Science and Engineering", Third Edition: 2008, (Reprint 2010), New Age International (P) Ltd, New Delhi.

REFERENCE BOOKS

1 B.K.Sharma, **"** Industrial Chemistry",Tenth Edition, Krishna Prakashan Media(P) Ltd,Meerut-250001(UP), India.
2 B Uppal M M revised by S C Bhatia, "Environmental Chemistry", Sixth Edition Khanna Publishers, New Delhi, 2002.
3 Trivedi R.K. and Goel P. K., "Introduction to Air Pollution", Techno-Science Publications, Jaipur, 2003.
4 Masters. Gilbert M, "Introduction to Environmental Engineering and Science", Second Edition, Pearson Education, New Delhi, 2004.
5 Miller, T.G., "Environmental Science", Wadsworth Publishing Co.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Appreciate the importance of conservation of resources and our role in maintaining the clean environment
CO2: Develop an understanding of ecological balance and preservation of bio-diversity
CO3: Acquire the awareness about the different types of pollution and know about the impact of population explosion

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	I	j	k	l	m
CO1	3					2		3					
CO2	3					2		3					
CO3	3					2		3					

3 – Substantial, 2 – Moderate, 1 – Slight

11CS101 PROBLEM SOLVING AND PROGRAMMING

(Common to all Engineering and Technology branches)

3 0 0 3

Objective:

- To learn the basic concepts of computing.
- To know the methodology of problem solving.
- To develop skills in programming using C language

MODULE – I **15**

Basics: Evolution of computers- Generations of computers- Classification of computers- Applications of computers-Hardware - Software-Information Technology-Internet Problem-Solving Techniques- Program Control Structures-Programming Paradigms and Languages-Generations of Programming Languages.

Problem Solving: Introduction – Problem Solving Aspects- Top-Down Design-Implementation of Algorithms-Program Verification- Efficiency of Algorithms- Analysis of Algorithms- Fundamental algorithm- Factorial Computation - Generation of Fibonacci Sequence.

MODULE – II **15**

C Fundamentals and Arrays: Introduction to C – C programming structure – C character set – Identifiers – keywords. Data types – Constants – variables- Operators – Expressions – Library functions Managing Input and Output – formatted input and output. Control statements – Decision making and branching – Looping structures- Arrays – One dimensional array – Two dimensional arrays – Multidimensional arrays. Character arrays and strings.

MODULE - III **15**

Functions, Structures and Files: Functions - User defined functions: declaration, definition function call and parameter passing mechanisms – Recursion –Array and Functions - User defined data types –typedef - Structures – Unions –File operations in C- Introduction to pointer –Pointer Declaration and Initialization-Accessing a Variable through a pointer-Difference between array and Pointers.

TOTAL : 45

TEXT BOOKS

1. Kamthane, Ashok N. “Computer Programming”, Pearson Education, New Delhi, 2007.
2. Dromey, R.G., “How to solve it by Computers”, Pearson Publishers, New Delhi, 2007.

REFERENCE BOOKS

1. Gottfried Byron S, “Programming with C”, Second Edition, Tata McGraw-Hill, New Delhi, 2006.
2. Kanetkar Yashavant P., “Let us C”, Fifth Edition, BPB publications, New Delhi, 2005.
3. Schildt Herbert, “The Complete Reference C”, Fourth Edition, Tata McGraw-Hill, New Delhi, 2000.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the concepts of computing and methods of problem solving.

CO2: Develop programming skill in C language.

Mapping of COs with POs

COs/POs	a	b	c	d	e	F	g	h	i	j	k	l	m
CO1	1			1	3						3	2	3
CO2	1			1	3						3	2	3

3 – Substantial, 2 – Moderate, 1 – Slight

11EE201 CIRCUIT THEORY

(Common to ECE, EEE, EIE and Mechatronics Engineering)

3 1 0 4

MODULE – I **15**

DC Circuit Analysis: Ohms law, Temperature coefficient of resistors, resistors in series and parallel circuits, Kirchhoff's laws, Voltage and current division, Dependent and independent sources, source transformation, star delta transformation, mesh and nodal analysis for DC circuits. Steady state analysis of DC circuits.

Simple AC Circuits: Sinusoidal voltage and current, definitions, analysis of simple AC series and parallel circuits, RL,RC,RLC-concept of power and power factor

MODULE – II **15**

Three phase AC circuits: Three phase system- Relation between phase and line values in star and delta. Three phase balanced and unbalanced system- Three phase power measurement.

Network Theorems: Thevenin's and Norton's theorem, Superposition theorem, maximum Power Transfer theorem, Reciprocity theorem and Substitution theorem for DC and AC circuits.

MODULE- III **15**

Resonance Circuits: Series and Parallel Resonance, Frequency response, Quality factor and Bandwidth.

Transients in DC Circuit: Transient of RL, RC, RLC circuit analysis with source free and forced (step) response.

Coupled Circuits: Mutual Inductance, Co efficient of coupling, dot convention, analysis of simple coupled circuits.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOK

1. Sudhakar A and Shyam Mohan S.P, "Circuits and Network Analysis and Synthesis", Tata McGraw-Hill, New Delhi, 2007.

REFERENCE BOOKS

1. Edminister Joseph A. and Nahri, Mahmood., "Electric Circuits", Schaum's Series, Tata McGraw-Hill, New Delhi, 2007.
2. Arumugam, M and Premkumar, N., "Electric Circuit Theory", Khanna Publishers, New Delhi, 1989.
3. Hayt William H., Kemmerly, Jack E. and Durbin ,Steven M., "Engineering Circuit Analysis", Sixth edition, Tata McGraw –Hill, New Delhi, 2007.
4. Chakrabati, A., "Circuit Theory: Analysis and Synthesis", Dhanpath Rai & sons, New Delhi, 1999.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Learn the basics of circuit elements and their V-I characteristics.

CO2: Analyze DC and AC circuits.

CO3: Get the basic concepts of balanced and unbalanced three phase systems.

CO4: Understand the basics of resonating circuits and coupled circuits.

Mapping of COs with POs

COs/POs	a	b	c	d	e	F	g	h	i	j	k	l	m
CO1	3	1	3		3							2	
CO2	3	2	3		3							2	
CO3	3	1	3		3							2	
CO4	3	1	3		3							2	

3 – Substantial, 2 – Moderate, 1 – Slight

11PH202 PHYSICAL SCIENCES LABORATORY – II

(Common to all Engineering and Technology branches)

0 0 3 1

PART - A: APPLIED PHYSICS LABORATORY

(Any five experiments)

LIST OF EXPERIMENTS /EXERCISES

1. Determination of band gap of a semiconductor material.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
4. Determination of hysteresis loss in a ferromagnetic material.
5. Determination of Young's modulus of the material – uniform bending.
6. Determination of viscosity of liquid – Poiseuille's method.

PART - B: APPLIED CHEMISTRY LABORATORY

(Any five experiments)

LIST OF EXPERIMENTS /EXERCISES

1. Estimation of Chloride in a given water sample.
2. Determination of Dissolved Oxygen in a sample of water / sewage.
3. Estimation of Chromium in Industrial waste water.
4. Estimation of Ferrous ion in rust solution.
5. Estimation of percentage of Copper present in brass.
6. Estimation of ferric ion by Spectrophotometeric method.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Determine the features of conducting materials

CO2: Familiarize the concepts of thermal conductivity

CO3: Estimate DO, chloride, chromium, ferrous ion and copper in wastewater

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3		2	1							2	
CO2	3	3		2	1							2	
CO3	3	3		2	1							2	

3 – Substantial, 2 – Moderate, 1 – Slight

11CS102 PROGRAMMING LABORATORY

(Common to all Engineering and Technology branches)

0 0 3 1

LIST OF EXPERIMENTS /EXERCISES

A) APPLICATION PACKAGES

1. To create an advertisement using word
2. To illustrate the concept of mail merging using word
3. To create a spread sheet to analyse the marks of the students of a class and also to create appropriate charts using excel
4. To create the presentation for the department using power point
5. To create the presentation for digital computers using power point

B) C PROGAMMING (ANY TWO PROGRAMS IN EACH SECTION)

6. Simple programs using decision making and branching:
   a. Program to find biggest of three numbers
   b. Design of simple menu driven calculator
   c. Program to find the roots of the quadratic equation
   d. Program to convert the given decimal number to binary
   e. Program to print the prime numbers between 100 to 500
   f. Program to print the electricity bill in a specified format applying specified rules
7. Programs using arrays:
   a. Program to find the biggest number in the array
   b. Menu driven program to insert and delete a specified element from the array
   c. Program to arranged the elements of the array in ascending order
   d. Program to merge given two one dimensional arrays and to remove the duplicates
   e. Program for multiplication of two matrices
8. String manipulations:
   a. Program to find the length of the string, copy one string to another and compare two strings, concatenate two strings without using library functions.
   b. Program to check whether the given string is a palindrome or not without reversing
   c. Program to find the occurrence of a substring in a main string and replace the substring by another string.
   d. Arranging the list of names in alphabetical order
   e. Program to count the number of occurrences of vowels, consonants, words, white spaces and special characters in the given statement.
9. Functions:
   a. Program to swap the contents of two variables using functions (Pass by address and pass by reference)
   b. Program to print the Fibonacci series using recursive function
   c. Program to print the average and standard deviation of the elements of the one- dimensional array using function.
   d. Program to print the transpose of a matrix using functions
   e. Menu driven program to perform string operations using functions
10. Structures and file operations:
    a. Define a structure to store the student details viz., Roll no, name, marks in three subjects, total, avg and class obtained. Read the first three fields and write your logic to calculate the total, average and class obtained for ten students. Print the results in the order of ran obtained.
    b. Structure based program to print the pay slip of an employee.
    c. Program using files to copy the contents of one file to another

REFERENCES / MANUALS/SOFTWARE:

Software requirements

Operating System : Windows / Linux
Compiler : C compiler
Packages: MS office or Equivalent

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Solve specific problems with the application packages in C programming

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		3			2						3	2	2

3 – Substantial, 2 – Moderate, 1 – Slight

11EE202 CIRCUITS LABORATORY

(Common to ECE, EEE and EIE branches)

0 0 3 1

LIST OF EXPERIMENTS /EXERCISES

1. Verification of Ohm's Laws and Kirchhoff's Laws.
2. Verification of Thevenin's and Norton's Theorem.
3. Verification of Superposition Theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Verification of Reciprocity Theorem.
6. Transient response of RL and RC circuits (also using PSPICE).
7. Frequency response of Series and Parallel Resonance Circuits (also using PSPICE).
8. Study of Frequency response of Single and double Tuned coupled Circuits.
9. Measurement of real power, reactive power, power factor and impedance of RC, RL and RLC Circuits.
10. Power measurement in a three phase circuit by two Watt meters.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: analyze and verify various transient circuits.

CO2: Apply various theorems in the analysis of electrical circuits.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3	3		2							2	
CO2	3	3	3		2							2	

3 – Substantial, 2 – Moderate, 1 – Slight

11MA301 ENGINEERING MATHEMATICS – III

(Common to all Engineering and Technology branches)

3 1 0 4

MODULE – I **15**

Fourier Series: Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Change of interval - Parseval's Identity - Harmonic analysis.

MODULE - II **15**

Partial Differential Equations: Formation – By elimination of arbitrary constants and arbitrary functions – Standard types– Lagrange's linear equation- Linear partial differential equations of second order with constant coefficients.

Applications of Partial Differential Equations: Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded).

MODULE - III **15**

Fourier transform: Fourier integral theorem (Statement only) – Fourier transform pair – Properties – Transforms of simple functions – Sine and Cosine transforms – Convolution theorem and Parseval's identity (Statement only).

Z-transform: Elementary properties – Transforms of simple functions - Inverse Z – transform(Partial Fraction Method and Residue method) – Convolution theorem (Statement Only) – Solution of Difference Equations.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics", Volume - III, S. Chand & Co, New Delhi, 2008.
2. Veerarajan, T., "Engineering Mathematics", Tata McGraw-Hill, New Delhi, Reprint 2010.

REFERENCE BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, New Delhi, 2007.
2. Wylie, C. Ray and Barrett, Louis, C., "Advanced Engineering Mathematics", Sixth Edition, McGraw-Hill, New York, 2004.
3. Andrews, L. A. and Shivamoggi, B. K., "Integral Transforms for Engineers and Applied Mathematicians", Macmillan, New York, 2004.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Express periodic functions in terms of trigonometric series

CO2: Formulate and solve multidisciplinary engineering problems using partial differential equations for variety of applications

CO3: Have skills in the areas of boundary value problems and transform techniques

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	G	h	i	j	k	l	m
CO1	3		1		3								
CO2	3		1		3							1	
CO3	3		1		3								

1 – Slight, 2 – Moderate, 3 – Substantial

11IT301 DATA STRUCTURES

(Common to ECE and IT branches)

3 0 0 3

MODULE – I **15**

Advanced C: Pointer – void pointer –null pointer – use of pointers-arrays and pointers – Pointers and strings – Pointer arithmetic – Pointers to pointers – array of pointers – Pointers to an array – 2D arrays and pointers – 3D arrays – Pointers to functions – Dynamic memory allocation – Files – Preprocessors.

Lists, Stacks And Queues: Introduction to Data Structures- Algorithm Analysis – Running time calculations - Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT.

MODULE - II **15**

Trees: Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing – Priority Queues (Heaps) – Model – Simple implementations – Binary Heap.

Sorting: Preliminaries – Insertion Sort – Shell sort – Heap sort – Merges ort – Quick sort – External Sorting.

MODULE - III **15**

Searching: Searching techniques- binary search-indexed sequential search

Graphs: Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Kruskal's Algorithms -Applications of Depth-First Search – Undirected Graphs – Biconnectivity.

TOTAL : 45

TEXT BOOKS

1. Weiss, M. A., "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education Asia, New Delhi, 2002.
2. Dey, Pradep and Ghosh, Manas., "Computer Fundamentals and Programming in C", Oxford University Press, New Delhi, 2006.

REFERENCE BOOKS

1. Langsam, Y., Augenstein, M. J. and Tenenbaum, A. M., "Data Structures using C", Pearson Education Asia, New Delhi, 2004.
2. Gilberg, Richard F and Forouzan, Behrouz A., "Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, Singapore, 1998.
3. Instructional Software Research and Development (ISRD) Group, "Data structures using C", Tata McGraw-Hill, New Delhi, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand memory allocation and the operation behind queues and stacks

CO2: Design and apply appropriate data structures for solving computing problems

CO3: Solve and develop code for real life problems like shortest path, network flow, and minimum spanning using graph theory

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	J	k	l	m
CO1	-	3	-	1	3	-	-	-	-	-	2	-	-
CO2	-	3	-	1	3	-	-	-	-	-	1	-	-
CO3	-	3	-	1	3	-	-	-	-	-	2	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC301 DIGITAL ELECTRONICS

(Common to ECE, CSE and IT branches)

3 1 0 4

MODULE – I **15**

Number Systems: Binary, Octal, Decimal, Hexadecimal Number systems – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD-2421-Gray code-Excess 3 code-ASCII –EBCDIC.

Boolean algebra: Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions– Sum of Products (SOP) –Product of Sums (POS)-Minterm-Maxterm- Canonical forms – Conversion between canonical forms –Minimization: Karnaugh map, Tabulation Method-Don't care conditions. Logic Gates- Implementations of Logic Functions using gates, NAND –NOR implementations. TTL and CMOS Logic and their characteristics –Tristate gates

MODULE - II **15**

Combinational Circuits: Design procedure of Combinational circuits:– Adders-Subtractors – Parallel adder/ Subtractor-Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity generator and checker – code converters. Implementation of combinational logic using decoders and multiplexers.

Synchronous sequential Circuits: Flip flops SR, JK, T, D and Master slave – Characteristic and excitation tables and equations –Level and Edge Triggering –Realization of one flip flop using other flip flops – Analysis and design of sequential circuits with state diagram, State table, State minimization and State assignment-Ripple counters –Design of Synchronous counters, Ring counters and Sequence detector - Registers – shift registers- Universal shift register.

MODULE - III **15**

Asynchronous sequential Circuits: Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table - cycles – Races –Hazards: Static –Dynamic – Essential –Hazards elimination.

Memory Devices: Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell -SDRAM–ROM organization –Field Programmable Gate Arrays (FPGA)- Flash memory-NOR Flash memory cell- NAND Flash memory cell- Programmable Logic Devices –Programmable Logic Array (PLA)-Programmable Array Logic (PAL)

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Morris Mano, M, "Digital Design", Third Edition, Prentice Hall of India, New Delhi, 2003.
2. Roth Charles H., "Fundamentals of Logic Design", Thomson Publication Company, New Delhi, 2003.

REFERENCE BOOKS

1. Yarbrough, John M., "Digital Logic Applications and Design", Thomson Publications, New Delhi, 2007.
2. Leach, Donald P. and Malvino, Albert Paul., "Digital Principles and Applications", Fifth Edition, Tata McGraw-Hill, New Delhi, 2003.
3. Givone, Donald D., "Digital Principles and Design", Tata McGraw-Hill, New Delhi, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand numerical representation in digital logic and the corresponding design of arithmetic circuitry

CO2: Design combinational and sequential digital circuits

CO3: Represent logic functions in multiple forms

CO4: Understand the concept of storing the data in different memory devices and differentiate between them.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	-	3	-	2	-	-	-	-	-	-	2	-
CO2	3	-	3	-	2	-	-	-	-	-	-	2	-
CO3	3	-	3	-	2	-	-	-	-	-	-	1	-
CO4	3	-	3	-	1	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC302 ELECTRONIC DEVICES AND CIRCUITS - I

3 0 0 3

MODULE – I **15**

Semiconductor Physics: Electron Ballistics: Charged particle, Force on Charged particles in an Electric field, Constant field Potential, Field Intensity, Force in Magnetic field, Motion in a magnetic field – Parallel Electric and Magnetic Fields – Perpendicular Electric and Magnetic Fields – CRT – Electrostatic and Magneto Deflections, Semiconductor Theory: Review of Intrinsic and extrinsic semiconductors – Conductivity and mobility– Fermi Level – Charge Densities in Semiconductor - Drift and Diffusion current.

PN Junction Diode :Construction of PN junction diodes – VI characteristics – Quantitative theory of PN diode– Transition and diffusion capacitances – Applications : Clipping and Clamping Circuits, Voltage multipliers- Zener Diode – Characteristics of Zener Diode - Applications.

MODULE- II **15**

BJT: Construction and Principle of operation a Transistor - I/O characteristics of BJT in CE, CB and CC configurations.

Biasing of BJT: Need for biasing - 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 - Bias Compensation Techniques

FET : Construction and characteristics of JFET – FET Configurations – MOSFET: Depletion and Enhancement mode – Characteristics of MOSFET

Biasing of FET : Source self bias and voltage divider bias for FET

MODULE-III **15**

Rectifiers and Power Supplies: Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for Vdc and ripple voltage with C, CL, L-C and C-L-C filters. Zener diode regulator. – Transistor voltage regulators: Series and shunt – Line regulation, output resistance and temperature coefficient.- Protection circuits- Switched mode power supplies - SCR- Power control using SCR

TOTAL : 45

TEXT BOOKS

1. Millman Jacob, Halkias Christos C., and Satyabrata Jit., "Electronic Devices and Circuits", Second Edition, Tata McGraw-Hill, New Delhi, 2008.

REFERENCE BOOKS

1. Floyd, "Electronic Devices", Sixth Edition, Pearson Education, New Delhi, 2003.
2. Bell, David A., "Electronic Devices and Circuits", Fourth Edition, Prentice Hall of India, New Delhi, 2003.
3. Boylestad, Robert L. and Nashlesky Louis., "Electronic Devices and Circuit Theory" Eighth Edition, Prentice Hall of India, New Delhi, 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the movement of electrons in electric and magnetic fields

CO2: Have the knowledge on electron device characteristics and its applications

CO3: Design suitable biasing for electronic circuits

CO4: Realize appropriate power supply circuit for electronic systems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1	2	-	-	3	-	-	-	-	-	-	3	-
CO2	-	2	1	-	3	-	-	-	-	-	-	3	-
CO3	-	2	1	-	2	-	-	-	-	-	-	2	-
CO4	-	2	2	-	-	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC303 ELECTROMAGNETIC FIELDS

3 1 0 4

MODULE -I **15**

Static Electric Fields: Introduction to Co-ordinate System – Rectangular – Cylindrical and Spherical Co-ordinate System – Introduction to line, Surface and Volume Integrals.Coulomb's Law in Vector Form – Definition of Electric Field Intensity – Principle of Superposition – Electric Field due to discrete charges – Electric field due to continuous charge distribution - Electric Field due to charges distributed uniformly on an infinite and finite line – Electric Field on the axis of a uniformly charged circular disc – Electric Field due to an infinite uniformly charged sheet.Electric Flux Density – Gauss Law – Proof of Gauss Law – Applications - Divergence and Gradient- Divergence theorem. Electric Scalar Potential – Relationship between potential and electric field - Potential due to infinite uniformly charged line – Potential due to electrical dipole.Electric current – Current density – point form of ohm's law – continuity equation for current. Boundary conditions for electric fields.Electric Polarization- Nature of dielectric materials- Definition of Capacitance-Several Capacitance examples.Poisson's and Laplace's equation- Capacitance of various geometries using Laplace's equation.

MODULE -II **15**

Static Magnetic Field: The Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications. Curl- Stokes' theorem. Magnetic flux density-– Magnetic Vector Potential.The Lorentz force equation for a moving charge and applications – Force on a wire carrying a current I placed in a magnetic field – Torque on a loop carrying a current I – Magnetic moment.Nature of magnetic materials – magnetization and permeability - magnetic boundary conditions. Definition of Inductance – Inductance of loops and solenoids – Definition of mutual inductance – simple examples.

MODULE -III **15**

Time Varying Fields and Electromagnetic Waves: Faraday's law –Displacement current –Maxwell's four equations in integral form and differential form.Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.Derivation of Wave Equation – Uniform Plane Waves – Maxwell's equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material - Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect. Linear, Elliptical and circular polarization – Reflection of Plane Wave from a conductor – normal incidence – Reflection of Plane Waves by a perfect dielectric – normal and oblique incidence - Dependence on Polarization - Brewster angle.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Hayt William H., "Engineering Electromagnetics", Tata McGraw-Hill, New Delhi, 2003.

REFERENCE BOOKS

1. Ramo Whinnery and Van Duzer, "Fields and Waves in Communications Electronics", Third Edition, John Wiley & Sons, New York, 2003
2. Narayana Rao N., "Elements of Engineering Electro-Magnetics", Fourth Edition, Prentice Hall of India, New Delhi, 1998.
3. Matthew N.O.Sadiku, "Elements of Electromagnetics", Third Edition, Oxford University, New York, 2005
4. Jordan E.C and Balmain K.G., "Electromagnetic Waves and Radiating Systems", Second Edition, Prentice Hall of India, New Delhi, 2003

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze fields of potential due to static charges

CO2: Evaluate magnetic field due to static charges

CO3: Analyze the relation between the fields under time varying situations

CO4: Realize principles of propagation of uniform plane waves

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	-	-	-	2	-	-	-	-	-	-	2	-
CO2	3	-	-	-	2	-	-	-	-	-	-	2	-
CO3	3	-	-	-	2	-	-	-	-	-	-	1	-
CO4	3	-	-	-	2	-	-	-	-	-	-	1	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EE301 ELECTRICAL MACHINES

(Common to Mechatronics, ECE, EIE and Chemical branches)

3 1 0 4

MODULE - I **15**

DC Machines: DC Generator: Constructional details – EMF equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Principle of operation of DC motor – Back emf and torque equation – Characteristics of series, shunt and compound motors - Starting of DC motors – Types of starters – Speed control of DC shunt motors- Applications.

MODULE –II **15**

Transformers: Construction – Principle of operation – EMF equation –– Equivalent circuit – Transformer on load – Regulation Transformer Testing: Load test, open circuit and short circuit tests- Auto transformers.

Alternator: Construction of Synchronous Generators – Principles-EMF equation- Voltage regulation- EMF and MMF methods.

MODULE -III **15**

Induction Motors: Construction – Types – Principle of operation of three-phase induction motors –Starting and speed control – Single-phase induction motors - Applications.

Synchronous Motor: Construction-Principle- Methods of starting of synchronous motors

Electric Drives: Basic Elements of electric drive – Types of Electric Drives – factors influencing the choice of electrical drives –Classes of duty – Selection of motors for various industrial applications: Textile mills, Steel rolling mills, Cement mills, Machine tools.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Theraja, B.L and Theraja, A.K., "A Text Book of Electrical Technology", Volume-II, S. Chand & Co, New Delhi, 2008.
2. Vedam Subramaniyam, "Electric Drives: Concepts and Applications", Tata McGraw-Hill, New Delhi, 2004.

REFERENCE BOOKS

1. Rajput, R. K., "Electrical Machines", Third Edition, Laxmi Publications (P) Ltd, New Delhi, 2002.
2. Kothari, D. P and Nagrath, I. J, "Basic Electrical Engineering", Second Edition, Tata McGraw-Hill, New Delhi, 2002.
3. Bhattacharya, S.K., "Electrical Machines", Second Edition, Tata McGraw-Hill, New Delhi, 1998.
4. Mittle, V.N. and Mittle, Aravinth., "Basic Electrical Engineering", Second Edition, Tata McGraw-Hill, New Delhi, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Have knowledge on the construction and working principles of DC Motors and generators

CO2: Acquire knowledge on constructional details of different types of transformers, working principle and their performance

CO3: Gain knowledge on constructional details of induction motor and methods of speed control

CO4: Have knowledge on electric drives their types and method of speed control

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	2	2	-	2	-	-	-	-	-	-	-	-
CO2	3	2	1	-	2	-	-	-	-	-	-	-	-
CO3	3	2	1	-	2	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC305 ELECTRON DEVICES AND CIRCUITS –I LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Characteristics of PN Junction Diode
2. Characteristics of Zener Diode
3. Characteristics of BJT (common emitter configuration) and h parameters
4. Characteristics of BJT (common collector configuration) and h parameters
5. Characteristics of Half Wave and Full Wave rectifiers.
6. Characteristics of SCR
7. Series and Shunt voltage regulators using Transistors.
8. Study of different types of biasing of BJT.
   (1) Fixed Bias
   (2) Collector to base Bias
   (3) Voltage divider Bias
9. Biasing of FET – Self Bias, Voltage Divider Bias
10. Simulation of experiments of (5-7) using PSPICE

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the characteristics of electron devices and their applications

CO2: Design, construct and test various biasing circuits for electronic systems

CO3: Use the electronic systems design tools to design, analyze and test the performance of electronic circuits

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	3	3	-	-	3	-	-	-	-	-	2	-
CO2	-	3	3	-	-	3	-	-	-	-	-	2	-
CO3	-	3	3	-	-	3	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EL202 COMMUNICATION SKILLS LABORATORY

(Common to all Engineering and Technology branches)

0 0 3 1

LIST OF EXPERIMENTS

English Lab

1. Listening Comprehension
   Listening to instructional software packages in the communication laboratory, using them, understanding the mechanics of language like grammar, listening to native speakers' presentation, and developing oral communication by imitating the model dialogues. Listening for specific information – listening to improve pronunciation – Listening and typing – Filling the blanks – TV programmes and News.
2. Reading comprehension and vocabulary:
   Reading for getting information and understanding; scanning, skimming and identifying topic sentences – reading for gaining knowledge, looking for transitions, understanding the attitude of the writer – Filling the blanks – Cloze exercises – vocabulary building – Comprehension.
3. Speaking:
   Group discussion; verbal and non-verbal communication; speaking on situational topics – maintaining eye contact, speaking audibly, clearly and with confidence – Common errors in English
   Conversations – face-to-Face conversation – Telephone Conversation – Roll play.
4. Writing Skills:
   Writing job application: resume, applications for jobs, making complaint letters – Projects: report writing – editing and proof reading – research paper and translating numerical data from charts and diagrams into verbal communication.

Career Lab

1. Letter Writing / Resume / Report preparation:
   Structuring Letter Writing / Resume / Report preparation / E-Mail
2. Presentation skills
   Elements and structure effective presentation – presentation tools – voice Modulation – Body language – Video samples
3. Group Discussion
   Structure of Group Discussion – Strategies in GD – Team work – Video Samples
4. Interview skills
   Kinds of Interview- corporate culture – video samples
5. Soft Skills
   Time management – stress management – assertiveness – case study

Communication Software Package:

a. Presentation Skills
b. Interview Skills
c. Group Discussion
   - From Globarena Software

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Write, read and listen English effectively
CO2: Communicate efficiently in English in real life and carreer related situations
CO3: Demonstrate good presentation skill
CO4: Use the modern communication software package to enhance the soft skills

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1				1			3		3				1
CO2				2			3		2				1
CO3				2			3		3				1
CO4				1			3		3				1

1 – Slight, 2 – Moderate, 3 – Substantial

11CS305 DATA STRUCTURES AND ALGORITHMS LABORATORY

(Common to ECE, EIE and CSE branches**)**

0 0 3 1

LIST OF EXPERIMENTS /EXERCISES

1.Linked list implementation of Stack ADT
2.Infix to Postfix Conversion Using Stack
3.Implement the application for 'Evaluating Postfix Expressions' using array of Stack ADT
4.Queue ADT
5.Implementation of Singly Linked List and Doubly Linked List
6.Implementation of Binary Search Tree
7.Array based Implementation of Circular Queue
8.Quick Sort
9.Heap Sort
10.Implementation of Dijkstra's Algorithm to find Shortest Path

REFERENCES / MANUALS /SOFTWARE :

1. Windows-Operating System
2. C -Compiler

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Design simple algorithms for solving computing problems

CO2: Design and implement different sorting and searching algorithms

CO3: Apply their knowledge of data structures to write more efficient programs in C

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	3	-	1	3	-	-	-	-	-	2	-	-
CO2	-	3	-	1	3	-	-	-	-	-	2	-	-
CO3	-	3	-	1	3	-	-	-	-	-	2	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11MA403 PROBABILITY THEORY AND RANDOM PROCESS

3 1 0 4

MODULE - I **15**

Discrete Distributions: Mathematical Expectation - Mean, Variance and Moment Generating Function – Binomial, Poisson, Geometric distributions – Recurrence Relations.

Continuous Distributions: Mean, Variance, Moment Generating Function – Uniform, Exponential, Gamma and Normal distributions and their properties.

MODULE - II **15**

Two Dimensional Random Variables: Joint probability distributions - Marginal and conditional distributions – Covariance - Correlation and regression.

Random processes: Classification - Stationary process- Poisson process - Markov chains - Transition probabilities - Limiting distributions.

MODULE- III **15**

Spectral Densities: Auto Correlation- Cross Correlation – Properties – Power spectral density – Cross spectral density – Properties – Wiener- Khintchine relation – Relationship between cross power spectrum and cross correlation function.

Testing of Hypothesis: Likelihood Ratio Test - Baye's Test - Probability of error - Minimax test, Neyman-Pearson test.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Veerarajan, T, "Probability, Statistics and Random Process", Second Edition, Tata McGraw-Hill, New Delhi, 2012.
2. Sp Eugine Xavier, Statistical Theory of Communication, New Age Publishers, 2007.

REFERENCE BOOKS

1. Peebles, P.Z, "Probability Random Variables and Random Signal Principles", Fourth Edition, Tata McGraw-Hill, New Delhi, 2002.
2. Prof. B.R. Levin, "Statistical communication theory and its applications", MIR Publishers, Moscow. (1982)
3. Gupta S C and Kapoor V K, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 2005.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand various distributions and properties of Two Dimensional Variables

CO2: Appreciate the concepts of Random processes and Markov chains

CO3: Understand the basic concept and properties of spectral density function and cross correlation function

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3			3							2	
CO2	3	3			3							2	
CO3	3	3			3							2	

1 – Slight, 2 – Moderate, 3 – Substantial

11EC401 ELECTRON DEVICES AND CIRCUITS – II

3 1 0 4

MODULE- I **15**

Midband Analysis of BJT: CE, CB and CC amplifiers. Midband analysis of various types of single stage amplifiers using small-signal equivalent circuit- Miller's theorem- Methods of increasing input impedance using Darlington connection and bootstrapping. Multistage amplifiers. Basic emitter coupled differential amplifier circuit. Bisection theorem. Differential gain. CMRR. Use of constant current circuit to improve CMRR. Derivation of transfer characteristic, Trans-conductance.
Midband analysis of FET: CS, CG and CD (FET) amplifiers.

MODULE - II **15**

Frequency response of amplifiers: 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.

MODULE- III **15**

Large Signal Amplifiers: Classification of amplifiers (Class A, B, AB, and 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

Special Diodes : UJT -Tunnel Diode –Pin diode – IGBT - TRIAC-DIAC-Photodiodes-LED, LCD -photo transistors - photo voltaic cell -Photo conductive cell

Lecture: 45, Tutorial:15, TOTAL : 60

TEXT BOOK

1. Allen Mottershead, "Electronic Devices and Circuits- An Introduction", PHI, New Delhi, 1990

REFERENCE BOOKS

1. Boylestad Robert L. and Nashelsky Louis, "Electronic Devices and Circuit Theory", Eighth Edition, Prentice Hall of India, New Delhi, 2002.
2. Jacob Millman, Christos C. Halkias, Satyabrata Jit., "Electronic Devices and Circuits", Second Edition, Tata McGraw-Hill, New Delhi, 2008.
3. Millman, Jacob and Halkias, Christos C., "Integrated Electronics", McGraw-Hill, New York.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Able to understand the various parameters related to frequency response of amplifier

CO2: Able to analyze the performance of amplifiers for mid band frequency

CO3: Identify, formulate, and design the application of special diodes

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	J	k	l	m
CO1		3	2		3							2	
CO2		3	2		3							2	
CO3		3	2		3							2	

1 – Slight, 2 – Moderate, 3 – Substantial

11EC402 SIGNALS AND SYSTEMS

3 1 0 4

MODULE – I **15**

Classification of Signals and Systems: Continuous time signals (CT signals)- discrete time signals (DT signals) - step-Ramp- Pulse-Impulse- Exponential- Classification of CT and DT signals - periodic and aperiodic- Energy and power-even and odd-Deterministic and Random signal- Transformation on Independent variables –CT systems and DT systems-Properties of Systems – Linearity-Causality-Time Invariance-stability-Invertibility and LTI Systems.

MODULE– II **15**

Analysis of CT Signals and Systems: Analysis of LTI CT-Systems- Convolution integral- calculation of Continuous Time Fourier Series and its properties – Continuous Time Fourier Transform and its properties
Laplace transform- properties – Inverse Laplace transform – solution of differential equations using Laplace transform-Response of LTI CT systems – step response – impulse response.

MODULE–III **15**

Analysis of DT Signals and Systems: Sampling methods- representing a CT signal by samples - aliasing- Convolution sum- calculation of Discrete Time Fourier Series and its properties – Discrete Time Fourier Transform and its properties
Z- Transform -Inverse Z Transform - Properties of Z-transform in signal analysis-Solution of difference equations using Z-Transform - Response of LTI DT systems – step response – impulse response- Realization- Direct form I-Direct form II-Cascade-Parallel-transpose structure.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOK

1. Nagoorkani, A.,. 'Signals and Systems', Tata McGraw-Hill, New Delhi, 2010.

REFERENCE BOOKS

1. Ramakrishna Rao, P. 'Signals and Systems' Tata McGraw-Hill, New Delhi, 2008.
2. Oppenheim. Alanv., Willsky. Alan S and Hamid. Nawab S, "Signals and Systems", Second Edition, Pearson Education, New Delhi, 2007.
3. Haykin. Simon and Barry Van Veen, "Signals and Systems", John Wiley & Sons, New York, 1999.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: understand, represent, and analyze the continuous and discrete time signals and systems using mathematical models

CO2: analyze various parameters of signals in the time and frequency domain

CO3: identify, formulate, and realize Linear Time Invariant Discrete Time Systems

CO4: identify and solve the contemporary issues in signal processing applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	1	3	-	1	-	-	-	-	-	-	2	-
CO2	3	1	3	-	2	-	-	-	-	-	-	1	-
CO3	3	1	3	-	3	-	-	-	-	-	-	2	-
CO4	3	1	3	-	1	-	-	-	-	3	-	1	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC403 MICROPROCESSOR AND MICROCONTROLLER

3 0 0 3

MODULE - I **15**

16 Bit Microprocessor Architecture: Register organization of 8086 – Architecture - Physical Memory organization - I/O addressing capability - Addressing modes of 8086 - Instruction set of 8086: Data transfer instructions- String instructions- Logical Instructions- Arithmetic Instructions -Transfer of control instructions -Processor control Instructions. Spécial Processor activités: Maximum mode CPU Module - Minimum mode CPU module. Assembly language programming-Programming with an assembler - Assembly language example programs. Introduction to stack - Interrupt and Interrupt service routines-interrupts cycles-interrupt programming-memory interfacing-Assembler Directives and operators- Time Delays using counter

MODULE - II **15**

89C51 Microcontroller: Introduction to RISC and CISC Machines -89c51 Micro controller hardware- Memory Bank- Memory mapping-Register organization-I/O pins, ports and circuits- External memory interfacing –Counters and Timers-modes of operation-Serial Data communication I/O- Interrupts-Interfacing to external memory-Instruction sets-Addressing modes

MODULE - III **15**

89C51 Programming and Applications: Assembly language programming and Programming with C – Simple programming -I/O port programming -Timer and counter programming – Serial data Communication using max232 converter – Interrupt programming –89c51 Interfacing with Peripherals : LED-Seven segment display – Switch interfacing- LCD, Parallel and Serial -Analog to Digital Converter- Sensors - Stepper Motors - Speed control of DC motors- Matrix Keyboard and Digital to Analog Converter – Voice operated home appliances for the physically challenged.

TOTAL : 45

TEXT BOOKS

1. Ray K., and Bhurchandi K. M., "Advanced Microprocessors and Peripherals: Architecture, Programming and Interface", Tata McGraw Hill, New Delhi, 2000.
2. Mazidi Mohammed Ali and Mazidi Janice Gillispie, "The 8051 Microcontroller and Embedded Systems", Pearson Education Asia, New Delhi, 2007.

REFERENCE BOOKS

1. Hall Douglas V, "Microprocessors and Interfacing Programming and Hardware", Tata McGraw Hill, 1995.
2. Tabak Daniel, "Advanced Microprocessors", McGraw Hill, New Delhi, 1995.
3. Ayala Kenneth J, "The 8051 Microcontroller Architecture Programming and Application", Second Edition, Penram International Publishers (India), New Delhi, 1996.
4. Patterson David A., and Hennessey John. L., "Computer Organization and Design: the hardware/software Interface", Third Edition, Elsevier-Morgan Kaufmann Publishers, 2005.
5. Hamacher Carl, Vranesic Zvonko, and Zaky Safwat, "Computer Organization", Fifth edition, McGraw-Hill, New York, 2002.
6. Uffenbeck John, "The 8086 Family, Design, Programming and Interfacing", Third Edition. Pearson Education, New Delhi, 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: learn the basic architecture of microprocessor and microcontroller

CO2: interface various peripheral devices using microcontroller

CO3: formulate algorithm and write programs for microprocessor and microcontroller based systems

CO4: identify, formulate, and solve problems in the multidisciplinary application using microcontroller based products

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	3	-	-	-	-	-	-	-	-	3	2
CO2	-	2	3	-	1	-	-	-	-	-	-	1	1
CO3	-	1	3	-	2	-	-	-	-	-	-	2	2
CO4	-	-	-	-	-	-	-	-	-	-	-	2	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EC404 TRANSMISSION LINES AND WAVEGUIDES

3 1 0 4

MODULE– I **15**

Transmission Line Parameters and Line at Radio Frequencies: Transmission line Parameters – Characteristic impedance –as a cascade of T-Sections – Definition of Propagation Constant–General Solution of the transmission line – The two standard forms for voltage and current of a line terminated by an impedance – physical significance of the equation and the infinite line. The two standard forms for the input impedance of a transmission line terminated by an impedance. Transfer impedance–Reflection coefficient – wavelength and velocity of propagation-Waveform distortion – distortion less transmission line –Input impedance of lossless lines – reflection factor and reflection loss – reflection on a line not terminated by Zo –T and ∏ Section equivalent to lines. Parameter of the open wire at high frequencies-coaxial line-Voltage and Current on dissipation less 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-Applications.

MODULE– II **15**

Impedance Measurement and Guided Waves: The circle diagram for the dissipation less 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 and double stub matching. Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics of TE and TM Waves – waves Transverse Electromagnetic waves – Velocities of propagation –Attenuation of TE and TM waves in parallel plane guides – Wave impedances in parallel plane guides.

MODULE–III **15**

Rectangular and Circular Wave Guides and Resonators: 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 and TM modes in rectangular waveguides – Wave impedances – characteristic impedance – Excitation of modes. 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 cavities- Rectangular cavity resonators- circular cavity resonator- semicircular cavity resonator- Q factor of a cavity resonator for TE101 mode.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Ryder J.D, "Networks Lines and Fields", Prentice Hall of India, New Delhi, 2003.
2. Umesh Sinha., "Transmission Lines and Networks", Fourth Edition, Satya Prakasan Publications, New Delhi, 2007.

REFERENCE BOOK

1. Jordan E.C and Balmain K.G., "Electromagnetic Waves and Radiating System", Prentice Hall of India, New Delhi, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand/identify engineering problems related to transmission line parameters

CO2: Appreciate and comprehend the characteristics of TE and TM wave

CO3: Analyze the performance parameters of various waveguides

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	2	3	-	2	-	-	-	-	-	-	1	-
CO2	2	-	3	-	-	-	-	-	-	-	-	1	-
CO3	2	-	3	-	2	-	-	-	-	-	-	1	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EI402 MEASUREMENTS AND INSTRUMENTATION

(Common to ECE and EEE branches)

3 0 0 3

MODULE – I **15**

Measurement Concepts and Measuring Instruments: Measurement systems- Static and dynamic characteristics – Units and standards of measurements – error analysis – moving coil – Torque equations - Moving iron instruments – DC Ammeters-DC Voltmeters-Wattmeters-Energy meters- Megger — Bridge measurements – Maxwell- Kelvin- Schering-Anderson and Wien bridge-Grounding and Shielding Techniques.

MODULE –II **15**

Signal Generators and Transducers: RF signal generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer- frequency counters-time interval measurement Classification of transducers-selecting a transducer -strain gauges-temperature transducer-LVDT - capacitive transducers-Piezo electric transducers – optoelectronic transducers –LCD Display- Touch screen–MEMS Materials and their properties –Introduction to Microsystem Fabrication process: Photolithography- Ion implantation – Diffusion – Oxidation - Chemical Vapor Deposition-Physical Vapor Deposition-Deposition by epitaxy – Etching -Micromanufacturing- Bulk micromanufacturing, Surface Micromachining -LIGA and SLIGA process.

MODULE–III **15**

Modern Measurement Techniques and Virtual Instrumentation: A/D and D/A converters-Elements of a digital data acquisition system – interfacing of transducers – multiplexing -computer controlled instrumentation – virtual instrument - Virtual Instruments and traditional instruments- Hardware and Software in Virtual Instrumentation - Virtual Instrumentation for test, Control and Design Graphical programming and Textual programming–LabVIEW – Advantages Software environment , Creating and saving a VI - Front panel Toolbar Block diagram toolbar - palettes - Front panel - controls and indicators- Block diagram - data types - data flow programming

TOTAL : 45

TEXT BOOKS

1. Helfrick, Albert D, and Cooper, William D., "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, New Delhi, 2003.
2. Shawney A.K., "A course in Electrical and Electronics Measurement and Instrumentation", Eighteenth Edition, Dhanpat Rai & Sons, New Delhi.

REFERENCE BOOKS

1. Tai-Ran Hsu, "MEMS & Microsystems: Design and Manufacture", 2nd Edition, March 2002, Tata Mc Graw Hill Pvt Ltd., New Delhi, India.
2. Anand M.M.S., "Electronic Measurement and Instrumentation Technology", Prentice Hall of India, New Delhi, 2007.
3 Jovitha Jerome,"Virtual Instrumentation using LabVIEW "PHI Learning Private Limited, New Delhi, 2010

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Appreciate concepts of measuring instruments and its modern techniques

CO2: Understand the properties and application of different types of transducers

CO3: Use the Lab view software tool to analyze & interpret data

CO4: Identify, formulate, and design data acquisition systems in multidisciplinary environment

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	-	-	-	3	-	-	-	-	1	2	-	-
CO2	3	-	2	1	3	-	-	-	-	1	-	2	-
CO3	1	-	2	1	1	-	-	-	-	-	2	-	-
CO4	-	-	2	3	3	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC405 ELECTRON DEVICES AND CIRCUITS –II LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Characteristics of JFET and MOSFET
2. Characteristics of IGBT
3. Characteristics of UJT
4. Amplifying circuits Simple Common emitter amplifier configuration-Gain & Band Width.
5. Common Source amplifier.
   Function of each component, gain measurement & Frequency Response.
6. Two stages RC coupled Amplifier.
7. Frequency response of Darlington Pair.
8. Class – A Power amplifier.
9. Class - B Complementary Class-B Power amplifier.
10. Simulation of experiments (1, 2, 3, 4, 5, 6) any five using SPICE.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand and analyze the characteristics of electron devices like JFET, MOSFET, IGBT and UJT

CO2: Comprehend the frequency response of BJT and FET amplifiers

CO3: Design and analyze BJT amplifiers with different configurations under various biasing techniques

CO4: Use electronic design tools to design, construct, and analyze the performance of electronic circuits

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	M
CO1		2			3							3	2
CO2		2										3	
CO3		2			3							3	2
CO4		2			3						1	3	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EC406 MICROPROCESSOR ,MICROCONTROLLER AND APPLICATIONS LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Programs for 8/16 bit Arithmetic operations (Using 8086).
2. Programs for Sorting and Searching and String manipulation (Using 8086).
3. Programming with control instructions using 8086 Microprocessor
   - Hex./ASCII/BCD code converters
   - Matrix multiplication
4. Simple programs using 89c51 microcontroller
   - Addition / Subtraction / Multiplication / Division
5. Interfacing of Switch and LED using 89c51 Microcontroller
6. Device ON / OFF using 89c51 microcontroller (Relay and LED).
7. Interfacing of LCD/Real Time Clock using 89c51 microcontroller.
8. UART Programming using 89c51 microcontroller
9. ADC Programming using 89c51 microcontroller.
10. Interfacing with motors using 89c51 microcontroller
    - Stepper Motor
    - DC Motor

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Write , implement and debug assembly language programs for microprocessor and microcontroller

CO2: Interface various peripherals with 8051 microcontroller

CO3: Design and develop microcontroller based products

CO4: Identify, formulate, and solve the engineering problems

CO5: Aptitude to take up applied research and to become entrepreneur

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	M
CO1	-	3	-	-	2	-	-	-	-	-	3	2	-
CO2	-	3	-	-	2	-	-	-	-	-	-	2	2
CO3	-	3	-	-	2	-	-	-	-	-	3	2	2
CO4	-	3	-	-	2	-	-	-	-	-	3	2	-
CO5	-	-	-	-	2	-	-	-	-	2	3	2	3

1 – Slight, 2 – Moderate, 3 – Substantial

11EC304 DIGITAL ELECTRONICS LABORATORY

(Common to ECE, CSE and IT branches)

0 0 3 1

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates.
2. Design and implementation of combinational circuits using basic gates and universal gates for arbitrary functions.
3. Design and implementation of code converters.
4. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices.
5. Design and implementation of parity generator / checker using basic gates and MSI devices.
6. Design and implementation of magnitude comparator.
7. Design and implementation of multiplexers and Demultiplexers.
8. Design and implementation of Decoders and Encoders.
9. Verification of operation of flip-flops.
10. Design and implementation of Shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's.
11. Design and implementation of Synchronous counters.
12. Design and implementation of Asynchronous counters.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the basic Boolean Theorems and Logic gates

CO2: Design, Construct and test the digital circuits

CO3: Understands, design and implement the synchronous and asynchronous circuits

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	M
CO1	-	3	-	-	-	-	-	-	-	-	-	2	-
CO2	-	3	2	-	1	-	-	-	-	-	-	1	1
CO3	-	3	2	1	-	-	-	-	-	-	-	1	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC501 ELECTRON DEVICES AND CIRCUITS -III

3 0 0 3

MODULE – I **15**

Feedback Amplifiers and RC Oscillators: Feed back amplifiers - Block diagram - Loop gain - Gain with feedback - Desensitivity of gain - Distortion and cut off frequencies with feedback - The four basic feedback topologies and the type of gain stabilized by each type of feedback - Input and Output resistances with feedback - Method of identifying feedback topology - feedback factor - basic amplifier configuration with loading effect of feedback network - Analysis of feedback amplifiers - Nyquist criterion for stability of feedback amplifiers - Barkhausen Criterion - Mechanism for start of oscillation - stabilization of amplitude - Analysis of Oscillator using Cascade connection of one RC and one CR filters - RC phase shift Oscillator - Wienbridge Oscillator – twin T Oscillators.

MODULE – II **15**

Tuned Amplifiers and LC Oscillators: Analysis of LC Oscillators - Colpitts-Hartley-Clapp-Miller and Pierce oscillators-Frequency range of RC and LC Oscillators-Quartz Crystal Construction-Electrical equivalent circuit of Crystal. Crystal Oscillator circuit- Coil losses- unloaded and loaded Q of tank circuits-Analysis of single tuned and double tuned amplifiers-Instability of tuned amplifiers- Stabilization techniques-Narrow band neutralization using coil- Broad banding using Hazeltine neutralization- Class C tuned amplifiers and their applications- Efficiency of Class C tuned Amplifier.

MODULE – III **15**

Multi-Vibrators, Blocking Oscillators and Time Base Generators: RL & RC Integrator and Differentiator circuits-Collector coupled and Emitter coupled Astable multivibrator- Monostable multivibrator-Bistable multivibrators-Triggering methods- Storage delay and calculation of switching times- Speed up capacitors- Schmitt trigger circuit- Monostable and Astable Blocking Oscillators using Emitter and base timing- Frequency control using core saturation- Pushpull operation of Astable blocking oscillator- Pulse transformers.- UJT sawtooth generators- Linearization using constant current circuit-Bootstrap and Miller saw-tooth generators- Current time base generators.

TOTAL : 45

TEXT BOOKS

1. Millman, Jacob and Halkias, C, “Integrated Electronics”, Tata McGraw-Hill, New Delhi, 2001.
2. Millman, J and Taub, H., "Pulse Digital And Switching Waveform", Second Edition, McGraw-Hill, New York, 2007.

REFERENCE BOOKS

1. Schilling and Belove, "Electronic Circuits", Third Edition, Tata McGraw-Hill, New Delhi, 2002.
2. Sedra and Smith, “Micro Electronic Circuits”, Oxford University Press, Oxford, 2004.
3. Bell, David A., “Solid State Pulse Circuits”, Prentice Hall of India, New Delhi, 1992.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the performance metrics of amplifiers using feedback concepts

CO2: Design RC and LC oscillators for various frequencies

CO3: Have knowledge on application of non sinusoidal oscillators like square, saw tooth and rectangular waves

CO4: Design electronic circuits for developing products

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	3	2	-	3	-	-	-	-	-	-	2	-
CO2	-	3	-	-	3	-	-	-	-	-	-	-	-
CO3	-	3	-	-	3	-	-	-	-	-	-	1	-
CO4	-	3	-	-	3	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC502 DIGITAL SIGNAL PROCESSING

(Common to ECE and IT branches)

3 1 0 4

MODLUE - I **15**

FIR & IIR FILTER DESIGN

FIR Filter Design: Amplitude and phase responses of FIR filters – Linear phase filters – symmetrical linear phase filter, asymmetrical linear phase filter - windowing techniques for the design of Linear phase FIR filters – Rectangular, Hamming, Hanning, Blackman and Kaiser windows – Design using frequency sampling technique - Realization of FIR filters – Transversal, Linear phase and Polyphase realization structures. **IIR Filter Design:** Review of design of analogue Butterworth and Chebychev Filters, Frequency transformation in analog domain – Design of IIR digital filters using impulse invariance technique – Design of IIR digital filters using bilinear transformation – pre warping – Frequency transformation in digital domain

MODLUE - II **15**

Effects of Finite Word Length and FFT: Quantization noise – derivation for quantization noise power – Binary fixed point and floating point number representations – Comparison – truncation and rounding error – input quantization error-coefficient quantization error – limit cycle oscillations- Overflow error-signal scaling - Review of DFT – Efficient computation of DFT- Properties of DFT – FFT algorithms – Radix-2 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms –Use of FFT algorithms in Linear Filtering and correlation

MODLUE - III **15**

DSP Processor and Its Implementation: Introduction to programmable DSPs – need for DSP processor – features of DSP processor – MAC – modified bus architectures – memory access scheme – multiple access memory – multiported memory – VLIW architecture – pipelining – special addressing modes – on chip peripherals. TMS320C54X – Architecture of C54X – C54X buses – memory organization- CPU – ALU – Barrel shifter – multiplier / adder unit – DAGEN – PAGEN – instruction set – application programs – implementation.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Oppenheim, Alan V. and Schafer, Ronald., "Digital Signal Processing", Prentice Hall of India Pvt. Ltd., New Delhi, 2008.
2 Venkataramani. B and Bhaskar M., "Digital Signal Processor Architecture, Programming and Application", Tata McGraw-Hill, New Delhi, 2002.

REFERENCE BOOKS

1. Proakis John G and Manolakis Dimtris G., "Digital Signal Processing: Principles, Algorithms and Application", Fourth Edition, Prentice Hall of India, New Delhi, 2007.
2. Mitra S.K., "Digital Signal Processing: A Computer Based Approach", Tata McGraw-Hill, New Delhi, 1998.
3. Avtar Singh and Srinivasan S, "DSP Implementation using DSP Microprocessor with Examples from TMS32C54XX", Thomson / Brooks cole Publishers, Singapore, 2003.
4. Poornachandra S, and Sasikala B, "Digital Signal Processing", Second Edition, Tata McGraw-Hill, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Convert time domain signals to frequency domain signals
CO2: Design various filters
CO3: Implement the concept of digital signal processing using DSP processor
CO4: Implement the concepts of Digital Signal Processing to multi disciplinary areas
CO5: Identify and solve the requirements of real world signal processing using engineering tools

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	2	3	-	3	-	-	-	-	-	-	2	-
CO2	2	2	3	-	2	-	-	-	-	-	-	2	-
CO3	2	2	3	-	2	-	-	-	-	-	-	-	-
CO4	2	2	3	-	3	-	-	-	-	-	-	2	-
CO5	2	2	3	-	3	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC503 LINEAR INTEGRATED CIRCUITS

3 1 0 4

MODULE – I **15**

Characteristics of Operational Amplifier and its Applications: Differential amplifier - Current sources –Widlar – Wilson current source- current repeaters Characteristics of Op-Amp –AC characteristics – DC characteristics–Frequency response of Op-Amp –frequency compensation and its types - Slew Rate- Inverting and Non inverting Amplifiers - Differentiator - Integrator- Voltage to Current converter- Instrumentation amplifier- Oscillator:RC phase shift Oscillator – Wien bridge Oscillator- Low-pass and band-pass filters- Comparators - zero crossing detector – window detector- Multivibrators and Schmitt trigger- Triangular wave generator- Log and Antilog Amplifiers.

MODULE - II **15**

ADC, DAC and Special Function ICS: D/A converter-weighted resistor – R-2R ladder – inverted R-2R – switches for DAC - A/D converter-Flash- Single slope- Dual slope-Successive approximation- 555 timer – Functional characteristics - Astable and Monostable Multivibrators using 555 Timer-Voltage regulators- series Op-Amp regulator - linear and switched mode types- Switched capacitor filter- Frequency to Voltage converters- Video amplifiers.

MODULE - III **15**

Analog Multiplier and PLL: Variable transconductance multipliers - Gilbert cell as analog multiplier- Analysis of four quadrant analog multiplier – Phase Locked Loop – block diagram- Derivation of capture and lock range – Phase detector: Analog phase detector and Digital phase detector - Voltage controlled Oscillator- Applications: AM - FM and FSK demodulators -Frequency synthesizers- Frequency multiplier/dividers.

Lecture: 45, Tutorial: 15, TOTAL : 60

TEXT BOOKS

1. Roy Choudhry, D and Shail Jain, “Linear Integrated Circuits”, New Age International, New Delhi, 2007.
2. Gray, Paul R and Meyer, Robert G., “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, New York, Fifth Edition, 2009.

REFERENCE BOOKS

1. Gayakwad, Ramakant A., “OP-AMP and Linear IC’s”, Pearson Education, New Delhi, 2004.
2. Sergio Franco., “Design With Operational Amplifiers and Analog Integrated Circuits”, McGraw-Hill, New York, 2002.
3. Taub and Schilling, “Digital Integrated Electronics”, McGraw-Hill, New York, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Better insight about linear ICs like 565,555 widely used in communication

CO2: Clear understanding of design and analysis of linear ICs

CO3: Design applications towards the product development using linear ICs

CO4: Knowledge to design special function circuits using linear ICs

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	1	2	-	3	-	-	-	-	-	-	3	-
CO2	-	1	-	-	3	1	-	-	-	-	-	-	-
CO3	-	1	2	-	3	-	-	-	-	-	-	3	-
CO4	-	1	2	-	3	1	-	-	-	-	-	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC504 ADVANCED MICROCONTROLLER ARCHITECTURE AND ITS APPLICATIONS

3 0 0 3

MODULE - I **15**

Introduction to 8 - Bit Microcontrollers: Architecture of PIC 16F877- program memory consideration – Register file structure and addressing modes – CPU Register – Instruction set –Status Register-Memory organization: Program memory-Data memory-Oscillator and Reset circuits.

MODULE - II **15**

PIC Programming and Application: External Interrupts and Timers: Timer 0 compare / capture mode – Timer 1/ CCP programmable period scalar. Watch dog timer - On-chip timer – On-chip counter-Capture - Compare PWM modes - Assembly language programming – Simple Programs- I/O port programming -USART-I^2C –ADC-Interfacing to External memory.

MODULE - III **15**

16 - Bit Microcontroller and Development Tools: Introduction to the S12 and S12X Microcontroller – Interrupts- Clock Generation- Resets- Parallel Ports - Timer Functions- Serial Communication Interface (SCI)- Serial Peripheral Interface (SPI)- Inter-Integrated Circuit (I2C) Interface- Hardware and Software Development Tools- C Language Programming - Codewarrior tools – Project IDE - Compiler - Assembler and Debugger - JTAG and hardware debuggers - Code optimization - Real time clock with I2C programming.

TOTAL : 45

TEXT BOOKS

1. Mazidi, Muhammad Ali and Mckinlay, Rolin D., "PIC Microcontroller and Embedded Systems using Assembly and C", Pearson Education Asia, Singapore, 2009.
2. Huang Han-Way, "The HCS12/9S12: An Introduction to Hardware and Software Interfacing", Second Edition, 2006.

REFERENCE BOOKS

1. Peatman, John B., "Design with PIC Microcontrollers", Pearson Education, New Delhi, 2002.
2. Micro chip / PIC Microcontroller Data Manuals
3. Cady Fredrick M., "Assembly and C Programming for the Free scale HCS12 Microcontroller", Second Edition, Oxford University Press, New York, 2008.
4. Valvano Jonathan W., "Embedded Microcomputer Systems: Real Time Interfacing", Second Edition, Thomson Asia, Singapore, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the concepts of 8bit and 16 bit microcontrollers

CO2: Do programming for various embedded applications

CO3: Develop various applications with the knowledge of 8 bit and 16 bit microcontrollers

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		2	3		2							3	2
CO2		2	3									3	2
CO3		2	3		2							3	

1 – Slight, 2 – Moderate, 3 – Substantial

11EC505 COMMUNICATION SYSTEMS

3 1 0 4

MODULE - I **15**

Amplitude Modulation and Angle Modulation: Generation and demodulation of AM: DSB-SC - SB-SC - VSB Signals - Comparison of Amplitude modulation systems - Frequency Division multiplexing - AM transmitters – AM receivers - Superhtetrodyne receiver - Angle modulation - 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 - PLL – Nonlinear model and linear model of PLL – Non linear effects in FM systems.

MODULE - II **15**

Noise Performance: Noise – Shot noise - thermal noise - White noise - Narrowband noise - Representation of Narrowband noise in terms of envelope and phase components - Sine wave plus Narrowband Noise - Noise in DSB-SC receiver - Noise in SSB receiver Noise in AM receivers threshold effect - Noise in FM receivers, capture effect - FM threshold effect - FM threshold reduction - Pre-emphasis and de-emphasis in FM - Comparison of performance of AM and FM systems.

MODULE - III **15**

Pulse Modulation: Sampling process –PAM- other forms of pulse modulation –Bandwidth –Noise trade off – Quantization –PCM- Noise considerations in PCM Systems-TDM- Digital multiplexers-Virtues, Limitation and modification of PCM-Delta modulation–differential pulse code modulation – Adaptive Delta Modulation-Adaptive differential PCM.

Lecture: 45, Tutorial: 15, TOTAL : 60

TEXT BOOK

1. Haykin Simon, “Communication Systems”, Fourth Edition, John Wiley & sons, NY, 2001.

REFERENCE BOOKS

1. Roddy and Coolen., “Electronic Communication”, Fourth Edition, Prentice Hall of India, New Delhi, 2003.
2. Taub and Schilling., “Principles of Communication Systems”, Tata McGraw-Hill, New Delhi, 1995.
3. Bruce Carlson et al, “Communication Systems”, Fourth Edition, McGraw-Hill Inc., New York, 2002

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand different analog modulation techniques

CO2: Get better insight in the concepts of various receivers

CO3: Gain knowledge on frequency and spectrum analysis for various receiver systems

CO4: Design and implement various channel coding techniques

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	3	-	2	-	-	-	-	-	-	3	-
CO2	-	-	3	-	2	-	-	-	-	-	-	2	-
CO3	-	-	2	-	2	-	-	-	-	-	-	3	-
CO4	-	-	3	-	-	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EE503 CONTROL SYSTEMS

(Common to Mechatronics, ECE, EEE and EIE branches)

3 1 0 4

MODULE-I **15**

System Representation: Basic elements in control systems – Open and closed loop systems – Modeling of Electrical and mechanical systems – Electrical analogy of mechanical systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs – Masons gain formula.

Introduction to state space analysis – canonical form and companion forms.

MODULE – II **15**

Time Response and Stability Analysis: Time response – Time domain specifications – Types of test input – First and Second order system response – Error coefficients – Steady state error- Generalized error series –effect of P, PI, PID controllers on time response.

Characteristics equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of poles and zeros on system stability.

MODULE – III **15**

Frequency Response and Compensator Design: Frequency response – Bode plot – Polar plot – Constant M an N circles – Nichols chart – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications– stability via gain margin and phase margin - Nyquist stability criterion- Need for compensators - Compensators design - Lag, lead and lag-lead compensator design using bode plot.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Gopal, M., "Control Systems: Principles and Design", Third Edition, Tata McGraw- Hill, New Delhi, 2008.
2. Ogata K., "Modern Control Engineering", Fourth Edition, Pearson Education/ PHI, New Delhi, 2007.

REFERENCE BOOKS

1. Nagrath I.J. and Gopal M., "Control Systems Engineering", Fifth Edition, New Age International Publishers, New Delhi, 2008.
2. Kuo, B.C., "Automatic Control Systems", Eighth Edition, John Wiley & Sons, New York, 2003.
3. Nise, Norman S., "Control Systems Engineering", Fifth Edition, Wiley Publishers, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Appreciate the methods of representation of systems and their transfer function models

CO2: Analyze the Time Response and Frequency response of a system

CO3: Identify and solve the problems in the applications of open loop and closed loop systems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	2	-	3	1	-	-	-	-	-	-	2	-
CO2	-	2	-	3	1	-	-	-	-	-	-	2	-
CO3	-	2	-	3	1	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC506 ELECTRONIC CIRCUITS AND LINEAR IC LABORATORY

0 0 3 1

LIST OF EXPERIMENTS:

Design and Implementation of

1. Feed back amplifier circuits-current series and voltage shunt- Calculation of Gain & Band width.
2. RC Phase Shift Oscillator using transistors.
3. Wein Bridge Oscillator using Op-Amps..
4. Hartley & Colpitts Oscillators using transistors.
5. Schmitt trigger Circuits.
6. Astable Multivibrators using Op-Amp.
7. Monostable Multivibrators using 555 IC
8. Bistable multivibrators using transistors.
9. Linear Op-Amp circuits – Inverting and Non inverting Amplifiers,Voltage Follower Differentiator, Integrator, zero crossing detector.
10. Active filters using Op-Amps – 2^{nd} order LPF, BPF.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Design and analyze various application of Electronic circuits

CO2: Design and conduct experiments on Opamp based applications

CO3: Design and develop products using electronic circuits and linear ICs

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	3	2	-	3	-	-	-	-	-	-	2	-
CO2	-	3	2	-	3	2	-	-	-	-	-	2	-
CO3	-	3	1	-	3	1	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC507 DIGITAL SIGNAL PROCESSING LABORATORY

(Common to ECE and EIE branches)

0 0 3 1

LIST OF EXPERIMENTS

USING TMS320C54X DSP PROCESSOR

1. Generation of Signals
2. Linear Convolution
3. Spectrum of FFT
4. Filter Design
5. Speech coding

USING MATLAB

1. Generation of Discrete time Signals
2. Verification of Sampling Theorem
3. Finding Response of LTI systems
4. Finding FFT and IFFT
5. Linear and Circular Convolution through FFT
6. Design of FIR filters(All types)
7. Design of IIR filters(All types))
8. Realization Structures

Software Reference:

- MATLAB 7.1
- TMS320C54X Simulator

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Use engineering tools to analyze various parameters of a system

CO2: Simulate the Filtering operations

CO3: Implement filtering operations using Texas Processors

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	3	3	-	1	-	-	-	-	-	-	3	-
CO2	-	3	3	-	1	-	-	-	-	-	-	2	-
CO3	-	3	3	-	2	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC508 ADVANCED MICROCONTROLLER AND ITS APPLICATIONS LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Programming using Arithmetic, Logical and Bit Manipulation instructions of PIC16F877 microcontroller.
2. Device ON / OFF using PIC 16F877 microcontroller (Relay and LED).
3. Interfacing of LCD using PIC 16F877 microcontroller.
4. Interfacing of Real Time Clock using PIC 16F877 microcontroller.
5. Programs for timers using PIC16F877 microcontroller.
6. PWM generation using PIC16F877 microcontroller.
7. I2C communication using PIC16F877 microcontroller.
8. Interfacing of Switch and LED using S12X Controller.
9. Serial Communication Interface using S12X Controller
10. LCD Interface using S12X Controller

Software Reference:

- MP Lab
- Codewarrier Tool

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Use engineering tools for developing an application

CO2: Experience with 8bit Microcontroller

CO3: Design applications using 16bit Microcontroller

CO4: Identify and apply the design concepts for developing embedded products

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	3	3	-	-	-	-	-	-	-	-	3	1
CO2	-	2	3	-	-	-	-	-	-	-	-	3	1
CO3	-	3	3	-	-	-	-	-	-	-	-	2	1
CO4	-	3	2	-	-	-	-	-	-	-	-	2	1

1 – Slight, 2 – Moderate, 3 – Substantial

11GE601 ECONOMICS AND MANAGEMENT FOR ENGINEERS

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Economics – Basics Concepts and Principles – Demand and Supply – Law of demand – Determinants of demand, Law of supply – market Equilibrium – National Income – Circular Flow of Economic activities and Income –National Income and its measurement techniques – Inflation – Causes of Inflation – Controlling Inflation –Business Cycle .

MODULE – II **15**

Forms of business – Management Functions: Planning, Organizing, Staffing, Leading and Controlling- Managerial Skills - Levels of Management - Roles of manager.

Marketing – Core Concepts of Marketing, Four P's of Marketing, New product development, Product Life Cycle, Pricing Strategies and Decisions. Operations Management – Resources – Site selection, Plant Layout, Steps in Production Planning and Control – EOQ Determination

MODULE – III **15**

Accounting Principles – Financial Statements and its uses – Time value of Money – Depreciation methods — Break Even Analysis – Capital budgeting techniques – Introduction to FDI, FII, Mergers & Acquisition.

TOTAL : 45

TEXT BOOKS

1. Geetika, Plyali Ghosh, Purba Roy Choudhury, "Managerial Economics", 1st Edition, Tata McGraw-Hill, New Delhi, 2008.
2. Jeff Madura, "Fundamentals of Business", Cengage Learning Inc, India, 2007.

REFERENCE BOOKS

1. Stanley L. Brue and Campbell R Mcconnell, "Essentials of Economics", Tata McGraw-Hill, New Delhi, 2007.
2. S.P.Jain, K.L.Narang, Simi Agrawal, "Accounting for Management", First Edition, Tata McGraw-Hill, New Delhi, 2009

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Demonstrate the basic concepts of micro and macro economics

CO2: Understand the various functions of management

CO3: Demonstrate the important management decision making techniques

CO4: Understand accounting principles and capital budgeting techniques

CO5: Analyze various forms of business and its management functions

CO6: Identify, communicate and solve the problems related to the functional management

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	-	-	-	3	-	3	1	-	-	-	3
CO2	-	-	-	-	-	2	-	1	1	-	-	-	3
CO3	-	-	-	2	-	1	-	2	1	-	-	-	3
CO4	-	-	-	2	-	3	-	2	2	-	-	-	3
CO5:	-	-	-	1	-	2	-	2	3	1	-	-	3
CO6:	-	-	-	1	-	3	-	3	3	3	-	-	3

1 – Slight, 2 – Moderate, 3 – Substantial

11EC601 VLSI DESIGN

3 1 0 4

MODULE - I **15**

VERILOG HDL: Basic Concepts - VLSI Design flow – Lexical conventions-data types-system tasks and compiled directives-modules and ports- gate level modeling- dataflow modeling- behavioral modeling- switch level modeling – tasks and functions- procedural continuous assignment- –RTL, Structural, gate level description of decoder - equality detector –comparator - priority encoder - D-latch - D-Flip Flop- half adder - Full adder - Ripple Carry adder - FSM, memory design – ALU - MAC.

MODULE - II **15**

CMOS Technology: NMOS - PMOS Enhancement transistor - Basic CMOS technology: N well - P well - Twin tub - SOI Process - An overview of Silicon semiconductor technology - MOS DC equations -Threshold voltage - Body effect - channel length modulation - Mobility variation - MOS models - small signal AC characteristics - CMOS inverter DC characteristics - Rise time - fall time - power dissipation - Latch up and prevention.

MODULE - III **15**

CMOS Chip Design and Testing: Logic design with CMOS: MOSFETS as switches - Complex logic gates - Transmission gates: Muxes and latches - Stick diagram, Layout design rules - physical design: basic concepts - CAD tool sets - physical design of logic gates: Inverter – NAND – NOR - Design Hierarchies. ASIC design flow CMOS chip design options: Full custom ASICs, Std. Cell based ASICs - Gate Array based ASICs Channelled - Channelless and structured GA - Programmable logic structures - 22V10, Programming of PALs - Programmable Interconnect - Reprogrammable GA - Xilinx programmable GA -Test and Testabilty- System partitioning- Design for testability- Testing combinational logic- Testing sequential logic- DFT- scan design- BIST.

Lecture:45, Tutorial: 15, TOTAL : 60

TEXT BOOKS

1. Pucknell, Douglas A. and Eshragian, K.., “Basic VLSI Design”, Third Edition, Prentice Hall India Pvt Ltd, 2006.
2. Palnitkar Samir., “Verilog HDL: Guide to Digital Design and Synthesis”, Third Edition, Pearson Education, New Delhi, 2003.

REFERENCE BOOKS

1. Weste Neil H E and Eshraghian Kamran., “Principles of CMOS VLSI Design”, Second Edition, Addison Wesley, New York, 1993.
2. Smith M.J.S, “Application Specific Integrated Circuits”, Pearson Education, New Delhi, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Model different digital VLSI systems using hardware design language such as verilog

CO2: Demonstrate an understanding of fabrication techniques and basics of MOS transistor

CO3: Design analyze and implement IC’s using design tools for different application

CO4: Test and improve its performance of the VLSI chips

CO5: Take up research in the field of VLSI design

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	3	3	-	-	-	-	-	-	3	-	3	1
CO2	-	3	3	-	-	-	-	-	-	2	-	3	1
CO3	-	3	3	-	-	-	-	-	-	2	-	2	-
CO4	-	3	3	-	-	-	-	-	-	2	-	3	-
CO5	-	2	3	-	-	-	-	-	-	3	-	3	1

1 – Slight, 2 – Moderate, 3 – Substantial

11EC602 DIGITAL COMMUNICATION

3 1 0 4

MODULE – I **15**

Error Control Coding: Discrete memoryless channels – Linear block codes: BCH code, Cyclic codes, Convolutional codes, RS codes – Maximum likelihood decoding of convolutional codes-Viterbi Algorithm - Trellis coded Modulation - Turbo codes.

MODULE - II **15**

Line coding and Pass Band Data Transmission: Introduction to line coding –NRZ ,RZ, phase encoding, power spectral density of NRZ-L, polar RZ ,Manchester – High density bipolar signaling. Intersymbol Interference- Nyquist's criterion for Distortion less Base band Binary Transmission – Correlative level coding – Base band M-ary PAM transmission – Eye pattern – Adaptive Equalization. Introduction – Pass band Transmission model – Generation- Signal space diagram of BPSK, QPSK, FSK and MSK, QAM, M-ary modulation schemes,

MODULE - III **15**

Detection techniques - Bit error probability and Power spectra of BPSK, QPSK, FSK and MSK, QAM, M-ary modulation schemes –Differential phase shift keying – Comparison of Digital modulation systems using a single carrier; Binary signal detection and hypothesis testing, ML detector-matched filter and correlation receiver, carrier and symbol synchronization

Spread Spectrum Modulation Pseudo- noise sequences –a notion of spread spectrum – Direct sequence spread spectrum with coherent binary phase shift keying – Signal space Dimensionality and processing gain –Probability of error – Frequency hop spread spectrum.

Lecture: 45, Tutorial: 15, TOTAL : 60

TEXT BOOKS

1. Haykin, Simon., "Communication Systems", Fourth Edition John Wiley, New York, 2001.
2. Haykin, Simon., "Digital Communication", John Wiley & sons, 2006

REFERENCE BOOKS

1. Shanmugam Sam K. "Analog and Digital Communication" John Wiley & sons, New York.
2. Proakis John G., "Digital Communication" Fifth Edition, McGraw Hill, 2001.
3. Taub and Schilling , "Principles of Digital Communication", Tata McGraw-Hill,28th reprint, 2003.
4. M.Kulkarni, " Digital Communications" Umesh publications, 2006

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Demonstrate the basic concepts of various digital modulation schemes

CO2: Analyze the performance of various receivers

CO3: Understand the basic concepts of spread spectrum techniques in telecommunication system

CO4: Understand and Design the various error control coding techniques in Digital communication

CO5: Identify, formulate and solve contemporary issues in communication System

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	2	-	-	2	-	-	-	-	-	-	3	1
CO2	3	1	-	-	2	-	-	-	-	-	-	3	1
CO3	3	1	-	-	2	-	-	-	-	-	-	3	1
CO4	3	2	-	-	2	-	-	-	-	-	-	3	2
CO5	3	2	-	-	2	-	-	-	-	-	-	3	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EC603 ANTENNAS AND WAVE PROPAGATION

3 1 0 4

MODULE - I **15**

Radiation Fields and Antenna Fundamentals: Concept of vector potential - Modification for time varying retarded case - Fields associated with Hertzian dipole - Power radiated and radiation resistance of current element - Radiation from half-wave dipole and quarter-wave monopole - Use of capacity hat and loading coil for short antennas -
Definitions: Radiation intensity - Directive gain – Directivity - Power gain - Beam Width - Band Width - Gain and radiation resistance of current element – Halfwave dipole and folded dipole - Reciprocity principle - Effective length and Effective area - Relation between gain, effective length and radiation resistance.

MODULE - II **15**

Antenna Arrays and Different Antennas: Antenna Arrays: Expression for electric field from two and three element arrays - Uniform linear array - Method of pattern multiplication - Binomial array. 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 - Rhombic antenna - Log periodic antenna - Yagi uda Antenna - Horn antenna- Reflector antennas and their feed systems.

MODULE - III **15**

Wave Propagation and Antenna Measurements: The three basic types of propagation: Ground wave - space wave and sky wave propagation - Duct propagation Ground wave propagation: Attenuation characteristics for ground wave propagation- Calculation of field strength at a distance -Sky wave propagation: Structure of the ionosphere - Effective dielectric constant of ionized region - Mechanism of refraction - Refractive index - Critical frequency - Skip distance - Effect of earth's magnetic field - Maximum usable frequency - Fading and Diversity reception Space wave propagation: Reflection characteristics of earth - Resultant of direct and reflected ray at the receiver Antenna Measurements:
Measurement of antenna impedance - Pattern measurements - Measurement of Antenna Gain - Beam width - Radiation resistance - Antenna efficiency – Directivity – Polarization - Measurement of Noise Figure and Noise Temperature.

Lecture: 45 Tutorial: 15 TOTAL : 60

TEXT BOOKS

1. Prasad K. D, "Antennas and Wave Propagation", Tech India Publications, New Delhi, 2009.
2. Kraus John D and Marhefka Donald J., "Antennas", Tata McGraw-Hill Book Company, New Delhi, 2002.

REFERENCE BOOKS

1. Jordan Edward C and Balmain Keith G., "Electromagnetic Waves and Radiating Systems", Prentice Hall of India, New Delhi, 2003.
2. Balanis Constantine A., "Antenna Theory", Second Edition, John Wiley & Sons, New York, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the radiation patterns of Antennas

CO2: Have knowledge to design various Antennas and analyze its array characteristics

CO3: Analyze the noise parameters and ray propagation effects on ground, in atmosphere and ionosphere

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	1	2	-	3	-	-	2	-	-	-	2	3
CO2	-	1	1	-	3	-	-	1	-	-	-	1	3
CO3	-	1	2	-	3	-	-	3	-	-	-	1	3

1 – Slight, 2 – Moderate, 3 – Substantial

11IT502 COMPUTER COMMUNICATION NETWORKS

(Common to Mechatronics, ECE and IT branches)

3 0 0 3

MODULE – I **15**

Introduction to Data Communications and Physical Layer: Components and representations– Data flow – Networks – Criteria, physical structures and categories – Topologies –Protocols and standards – ISO / OSI model- Line coding – Line coding schemes – Transmission Modes - Transmission Media –Guided media -Twisted-pair- Coaxial Cable – Fiber Optics .

Data Link Layer -Flow Control and Error Control: CRC – Check sum - Stop and wait – Go back-N - ARQ – Selective repeat ARQ- Sliding window – HDLC – Point-to-Point protocol

MODULE – II **15**

Data Link Layer -Local Area Network(LAN): Wired LAN – Ethernet- IEEE Standards- IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - Fast Ethernet- Gigabit Ethernet- IEEE 802.11

Network Layer: Inter-networks – IPV4 and IPV6 addressing methods – IPV4 –IPV6 – ARP - RARP – ICMP – Forwarding and routing - Unicast routing protocols – Intra and inter-domain routing - Distance vector routing – Link state routing – Path vector routing- VLAN

MODULE – III **15**

Transport Layer: Process-to-process delivery - UDP - TCP – Congestion Control – Quality of services (QoS) – Techniques to improve QoS - Integrated Services- Differentiated service.

Application Layer: Domain Name Space (DNS) – Distribution of name space- DNS in the Internet- Resolution- Remote logging –Electronic Mail- File transfer- HTTP - WWW - SNMP

TOTAL : 45

TEXT BOOKS

1. Forouzan, Behrouz A., "Data communication and Networking", Fourth Edition, Tata McGraw-Hill, New Delhi, 2006.
2. Peterson, Larry L. and Davie, Peter S., "Computer Networks", Second Edition, Harcourt Asia, Singapore, 2000.

REFERENCE BOOKS

1. Kurose, James F. and Ross, Keith W., "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education, New Delhi, 2003.
2. Tanenbaum, Andrew S., "Computer Networks", Fourth Edition, Prentice Hall of India, New Delhi, 2003.
3. Stallings, William., "Data and Computer Communication", Sixth Edition, Pearson Education, New Delhi, 2000.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Demonstrate the concept, terminologies and technologies used in modern data communication and computer networking

CO2: Understand the functions of various layers in networking

CO3: Have a knowledge about the standards employed in computer networking and demonstrate an understanding of computer communication standards

CO4: Get familiarized with all the protocols and network components

CO5: Identify and analyze the different levels of QoS to different applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	1	2	-	-	-	-	1	-	-	-	1	-
CO2	3	1	1	-	-	-	-	1	-	-	-	1	-
CO3	3	2	2	-	-	-	-	2	-	-	-	1	-
CO4	3	2	2	-	-	-	-	2	-	-	-	1	-
CO5	3	2	2	-	-	-	-	3	-	-	-	1	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC604 ANALOG AND DIGITAL COMMUNICATION SYSTEMS LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Radiation pattern of Halfwave dipole Antenna
2. Radiation pattern of yagi Antenna
3. Radiation pattern of loop Antenna
4. Generation and detection of AM
5. Generation and detection of FM
6. Sampling & Time Division Multiplexing
7. Pulse modulation- PAM / PWM /PPM
8. Pulse code modulation
9. Line coding & Decoding
10. Delta modulation
11. Digital modulation –ASK, PSK,MSK, FSK

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the performance of various antennas

CO2: Experiment the concept of sampling and multiplexing

CO3: Analyze the performance of various analog and digital modulation techniques

CO4: Design modulations and demodulations for different Communication Systems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	3	-	-	-	-	-	-	-	-	-	3	1
CO2	2	2	-	-	-	-	-	-	-	-	-	3	1
CO3	1	3	-	-	-	-	-	-	-	-	-	3	1
CO4	2	3	-	-	-	-	-	-	-	-	-	3	1

1 – Slight, 2 – Moderate, 3 – Substantial

11EC605 VLSI LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Design and Simulation of Combinational circuits.
2. Design and Simulation of Sequential circuits.
3. Design and Simulation of 8 nos. of 8 bit parallel adder and subtractor
4. Design and Simulation of 8 nos. of 8 bit serial adder and subtractor.
5. Design and Simulation of MAC.
6. Design and Simulation of FSM.
7. Design and test 8 bit ALU on FPGA board.
8. Design and Testing of traffic controller on the FPGA board.
9. Design a Real time Clock (2 digits, 7 segments LED displays each for HRS, MTS, and SECS.) and demonstrate its working on the FPGA board.
10. Basic gates using Microwind tool
11. Mini Project

Software References:

- Model Sim
- XILINX
- Microwind

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Model and simulate digital systems using hardware description language like Verilog

CO2: Synthesis digital systems from Register transfer level to higher level of description

CO3: Implement the logic circuit designs using FPGA board

CO4: Formulate, design and analyze VLSI circuits for various application using design tools

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	3	3	-	2	-	-	-	-	1	-	3	1
CO2	1	3	3	-	1	-	-	-	-	2	-	3	2
CO3	2	3	3	-	2	-	-	-	-	1	-	3	1
CO4	2	3	3	-	2	-	-	-	-	3	-	3	1

1 – Slight, 2 – Moderate, 3 – Substantial

11EC606 NETWORKS LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Ethernet LAN protocol
   To create scenario and study the performance of CSMA/CD protocol Ethernet simulation
2. Token bus and token ring protocols
   To create scenario and study the performance of token bus and token ring protocols through simulation
3. Wireless LAN protocols
   To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
4. Implementation and study of stop and wait protocol
5. Implementation and study of Go back-N and selective repeat protocols
6. Implementation of distance vector routing algorithm
7. Implementation of Link state routing algorithm
8. Implementation of Data encryption and decryption
9. Transfer of files from PC to PC using Windows / Unix socket processing
10. Study of seven layer devices.
11. Study of different cables and devices used in physical layer connection.

Software References:

- Netsim
- ETHEREAL

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Familiarize and simulate the different LAN protocols and its operations

CO2: Implement various routing algorithms

CO3: Analyze the performance of the different congestion control protocols

CO4: Design and experiment various topologies of networks using simulation tools

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1	3	-	-	1	-	-	-	-	-	-	3	-
CO2	2	3	-	-	1	-	-	-	-	-	-	3	-
CO3	1	3	-	-	1	-	-	-	-	-	-	3	-
CO4	2	3	-	-	2	-	-	-	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11GE701 TOTAL QUALITY MANAGEMENT

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Quality Systems: Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs, Basic concepts of Total Quality Management, Historical Review. Need for ISO 9000 and Other Quality Systems, ISO 9000:2008 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, Introduction to TS 16949, QS 9000, ISO 14000, ISO 18000, ISO 20000, ISO 22000.

MODULE – II **15**

TQM Principles: Principles of TQM, Leadership – Concepts, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation. Customer satisfaction – Customer Perception of Quality, Customer Complaints, Customer Retention, Employee Involvement – Motivation, 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.

MODULE – III **15**

TQM Tools: The seven 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 seven Management tools, Poka Yoke. Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

TOTAL :45

TEXT BOOKS

1. Besterfield, Dale H. et al., "Total Quality Management", Third Edition, Pearson Education, 2008
2. Subburaj Ramasamy, "Total Quality Management", Tata McGraw Hill, New Delhi, 2007.

REFERENCE BOOKS

1. Feigenbaum. A.V, "Total Quality Management", Tata McGraw Hill, New Delhi, 1999.
2. Suganthi, L and Samuel A Anand., "Total Quality Management", PHI Learning, New Delhi.
3. Evans James R. and Lindsay William M., "The Management and Control of Quality", Seventh Edition, South-Western (Thomson Learning), 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Appreciate the need for TQM and also understand the evolution of TQM and the principles involved

CO2: Gain knowledge of various tools to implement TQM in industries

CO3: Gain appreciation of various quality standards

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	-	3	-	3	-	2	-	2	-	-	3
CO2	-	-	-	2	-	3	-	2	-	2	-	-	3
CO3	-	-	-	3	-	3	-	3	-	2	-	-	3

1 – Slight, 2 – Moderate, 3 – Substantial

11EC701 SATELLITE COMMUNICATION

3 0 0 3

MODULE - I **15**

Overview of Satellite Systems, Geostationary Orbit and Space Segment: Introduction – Frequency Allocations for Satellite Services –Kepler's Law – Definitions of Terms for Earth-orbiting Satellites – Orbital Elements – Apogee and Perigee Heights – Orbital Perturbations – Effects of a Nonspherical Earth – Atmospheric Drag – Inclined Orbits – Calendars – Universal Time – Julian Dates – Sidereal Time – The Orbital Plane – The Geocentric-Equatorial Coordinate System – Earth Station Referred to the IJK Frame – The Topcentric-Horizon Co-ordinate System – The Sub-satellite Point – Predicting Satellite Position - Antenna Look Angles – The Polar Mount Antenna – Limits of Visibility – Near Geostationary Orbits – Earth Eclipse of Satellite – Sun Transit Outage – Launching Orbits –Power Supply – Attitude Control – Spinning Satellite Stabilization – Momentum Wheel Stabilization – Station Keeping – Thermal Control – TT&C Subsystem – Transponders – Wideband Receiver – Input De-multiplexer – Power Amplifier

MODULE - II **15**

Earth Segment and Space Link: Introduction – Receive-Only Home TV Systems – Outdoor Unit – Indoor Unit for Analog (FM) TV – Master Antenna TV System – Community Antenna TV System – Transmit-Receive Earth Stations – Problems – Equivalent Isotropic Radiated Power – Transmission Losses – Free-Space Transmission – Feeder Losses – Antenna Misalignment Losses – Fixed Atmospheric and Ionospheric Losses – Link Power Budget Equation – System Noise – Antenna Noise – Amplifier Noise Temperature – Amplifiers in Cascade – Noise Factor – Noise Temperature of Absorptive Networks – Overall System Noise Temperature – Carrier-to-Noise Ratio – Uplink – Saturation Flux Density – Input Back Off – The Earth Station HPA – Downlink – Output Back off – Satellite TWTA Output – Effects of Rain – Uplink rain-fade margin – Downlink rain-fade margin – Combined Uplink and Downlink C/N Ratio – Intermodulation Noise.

MODULE - III **15**

Satellite Access and Direct Broadcast Services: Single Access – Preassigned FDMA, Demand-Assigned FDMA, SPADE System. TDMA: Reference Burst; Preamble and Post-amble, Carrier recovery, Network synchronization, unique word detection, Traffic Date, Frame Efficiency and Channel capacity, preassigned TDMA, Demand assigned TDMA, Comparison of uplink Power requirements for FDMA & TDMA. Code-Division Multiple Access – Direct-Sequence spread spectrum – code signal c(t) – autocorrelation function for c(t) – Acquisition and tracking – Spectrum spreading and despreading – CDMA throughput. Orbital Spacings – Power Rating and Number of Transponders – Frequencies and Polarization – Transponder Capacity – Bit Rates for Digital Television – MPEG Compression Standards – Forward Error Correction – Home Receiver Outdoor Unit (ODU) – Home Receiver Indoor Unit (IDU) – Satellite Mobile Services – VSATs – Radarsat – Global Positioning Satellite System – Orbcomm

TOTAL: 45

TEXT BOOK

1. Roddy Dennis, "Satellite Communications", Third Edition, McGraw-Hill, New York, 2001.

REFERENCE BOOKS

1. Pratt Timothy, Bostian, Charles and Allmuti, Jeremy, "Satellite Communications", John Willy & Sons, Singapore, 2004.
2. Pritchard Wilbur L., Suyder Hond, Henri G. and Nelson, Robert A., "Satellite Communication Systems Engineering", Second Edition, Pearson Education Ltd., New Delhi, 2003.
3. Richharia M., "Satellite Communication Systems: Design Principles", Second Edition, Macmillan Press Ltd, London, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the various terminologies in satellite communication
CO2: Understand the impact of solution for the global communication
CO3: Analyze and understand the effect of losses and noise and to apply them in the design
CO4: Take up research and develop solution in real world communication

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	-	3	-	2	-	-	1	3	-	-	-	3
CO2	2	-	3	-	2	-	-	1	2	-	-	-	1
CO3	2	-	3	-	1	-	-	2	2	-	-	-	-
CO4	-	-	2	-	2	-	-	3	3	-	-	-	3

1 – Slight, 2 – Moderate, 3 – Substantial

11EC702 OPTICAL COMMUNICATION

(Common to ECE and EEE branches)

3 0 0 3

MODULE – I **15**

Optical Fibers – Structure and Digital Transmission Systems: Evolution of Fiber Optic Systems – Elements of an Optical fiber Transmission link – Basic laws and definitions – ray optics – Optical fiber modes and configurations – Mode theory of circular waveguides – Overview of modes – Key modal concepts – Linearly Polarized waves – Single Mode Fibers – Graded Index Fiber Structure.

Point to point link systems considerations – Link Power budget – Rise time budget – Noise effects on system performance – Operational principles of WDM – Solitons – EDFAs – Basic concepts of SONET/SDH

MODULE - II **15**

Signal Degradation in Optical Fibers: Fiber fabrication – Double crucible method – Chemical, Vapor oxidation method, Deposition method- Attenuation – absorption loss – Scattering loss – Bending loss – Core and Cladding loss – Signal distortion in optical wave guides – Information capacity determination – Group delay – material dispersion – Wave Guide dispersion – Signal distortion in single mode fibers – Polarization mode dispersion – Intermodal dispersion – Pulse broadening in GI fibers – Mode Coupling – RI profile and cut – off wavelength

MODULE - III **15**

Optical Sources and Optical Receivers:

LEDs – LASER Diodes : Semiconductor Laser Diodes- Fabry-Perot Lasers - Distributed Feedback (DFB) Lasers – Modulation of LASER diodes – Temperature effects - Power Launching and Coupling : Source to fiber power launching – Lensing Schemes for Coupling improvement - LED coupling to single mode fibers.

PIN Photo detector – Schottky-Barrier Photodiodes - Avalanche Photodiodes – Photo detector noise – Detector response time – Avalanche multiplication of Noise – Temperature effects on Photo detectors – Phototransistors - Fundamental Receiver operation – preamplifiers – Error sources – Receiver configuration – Probability of error – Quantum limit**.**

TOTAL: 45

TEXT BOOKS

1. Keiser Gerd., “Optical Fiber Communication”, Fourth Edition, Tata McGraw-Hill, New Delhi, 2009
2. Agarwal G.P., “Fiber Optic Communication Systems”, Second Edition, John wiley & Sons, New York, 1997.

REFERENCE BOOKS

1. Senior John M., “Introduction to Optical Fiber Communications”, Prentice Hall, New Jersey, 2003.
2. Cherin Paul M., “Optical Fiber Communication”, Third Edition, McGraw Hill, New York, 1999.
3. Dutton Harry J. R., “Understanding Optical Communications”, IBM Corporation, International Technical Support Organization, 1998.
4. Franz and Jain, “Optical Communication System”, Narosa Publications, New Delhi, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the working of optical active and passive components and optical fiber

CO2: Design, analyze and troubleshoot the optical communication links

CO3: Develop realistic solutions for effective communication for wider coverage

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	1	3	-	-	-	-	3	-	1	-	-	-
CO2	3	2	3	-	-	-	-	3	-	2	-	-	-
CO3	3	1	3	-	-	-	-	3	-	3	-	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC703 MICROWAVE ENGINEERING

3 0 0 3

MODULE – I **15**

Microwave Networks and Microwave Measurements: Microwave frequency - S parameter representation of N ports and its properties - advantages - Relationship between S and Y , S and ABCD parameters - S Matrix of a Directional Coupler- waveguide Tees – Isolator – Circulator - Slotted Section – Attenuator - Waveguide Corners- Bends- Twists- Matched loads and movable shorts - VSWR measurement - impedance measurement - insertion loss and attenuation measurements - Return loss measurement using reflectometer - Power Measurement - frequency Measurement.

MODULE - II **15**

Microwave Oscillators and Amplifiers:

Two cavity Klystron amplifier: Reentrant Cavities - Velocity modulation - Bunching -Output Power –efficiency. Reflex Klystron: Velocity modulation – Bunching - Output Power - efficiency & Electronic admittance - Helix Traveling Wave Tubes – Slow Wave structures - Amplification Process - Convection Current - Axial Electric Field - Wave Modes - Gain Consideration - Cylindrical Magnetron and its Output power & efficiency.

Gunn-Effect Diodes – GaAs Diode- Background- Gunn Effect- Ridely-Watkins-Hilsun (RWH) Theory- Differential Negative Resistance- Two-Valley Model Theory- High-Field Domain- Modes of Operation- Amplification- Microwave Generation- Read Diode- IMPATT Diodes - TRAPATT Diodes- BARITT Diodes- Microwave Performance- Parametric Devices- Physical Structures- Nonlinear Reactance and Manley – Rowe Power Relations- Parametric Amplifiers- Applications.

MODULE - III **15**

Microstriplines - MMIC and Introduction to Radar: Microstrip Lines- Derivation of Characteristic Impedance of Microstrip Lines using Quasi Static analysis- Losses in Microstrip Lines - Quality Factor Q of Microstrip Lines–MMIC Materials –MMIC growth.

Basic RADAR- origin -The simple form of the RADAR equation- Block diagram- frequencies- Applications- Detection of signals in noise- Receiver noise and the SNR- Probability Density functions- Probability of detection and false alarm- Integration of RADAR pulses.

TOTAL : 45

TEXT BOOKS

1. Liao Samuel Y, “Microwave Devices and Circuits”, Third Edition, Prentice Hall of India, New Delhi, 2006.
2. Skolnik Merill I, “Introduction to Radar Systems”, Third Edition, Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. Das Annapurna and Das Sisir K, “Microwave Engineering”, Tata McGraw-Hill, New Delhi, 2009.
2. Collin R.E, “Foundations for Microwave Engineering”, Second Edition, IEEE Press, London, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the working of microwave setups using solid state devices

CO2: Analyze the microwave circuits and to measure various parameters related to it

CO3: Understand and apply the latest technologies such as MMIC, Micro strip lines to provide engineering solutions

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	1	-	-	2	-	-	-	-	-	1	1	-
CO2	3	3	-	-	1	-	-	-	-	-	1	-	-
CO3	3	-	-	-	1	-	-	-	-	-	-	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC704 WIRELESS NETWORKS

3 0 0 3

MODULE – I **15**

Network Planning and Operation: Wired transmission techniques: Design of wireless modems - power efficiency - out of band radiation - applied wireless transmission techniques - short distance base band transmission - UWB pulse transmission - broad Modems for higher speeds - diversity and smart receiving techniques - random access for data oriented networks - integration of voice and data traffic Wireless networks topologies - cellular topology - cell fundamentals signal to interference ratio calculation - capacity expansion techniques - cell splitting - use of directional antennas for cell sectoring - micro cell method - overlaid cells - channels allocation techniques and capacity expansion FCA - channel borrowing techniques – DCA - mobility management - radio resources and power management - securities in wireless networks.

MODULE - II **15**

Wireless WAN and LAN: Mechanism to support a mobile environment - communication in the infrastructure - IS-95 CDMA forward channel - IS – 95 CDMA reverse channel and frame formats in IS – 95 - IMT – 2000- forward channel in W-CDMA and CDMA 2000 - reverse channels in W-CDMA and CDMA-2000 - GPRS and higher data rates, short messaging service in GPRS mobile application protocols - Introduction- Fundamentals of WLANs- Technical issues- Network architecture -IEEE 802.11 Standard-Physical layer- MAC layer –CSMA/CA-MAC layer functionalities- other issues-WiMax and its applications.

MODULE - III **15**

Wireless PAN and AdHoc Networks: HIPERLAN Standard-HIPERLAN-1 –HIPERLAN-2-Bluetooth - WiMax - specifications-Transport protocol group-Middleware protocol group-Profiles- Zigbee-protocol architecture and applications - Introduction.- Ad hoc Vs cellular- applications- Issues in Ad Hoc Wireless Networks-Routing-Multicasting-Transport layer protocols- Quality of Service Provisioning-Security– Energy Management.

TOTAL : 45

TEXT BOOKS

1. Pahlavan Kaveh, and Krishnamoorthy Prashant, “Principles of Wireless Networks: A unified approach”, Pearson Education, New Delhi, 2002.
2. Siva Ram Murthy. C, and Manoj B.S, “AdHoc Wireless Networks Architectures and Protocols”, Pearson Education, New Delhi, 2008.

REFERENCE BOOKS

1. Schiller Jochen., “Mobile Communications”, Second Edition, Person Education, New Delhi, 2003.
2. Wang. X and Poor H.V., “Wireless Communication Systems”, Pearson Education, New Delhi, 2004.
3. Mallick M, “Mobile and Wireless Design Essentials”, Wiley Publishing Inc. New York, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand various standards and protocols of wired and wireless networks
CO2: Identify and design algorithms to Improve various QoS parameters
CO3: Involve in projects related to Geo-location systems and routing protocol
CO4: Will have an aptitude to take up applied research and to become entrepreneur in networking domain
CO5: Identify, formulate and solve multi disciplinary engineering problems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	2	-	-	3	-	-	1	-	-	1	2	2
CO2	-	2	-	-	3	-	-	1	-	-	1	2	2
CO3	-	2	-	-	3	-	-	1	-	-	1	2	2
CO4	-	2	-	-	3	-	-	1	-	-	1	2	2
CO5	-	2	-	-	3	-	-	1	-	-	1	2	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EC705 ELECTRONIC SYSTEM DESIGN LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

1. Design of Process Control Timer
2. Microprocessor/Micro Controller based system design along with suitable signal conditioners for the measurement using
   a. Photocell / LDR
   b. Temperature measurement using RTD- Thermo couples
3. Using assembly/C/Matlab interface to DSP to implement – FSK- DPSK- Signal compression
4. Simple applications using RFID.
5. Virtual Instrument for the measurement of voltage and frequency and development of VI for signal generator using LabVIEW
6. Development of VI using LabVIEW for
   a. Temperature measurement with display and visual and sound alarms
   b. Level measurement with display and visual and sound alarms
   c. Measurement of Torque/Speed/Displacement
   d. Audio Signal Spectrum Analyzer
7. .PCB Layout design using CAD

Software References:

- LabVIEW
- Orcad PSPICE

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Apply the knowledge to develop microcontroller and DSP based systems

CO2: Simulate the prototype of electronic circuits and electronic systems for the real time applications using Lab VIEW, ORCAD PSPICE and Proteus

CO3: Analyze and interpret the simulated circuits and systems to meet the requirements of the industry and society

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	3	2	-	-	-	-	1	-	-	2	2	-
CO2	-	3	2	-	-	-	-	2	-	-	3	2	-
CO3	-	2	2	-	-	-	-	3	-	-	2	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC706 OPTICAL AND MICROWAVE LABORATORY

0 0 3 1

LIST OF EXPERIMENTS

Microwave Lab Experiments:

1. Frequency measurement
2. Reflex Klystron mode characteristics
3. Radiation Pattern of Horn Antenna
4. VSWR and Z Measurement
5. Power Measurement
6. Characteristics of Gunn Diode Oscillator

Optical Experiments:

1. Measurement of the numerical aperture
2. LED and Laser diode characteristics
3. Data communication system using a fiber-optic system
4. Mode Characteristics of an optical fiber.
5. Characteristics of APD/ PD.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the characteristics of microwave oscillators, optical sources and detectors

CO2: Measure the microwave circuit parameters and optical fiber parameters required for analysis and troubleshooting

CO3: Set up microwave and optical systems for communication

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3	3	-	-	-	-	-	-	-	-	2	-
CO2	3	3	2	-	-	-	-	-	-	-	-	1	-
CO3	1	2	2	-	-	-	-	-	-	-	-	1	-

1 – Slight, 2 – Moderate, 3 – Substantial

11GE801 PROFESSIONAL ETHICS AND HUMAN VALUES

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Introduction to Human Values and Engineering Ethics: Understanding: Morals- Values-Ethics– Honesty – Integrity – Work Ethic – Service Learning – Civic Virtue –caring – Sharing– Courage – Valuing Time – Co-operation – Commitment – Empathy –Self-Confidence – Character – Spirituality- Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest –customs and religion- uses of ethical theories.

MODULE - II **15**

Safety, Responsibilities and Rights: Meaning of Engineering experimentation - engineers as responsible experimenters - codes of ethics for engineers - a balanced outlook on law - the challenger case study. Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - The Three Mile Island and Chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights – discrimination- Intellectual Property Rights (IPR)

MODULE - III **15**

Global Ethical Issues and Codes : Multinational corporations - Environmental ethics - computer ethics – weapons development-engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of Electronics and Telecommunication Engineers(IETE),India. etc.

TOTAL: 45

TEXT BOOKS

1. Martin Mike and Schinzinger Roland, “Ethics in Engineering”, Tata McGraw-Hill, New Delhi,2003.
2. Govindarajan M, Natarajan S, and Senthil Kumar V. S, “Engineering Ethics”, Prentice HallofIndia, New Delhi, 2004.

REFERENCE BOOKS

1. Fleddermann, Charles D., “Engineering Ethics”, Pearson Education/Prentice Hall, New Jersey, 2004.
2. Harris, Charles E., Protchard Michael S. and Rabins Michael J., “Engineering Ethics: Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000.
3. Seebauer, Edmund G and Barry, Robert L., “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Design a system, component or process to meet desired needs of social, political, ethical, health and safety requirements

CO2: Function in multi disciplinary teams by following engineering ethics and to undertake projects in multinational companies

CO3: Identify, formulate and solve engineering problems based on codes provided by the professional bodies and rights of the individual

CO4: Understand the impact of engineering solutions in a global and environmental context

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	3	-	-	3	-	-	3	-	-	-	-
CO2	-	-	3	2	-	3	-	-	3	-	-	-	-
CO3	-	-	3	3	-	3	-	-	-	-	-	-	-
CO4	-	-	3	3	-	3	-	-	-	-	-	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC801 CELLULAR AND MOBILE COMMUNICATION

3 0 0 3

MODULE - I **15**

Cellular Concept and Mobile Radio Propagation: Cellular Concept: Frequency reuse- channel assignment- hand off- Interference and system capacity- trunking and grade of service- Improving Coverage and capacity in Cellular systems - Free space propagation model- relating power to electric field -Propagation mechanisms- reflection -Ground reflection model -diffraction- scattering- link budget design using path loss models -Small scale Multipath propagation- Impulse response model of a multi-path channel- Small scale Multipath measurements- parameters of Mobile multipath channels- types of small scale fading

MODULE - II **15**

Modulation Techniques and Speech Coding: Modulation Techniques: Binary frequency shift keying- Minimum Shift Keying- Gaussian MSK- Orthogonal Frequency Division Multiplexing- Diversity reception- -Types of diversity- RAKE receiver -Basic combining methods- Equalization - Characteristics of speech signals - Quantization techniques - Adaptive Differential pulse code modulation (ADPCM)- Frequency domain coding of speech Vocoders- Linear Predictive Coders- Selection of Speech Codecs for Mobile Communication- GSM Codec- USDC Codec - Performance evaluation

MODULE - III **15**

Multiple Access Techniques and Cellular Standards: Multiple Access Techniques: FDMA- TDMA- spread spectrum multiple access- CDMA- SDMA- CSMA protocols- GSM-Architecture- Channels and Frame structure- GPRS- EDGE- CDMA standards (IS-95)-Forward CDMA channel and reverse CDMA channel –W-CDMA-Layer architecture- UMTS

TOTAL : 45

TEXT BOOK

1. Rappaport T.S, "Wireless Communications: Principles and Practice", Second Edition, Pearson Education/ Prentice Hall of India, New Delhi, 2003.

REFERENCE BOOKS

1. Garg Vijay K, "Wireless Network Evolution 2G to 3G", Pearson Education, New Delhi, 2003.
2. Agarwal Dharma Prakash and Zeng, Qing "An Introduction to Wireless and Mobile Systems", Second Edition, Thomson Learning, New Delhi, 2007.
3. Lee William C.Y, "Wireless and Cellular Telecommunications:, Third Edition, Tata McGraw-Hill, New Delhi, 2005.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the modulation techniques and model the propagation concepts in cellular communication

CO2: Identify, formulate and solve the problems in worldwide communication

CO3: Use the standards and multiple access techniques necessary for communication network management

CO4: Understand, design and develop realistic network architectures for various applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3	-	-	-	-	-	1	-	-	-	-	-
CO2	1	3	-	-	2	-	-	3	-	-	-	-	-
CO3	1	3	-	-	-	-	-	2	-	2	-	-	-
CO4	-	-	-	-	-	-	-	3	-	3	-	2	1

1 – Slight, 2 – Moderate, 3 – Substantial

11EC011 MEDICAL ELECTRONICS

3 0 0 3

MODULE - I **15**

Human Physiology: Introduction to the Man-Instrument System - Components of the Man-Instrument System – Physiological Systems of the Body – Problems Encountered in Measuring a Living System – Resting and Action Potentials – Propagation of Action Potentials - The Bioelectric Potentials – Skin-contact impedance .

Electrodes and Transducers: Electrodes for ECG - Electrodes for EEG - Electrodes for EMG – Basic recording system – General consideration for electronic recorder amplifiers – Sources of noise in low level recording circuits – Preamplifiers - The main amplifier and driver stage.

MODULE - II **15**

Recording and Monitoring Instruments: Electrocardiograph – Phonocardiograph – Electroencephalograph – Electromyograph – Measurement of heart rate – Blood pressure measurement – Measurement of temperature – Measurement of respiration rate – Wireless Telemetry – Single channel telemetry systems – Temperature telemetry system – Multichannel wireless telemetry system – Multipatient telemetry – Transmission of analog physiological signals over telephone lines – Computer-aided ECG analysis – Computerised catheterisation laboratory – Computerised patient monitoring system

MODULE - III **15**

Measurements and Analysis Techniques: Basic principles of cardiac pacemaker, defibrillator-Electric shock hazards – Leakage currents – Test instruments for checking safety parameters of biomedical equipments – Ultrasonic blood flowmeters – Measurement of blood pCO2 – Blood pO2 measurement – Coulter counters.

Medical Instrumentation: Hemodialysis machine - MRI and CT scan - Surgical diathermy machine – Electrodes used with surgical diathermy – Safety aspects in electrosurgical units – Surgical diathermy analysers.

TOTAL : 45

TEXT BOOKS

1. Cromwel Leslie., Weibel Fred. J. and Pferffer Erich. A., "Biomedical Instrumentation and Measurements", Prentice Hall India, New Delhi, 2001.
2. Khandpur R.S., "Handbook of Biomedical Instrumentation," Tata McGraw- Hill, New Delhi, 2004.

REFERENCE BOOKS

1. Rangayyan Rangaraj. M., "Biomedical Signal Analysis: A Case Study Approach", IEEE Press, John Wiley & Sons Inc, New York, 2002.
2. Carr Joseph .J. and Brown John .M., "Introduction to Biomedical Equipment Technology", John Wiley & Sons Inc, New York, 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Comprehend the physiological systems of human body

CO2: Analyze the various physiological measurement procedures

CO3: Use various biomedical instruments and apply their knowledge to analyze the measurements

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	3	1	-	-	-	2	-	-	-	-	-
CO2	-	-	2	3	2	-	-	2	-	-	-	2	-
CO3	-	-	3	1	2	-	-	2	-	-	-	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC012 SOFT COMPUTING

(Common to Mechatronics, ECE, CSE and IT branches**)**

3 0 0 3

MODULE – I **15**

Artificial Neural Networks: Basic concepts - Biological neuron, Artificial neuron ,single layer perceptron-Multi layer perceptron-Supervised Learning Neural Networks - Adaline - Backpropagation Mutilayer Perceptrons - Radial Basis Function Networks - Unsupervised Learning Neural Networks - Competitive Learning Networks - Kohonen Self-Organizing Networks - Learning Vector Quantization - Hebbian Learning.

MODULE - II **15**

Fuzzy Systems, Neuro-Fuzzy Modelling: Fuzzy sets and Fuzzy reasoning-Fuzzy Matrices-Fuzzy functions-decomposition- Membership Function Formulation and Parameterization - Defuzzification methods 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 , Applications. Adaptive Neuro-Fuzzy Inference Systems - Architecture - Hybrid Learning Algorithm - Learning Methods that Cross-fertilize ANFIS and RBFN , Classification and Regression trees-Data clustering algorithm.

MODULE - III **15**

Genetic Algorithm and Neuro-Fuzzy Applications: Survival of the fittest-schema theorem -cross over, mutation-, reproduction methods-Application. ANFIS Applications - Introduction- Printed Character Recognition- Nonlinear System Identification- Channel Equalization- Adaptive Noise Cancellation – Soft Computing for color receipe prediction.

TOTAL : 45

TEXT BOOKS

1. Jang J.S.R., Sun C.T and Mizutani E, “Neuro Fuzzy and Soft Computing”, Pearson/Prentice Hall India, New Delhi, 2006.
2. Goldberg David E., “The Design of Innovation; Genetic Algorithm and Evolutionary Computation”, Kluwer Academic publisher, Dordrecht, 2002.

REFERENCE BOOKS

1. Ross Timothy J., “Fuzzy Logic Engineering Applications”, Tata McGraw-Hill, New Delhi, 1997.
2. Rajasekaran S and Vijayalakshmi Pai G A, “Neural Networks: Fuzzy Logic and Genetic Algorithms Synthesis and Applications”, Prentice Hall India, New Delhi, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Optimize real world problems using fuzzy systems and genetic algorithm

CO2: Analyze the classification of patterns using neural networks

CO3: Design and solve engineering problems using neural and hybrid systems

CO4: Identify, formulate and solve multi disciplinary engineering problems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	2	2	-	3	-	-	-	-	-	2	2	3
CO2	-	3	2	-	3	-	-	-	-	-	1	2	2
CO3	-	3	2	-	3	-	-	-	-	-	3	2	3
CO4	-	2	3	-	2	-	-	-	-	-	1	2	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EC013 COMPUTER ARCHITECTURE AND INTERFACING

3 0 0 3

MODULE - I **15**

Basic Structure of Computers and Processing Unit: Functional units- Basic Operational Concepts, Bus Structures, Software Performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – addressing modes – assembly language – Basic I/O operations – stacks and queues - Fundamental concepts – Execution of a complete Instruction – Multiple bus organization – Hardwired control – micro programmed control.

MODULE - II **15**

Pipelining and Memory System: Pipelining – Basic concepts – data hazards – instruction hazards – influence on Instruction sets – Data path and control consideration – Superscalar operation.

Basic concepts – semiconductor RAMs, ROMs – Speed, size and cost – cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage.

MODULE - III **15**

I/O Organization and Interfacing: Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface Circuits – Standard I/O Interfaces (PCI, SATA, USB) -Operating systems and boot process-BIOS–personal computer architecture-Motherboard- Chipsets-Interfacing peripheral devices-Device drivers-Introduction to other Personal computers/work stations/Network computers.

TOTAL : 45

TEXT BOOKS

1. Hamacher Carl, Vranesic Zvonko and Zaky Safwat, "Computer Organization" Fifth Edition, McGraw Hill, New York, 2002.
2. Bigelow, Stephen J., "Trouble Shooting, maintaining and Repairing PCs", Tata McGraw-Hill, New Delhi, 2001.

REFERENCE BOOKS

1. Stallings, William., "Computer Organization and Architecture: Designing for Performance", Sixth Edition, Pearson Education, New Delhi, 2003.
2. Patterson, David A. and Hennessy, John L., "Computer Organization and Design: Hardware / software Interface", Second Edition, Morgan Kaufmann, San Francisco, 2002.
3. Hayes, John P., "Computer Architecture and Organization", Fourth Edition, McGraw-Hill, New York, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand basics of computer systems and basic Operations

CO2: Understand and design various memory devices and its management

CO3: Interface the peripherals with processors

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	-	-	2	-	-	-	-	-	-	3	2
CO2	-	-	-	-	2	-	-	-	-	-	-	3	2
CO3	-	-	-	-	2	-	-	-	-	-	-	2	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EC014 SPEECH SIGNAL PROCESSING

3 0 0 3

MODULE - I **15**

The speech signal – process of speech production – acoustic phonetics – the speech chain – anatomy of the ear – sound perception – auditory models; Acoustic theory of speech production – lossless tube models – digital models for sampled speech signals Time domain processing of speech signals: short time energy, magnitude, zero crossing rate, autocorrelation function, AMDF. Frequency domain representations for speech signals: short time. Fourier analysis and its modifications;

MODULE - II **15**

Linear predictive analysis of speech: basics of LP analysis computation of model gain frequency
domain interpretation solution of the LP equations prediction error signal properties of the LP polynomial alternative representations of the LP coefficients

MODULE - III **15**

Perceptual Motivated Representations – Formant Frequencies – Role of Pitch – Pitch Detection of Speech – Channel Vocoders and Predictive Coding Scalar; Waveform Coders – Scalar Frequency Domain Coders – Code excited linear Prediction Law – Bit rate Speech coders, Speech Recognition – Hiden Markov Models (HMM) – Practical Issues in Using HMMs – HMM Limitations. Acoustic Modeling – Phonetic Modeling – Language Modeling – Speaker Recognition Algorithm – Signal Enhancement for Mismatched Conditions

TOTAL: 45

REFERENCE BOOKS

1. Rabiner Lawrence and Schafer Ronals, "Theory and Applications of Digital Speech Processing", Prentice Hall, 2011.
2. Quatieri T.F., "Discrete Time Speech Signal Processing", Prentice Hall 2002
3. B.Gold and Morgan N., "Speech and Audio Signal Processing", Wiley and Sons, 2000.
4. Schroeder M.R., "Computer Speech – Recognition, Compression, Synthesis", Springer Series in Information Sciences, 1999.
5. Shaughnessy Douglas O", Speech Communciations: Human and Machine, Universities Press, 2001

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: perform both time and frequency domain analysis of speech

CO2: perceive the acoustics of speech production

CO3: apply knowledge of speech recognition techniques for real time projects

CO4: design a simple system for speech processing

CO5: interpret the practical aspects of speech algorithms

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	G	h	i	j	k	l	m
CO1	3			3	2						3	3	
CO2	3			3	2						3	3	
CO3		2		2								3	
CO4		2	2		3							3	
CO5		2	2		3							3	

3 – Substantial, 2 – Moderate, 1 – Slight

11EC015 HIGH SPEED NETWORKS

MODULE – I **15**

High Speed Networks, Congestion and Traffic Management: Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL.High Speed LANs: Fast Ethernet, Gigabit Ethernet, Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management.

MODULE - II **15**

TCP and ATM Congestion Control: TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM – Requirements – Attributes.

MODULE - III **15**

Integrated, Differentiated Services Protocols For QoS Support: Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services - RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL: 45

TEXT BOOK

1. Stallings, William, "High Speed Networks and Internet", Second Edition, Pearson Education, New Delhi, 2002.

REFERENCE BOOKS

1. Walrand Jean and Varaiya Pravin., "High Performance Communication Networks", Second Edition, Harcourt Asia Pvt. Ltd., Singapore, 2001.
2. Pepelnjk Irvan, Guichard Jim and Apcar Jeff, "MPLS and VPN Architecture", Volume I & II, Cisco Press, London, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand various standards and protocols of communication networks

CO2: Identify and design algorithms to Improve various QoS parameters

CO3: Undertake projects in the area of high speed networks

CO4: Will have an aptitude to take up applied research and to become entrepreneur in networking domain

Mapping of COs with POs

COs/POs	a	B	c	d	e	f	g	h	i	j	k	l	m
CO1	-	2	-	-	1	-	-	1	-	-	1	-	3
CO2	-	1	-	-	2	-	-	1	-	-	1	-	-
CO3	-	2	-	-	3	-	-	2	-	-	1	-	3
CO4		2	-	-	2	-	-	3	-	-	2	-	3

1 – Slight, 2 – Moderate, 3 – Substantial

11EC016 OPTOELECTRONIC DEVICES

3 0 0 3

MODULE – I **15**

Elements of Light, Solid State Physics And Display Devices: Wave nature of light- Polarization- Interference- Diffraction- Light Source- Review of Quantum Mechanical concept- Review of Solid State Physics- Review of Semiconductor Physics and Semiconductor Junction Device. Photo Luminescence- Cathode Luminescence- Electro Luminescence- Injection Luminescence- LED- Plasma Display- Liquid Crystal Displays- Numeric Displays.

MODULE – II **15**

Lasers and Optical Detectors: Laser Emission- Absorption- Radiation- Population Inversion- Optical Feedback- Threshold condition-Line Shape function-Pumping - Laser Modes- Classes of Lasers- Mode Locking-Q switching- Laser applications-Measurements of distance –Holography - Laser Induced Nuclear Fusion-Photo detector- Thermal detector- Photo Devices- Photo Emissive Devices-Photomultiplier-Noise in Photomultiplier-Photon Counting Technique-Image Intensifier- Photo conductive detectors-Noise in Photoconductive detectors - Junction Detectors- Detector Array- Detector Performance.

MODULE - III **15**

Optoelectronic Modulator and Integrated Circuits: Introduction- Analog and Digital Modulation- Franz-Keldysh and Stark effect modulators: Quantum well - Electro Absorption Modulators-Electro-optic Modulators- Magneto Optic Devices- Acousto optic devices- Optical Switching and Logic Devices. Introduction to opto electronic ICs- hybrid and Monolithic Integration- Application of Opto Electronic Integrated Circuits- Integrated Transmitters and Receivers- Guided wave devices.

TOTAL : 45

TEXT BOOKS

1. Wilson J and Haukes J, “Opto-electronics: An Introduction”, Prentice Hall of India, New Delhi, 2007.
2. Bhattacharya, “Semiconductor Opto-electronic Devices”, Prentice Hall of India, New Delhi, 2006.

REFERENCE BOOK

1. Jasprit Singh, “Opto-electronics: An Introduction to Materials and Devices”, McGraw-Hill International Edition, New York, 1998.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the basics of opto electronic devices

CO2: Apply the concepts of optical modulators and opto electronic ICs for real time applications

CO3: Take up research in the field of fiber optic networks

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	-	-	-	-	2	-	-	-	-	-	-	2	3
CO3	-	-	-	-	-	-	-	-	-	-	-	1	3

1 – Slight, 2 – Moderate, 3 – Substantial

11EC017 DIGITAL IMAGE PROCESSING

(Common to Mechatronics, ECE, EIE, and Information Technology branches)

3 0 0 3

MODULE – I **15**

Digital Image Fundamentals and Transforms: Elements of digital image processing systems- Elements of visual perception- psycho visual model- brightness- contrast- hue- saturation- mach band effect -Image sampling- Quantization - Basic relationship between pixels - Color image fundamentals - RGB- HSI models. Image Trasforms: 1D DFT- 2D transforms – DFT- DCT- Discrete Sine, Walsh- Hadamard, Slant- Haar, Hough Transform, KL transforms - properties of all transforms.

MODULE – II **15**

Image Enhancement and Restoration: Spatial domain enhancement: gray level transformations - histogram equalization - Image averaging- Spatial filtering: Smoothing, Sharpening filters– Frequency domain filters: Smoothing – Sharpening filters - Homomorphic filtering- Color image enhancement. Image Restoration: degradation model- Unconstrained and Constrained restoration- Inverse filtering - Wiener filtering.

MODULE – III **15**

Image Segmentation, Compression and Representation: Point- line and edge detection- Thresholding - Region based segmentation: Region splitting and merging. Need for data compression-Lossless compression-Lossy compression-compression standards. Image representation: chain codes – polygonal approximations – signatures – boundary segments – skeletons - Regional descriptors –Simple descriptors- Texture.

TOTAL: 45

TEXT BOOK

1. Gonzalez Rafael C and Woods Richard E, “Digital Image Processing”, Second Edition, Pearson Education, New Delhi, 2004.

REFERENCE BOOKS

1. Jain Anil K., “Fundamentals of Digital Image Processing”, Prentice Hall of India, New Delhi, 2002.
2. Salomon David., “Data Compression: The Complete Reference”, Second Edition, Springer, Verlag, New York, 2001.
3. Pratt William K, “Digital Image Processing”, John Wiley, New York, 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the real time images in various domains

CO2: Analyze and improve the performance of various algorithms

CO3: Improve the quality of images

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	2	2	-	1	-	-	-	-	-	3	2	2
CO2	-	2	2	-	3	-	-	-	-	-	3	2	2
CO3	-	2	2	-	2	-	-	-	-	-	3	1	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EC018 RF COMMUNICATIONS

3 0 0 3

MODULE - I **15**

Transceiver Design and Impedance Matching: Importance of RF Design - Dimensions and Units - Frequency spectrum - RF behavior of Passive components - chip components and circuit board consideration - CMOS: Introduction to MOSFET Physics. Noise: Thermal – shot – flicker - popcorn noise -Transceiver Specifications: Two port Noise theory - Noise Figure - THD - IP2 - IP3 – Sensitivity – SFDR - Phase noise - Specification distribution over a communication link. Transceiver Architectures: Receiver: Homodyne – Heterodyne - Image reject - Low IF Architectures – Transmitter: Direct upconversion - Two step upconversion - S-parameters with Smith chart - Impedance matching networks.

MODULE - II **15**

Amplifiers and Feedback Systems: Amplifiers: Common Gate - Common Source Amplifiers – OC Time constants in bandwidth estimation and enhancement – High frequency amplifier. Design of Low Noise Amplifiers: Power match and Noise match – Single ended and Differential LNAs – Terminated with Resistors and Source Degeneration LNAs - Feedback Systems: Stability of feedback systems - Gain and phase margin - Root-locus techniques – Time and Frequency domain considerations – Compensation Power Amplifiers: General model – Class A, AB, B, C, D, E and F amplifiers – Linearisation Techniques – Efficiency boosting techniques – ACPR metric – Design considerations.

MODULE - III **15**

Oscillators, Frequency Synthesizers and Mixers: Oscillators: Describing Functions, Colpitts oscillators – Resonators – Tuned Oscillators - Negative resistance oscillators – Phase noise - PLL: Linearised Model – Noise properties – Phase detectors – Loop filters and Charge pumps Frequency Synthesizers: Integer-N frequency synthesizers – Direct Digital Frequency synthesizers - Mixer: characteristics – Non-linear based mixers: Quadratic mixers – Multiplier based mixers: Single balanced and double balanced mixers – sub sampling mixers.

TOTAL : 45

TEXT BOOK

1. Lee T., “Design of CMOS RF Integrated Circuits”, Second Edition, Cambridge University Press, 2004

REFERENCE BOOKS

1. Reinhold Ludwig, and Pavel Bretchko, “RF Circuit Design,” Pearson Education, New Delhi, 2008.
2. Jan Crols, and Michiel Steyaert, “CMOS Wireless Transceiver Design”, Kluwer Academic Publishers, 2003.
3. Razavi B., “Design of Analog CMOS Integrated Circuits”, McGraw Hill, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the RF behavior with their passive and chip components

CO2: Design the various power amplifiers and feedback systems used in RF transceivers

CO3: Analyze the impact of noise in RF communication and design oscillators and frequency synthesizers

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	1	-	2	-	-	-	-	-	-	2	2
CO2	-	-	2	-	3	-	-	-	-	-	-	3	3
CO3	-	-	2	-	3	-	-	-	-	-	-	3	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EC019 EMBEDDED SYSTEMS DESIGN

3 0 0 3

MODULE – I **15**

32 Bit Coldfire Processor: Introduction to ColdFire Core- User and Supervisor Programming Model- Addressing modes- Special instructions,- Multiply-Accumulate Unit, Extended Multiply Accumulator Unit -Exceptions - Interrupt controller- Cache- Cryptographic Acceleration Unit-The MCF5223X Microprocessor: 5223X Microprocessor - UART- I2C –ADC – Timers- Interfacing SDRAM and Flash to ColdFire processor

MODULE – II **15**

Embedded Processor Architecture: Introduction to Embedded Computing - Issues and Challenges in Embedded System Design - Hardware Architecture - Software Architecture - Trends: SoC - custom designed chips - configurable processors and multi-core processors - Introduction to RISC architecture – pipelining - Instruction issue and execution - Instruction formats - Addressing modes - Data alignment and byte ordering - Introduction to PowerPC Architecture

MODULE - III **15**

Real-Time Operating System Concepts and Case Studies: Architecture of the Kernel - task and task scheduler - Interrupt Service Routines – Semaphores –Mutex – Mailboxes - Message Queues - Event Registers – Pipes – Signals – Timers - Memory Management – Priority Inversion Problem - Scheduling approaches - Optimality of the Earliest deadline first (EDF) algorithm - challenges in validating timing constraints in priority driven systems - Use of µC/OS-II-MQX - Case study of coding for an Automatic Chocolate Vending Machine using MUCOS RTOS

TOTAL 45

TEXT BOOKS

1. Simon David E., "An Embedded Software Primer", Pearson Education Asia, Singapore, 2000.
2. Labrosse Jean J., "MicroC/OS-II: The Real-Time Kernel", Second Edition, CMP Books Group west Publications, 2002.

REFERENCE BOOKS

1. Vahid Frank and Tony Givargis., "Embedded Systems Design: A unified Hardware /Software Introduction", John Wiley, New York, 2002.
2. Frey Brad., "Power PC Architecture Book", PowerPC Architect, IBM.
3. Rajkamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw-Hill, New Delhi, 2003.
4. Wolf Wayne, "Computers as Components; Principles of Embedded Computing System Design", Harcourt India, Singapore, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the concepts involved in the development of embedded products

CO2: Design and develop embedded systems for real time applications and to automate multidisciplinary engineering applications

CO3: Take up applied research to meet the needs of the society and become entrepreneurs

CO4: Recognize the need for life long learning

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	2	2	-	3	-	-	-	1	1	-	3	-
CO2	-	2	1	-	-	-	-	-	2	2	-	3	3
CO3	-	-	1	-	2	-	-	2	3	3	-	-	3
CO4	-	-	-	-	-	-	-	-	2	-	2	2	-

1 – Slight, 2 – Moderate, 3 – Substantial

11EC020 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

3 0 0 3

MODULE – I **15**

EMC/EMI Overview and EMI Properties of Passive Components: Aspects of EMC – Electrical dimensions – Common EMC units – EMC requirements for electronic systems – Electromagnetic interference – EMI noise sources – Methods of noise coupling – Methods of eliminating interference- Susceptibility – Differential and common-mode noise source- Wires – Component leads- Resistors – Capacitors – Inductors – Ferrite beads – Common-mode chokes- Mechanical switches – PCB lands – Electromechanical devices. **Crosstalk and Cabling:** Crosstalk via common impedance – Capacitive crosstalk-Inductive – crosstalk – Crosstalk combinations – Reduction of crosstalk – Shield transfer impedance – Shielding of electric field – Shielding of magnetic field – Different types of cables – Effect of Pigtails – Cable layouts

MODULE – II **15**

EMI Control Techniques

Grounding: Safety grounds – Signal grounds- Single-point ground systems- Multipoint ground systems- Hybrid grounds – Functional ground layout – Practical low-frequency grounding – Hardware grounds – Grounding of amplifier shields – Grounding of cable shields –Ground loops – Elimination of ground loops – Shield grounding at high frequencies – Guard shields. **Shielding:** Characteristic and wave impedances – Shielding effectiveness – Attenuation of fields by metal plates – Shielding with magnetic materials – Apertures – Faraday cage – Conductive gaskets- conductive window and coatings.

Filtering: Mechanism of conducted emission – Concept of power line filter design – Diagnostic techniques – Layout of filter – Non-linear Phenomena – Consequences of nonlinear characteristics – Nonlinearity of semiconductor devices – Increasing the immunity of semiconductor circuits: aspects of system layout and adaptation of circuit design- Examples from practice.

MODULE - III **15**

Digital Circuit Noise and Radiation and EMI Measurements and Standards: Spectra of digital circuit waveforms – Analog versus digital circuits – Digital logic noise – Digital circuit ground noise – Noise minimization – Differential mode radiation- Controlling differential mode radiation – Common mode radiation and control

Electrostatic Discharge: Static generation- Human body model- Static discharge- ESD protection in equipment design- EMI Emission Measurements and Test Methods – Open field test site – Shielded enclosures – Radio frequency anechoic chamber –Antennas – Line impedance stabilization network – Absorbing clamp – Requirements and types of interference wave measuring instruments – Test procedures for conducted EMI emission – Test procedures for radiated EMI emissions – Susceptibility standards and regulations- Susceptibility of electronics to EMI/ESD – Software and hardware protection – Continuous waves and transients – Susceptibility tests- procedures and equipment –Problems with susceptibility tests

TOTAL:45

TEXT BOOKS

1. Mills J. P., “Electromagnetic Interference Reduction in Electronic Systems”, Prentice-Hall, New Jersey, 1993.
2. Goedbloed J.J., “Electromagnetic Compatibility”, Prentice-Hall India, New Delhi, 1992.

REFERENCE BOOK

1. Paul C.R, “Introduction to Electromagnetic Compatibility”, John Wiley & Sons, New York, 1992.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the RF behavior with their passive and chip components

CO2: Design the various power amplifiers and feedback systems used in RF transceivers

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	-	2	-	-	-	-	-	-	-	-	2	-
CO2	3	-	2	-	-	-	-	-	-	-	-	3	2

1 – Slight, 2 – Moderate, 3 – Substantial

11EE603 POWER ELECTRONICS

(common to ECE, EEE and EIE branches)

3 0 0 3

MODULE - I **15**

Power Semi-Conductor Devices: Construction, Principle of operation – Static and dynamic characteristics of Power diodes, SCR, TRIAC, GTO, power BJT, power MOSFET, IGBT and IGCT – Safe operating Area – protection circuits – series and parallel connections.

Phase Controlled Converters: AC to DC converters: single phase and three phase controlled rectifiers with R, RL and RLE load – Estimation of RMS load voltage, RMS load current and input power factor, DPF - effect of source inductance – Single phase and three phase AC voltage controllers (using thyristors and Triacs). Control circuits: Functional requirements of the switching control circuits.

MODULE - II **15**

DC to DC Choppers: DC to DC converters: DC choppers using devices other than thyristors – Principle of step up and step down operation – single quadrant DC chopper with R, RL and RLE load – Time ratio control –Current Limit Control– two quadrant and four quadrant DC choppers. Voltage, current and load-commutated choppers. Introduction to buck, boost, cuk, buck-boost regulators - Step up and step down cycloconverter – single phase to single phase - three phase to single phase. Generation of timing pulses for DC choppers

MODULE - III **15**

Inverters: DC to AC converters: Inverters– Types – voltage source and current source inverters – single phase bridge inverters – three phase bridge inverters – 180^o and 120^o mode PWM inverters –Series inverter - Control of AC output voltage – Harmonic reduction

Control Circuits and Applications: PWM techniques for DC to AC converters – Introduction to power converter control using Digital controllers. Applications: UPS HVDC systems - SMPS

TOTAL: 45

TEXT BOOKS

1. Rashid, M.H., "Power Electronics: Circuits Devices and Applications", Third Edition, Prentice Hall of India, New Delhi, 2008.
2. Singh, M. D and Kanchandani, "Power Electronics", Second Edition, Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. Vithayathi, Joseph., "Power Electronics", First Edition, (McGraw-Hill series in Electrical and Computer Engineering), McGraw-Hill, New York, 1995.
2. Dubey, G.K., Doradia, S.R., Joshi, A. and Sinha, R.M., "Thyristorised Power Controllers", Wiley Eastern Limited, New Delhi, 1986.
3. Lander, W., "Power Electronics", Third Edition, McGraw-Hill, New York, 1993.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyze the performance parameters of controlled rectifiers.

CO2: Realize switching techniques and DC-DC switching regulators with various topologies.

CO3: Understand different modulation techniques and harmonic reduction methods

CO4: Apply the knowledge of power electronic convertors in conditioning the power supply

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1		2		2	3							3	
CO2		2		2	3							3	
CO3		2		2	3							3	
CO4		2		2	3							3	

3 – Substantial, 2 – Moderate, 1 – Slight

11CS302 OBJECT ORIENTED PROGRAMMING WITH C++

(Common to ECE, CSE and IT branches)

3 0 0 3

MODULE – I **15**

Introduction to OOP and Basics of C++: Object oriented programming concepts – objects – classes-methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism.

Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const and volatile functions - static members – Objects – pointers and objects – constant objects – nested classes – local classes - Constructors – default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructors.

MODULE - II **15**

Inheritance and Polymorphism: Operator overloading – overloading through friend functions – overloading the assignment operator – type conversion – explicit constructor - Inheritance – public, private, and protected derivations – multiple inheritance - virtual base class – abstract class– composite objects Runtime polymorphism – virtual functions – pure virtual functions – RTTI – typeid – dynamic casting – RTTI and templates – cross casting – down casting.

MODULE - III **15**

Templates, Exception Handling and Files: Function and class templates - Exception handling – try-catch-throw paradigm – exception specification – terminate and Unexpected functions – Uncaught exception- Streams and formatted I/O – I/O manipulators - file handling – random access – object serialization – namespaces - std namespace – ANSI String Objects – standard template library

TOTAL : 45

TEXT BOOK

1. Trivedi, B., "Programming with ANSI C++", Oxford University Press, Oxford, 2007.

REFERENCE BOOKS

1. Eckel B. and Allison C, "Thinking in C++ volume Two: Practical Programming", Pearson Education, New Delhi, 2004.
2. Lippman S. B, Lajoie Josee and Moo Barbara E., "C++ Primer", Fourth Edition, Pearson Education, New Delhi, 2005.
3. Stroustrup B., "The C++ Programming language", Third edition, Pearson Education, New Delhi, 2004.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Describe the concepts of object-oriented programming

CO2: Apply the concepts of data encapsulation, inheritance, and polymorphism to develop simple application

CO3: Utilize the features of templates, exception and file handling mechanisms

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1	3	3									1	
CO2	1	3	3									1	
CO3		3	3									1	

3 – Substantial, 2 – Moderate, 1 – Slight

11CS402 OPERATING SYSTEMS

(Common to ECE, EIE, CSE and IT branches)

3 0 0 3

MODULE - I **15**

Operating System Concepts and CPU Scheduling: Introduction – Computer System Organization –Operating System Structure-Process Management – Memory Management-Storage Management –Protection and Security – Distributed Systems-Operating System Services – System Calls - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication- Threads – CPU Scheduling: Scheduling criteria – Scheduling algorithms- Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – critical regions – Monitors.

MODULE - II **15**

Deadlock and Memory Management: Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock. Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation - Virtual Memory: Background – Demand paging – Page replacement –Thrashing.

MODULE - III **15**

File System Interface and Mass Storage Structure: File-System Interface: File concept – Access methods – Directory structure – Protection. File-System Implementation: Directory implementation – Allocation methods – Free-space management – I/O Systems – I/O Hardware – Application I/O interface – Kernel I/O subsystem – streams – Mass-Storage Structure: Disk scheduling –Disk management –Case study: Linux- Design Principles – Kernel Modules – Memory management-File Systems.

TOTAL : 45

TEXT BOOKS

1. Silberschatz Avi, Peter Baer Galvin, and Greg Gagne, “Operating System Concepts”, Eighth Edition, John Wiley & Sons, Singapore, 2008.
2. Deital, Harvey M., “Operating Systems”, Third Edition, Pearson Education, New Delhi, 2005.

REFERENCE BOOKS

1. Tanenbaum, Andrew S., “Modern Operating Systems”, Second Edition, Pearson Education, New Delhi, 2004.
2. Gary Nutt., “Operating Systems”, Third Edition, Pearson Education, New Delhi, 2004.
3. Dhamdhere D M, “Operating System: A Concept-Based Approach”, Second Edition, Tata McGraw-Hill, New Delhi, 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Recognize the fundamentals of operating system and process management concepts

CO2: Categorize memory management techniques and solve problems using page replacement strategies

CO3: Identify deadlock situations and provide appropriate solutions.

CO4: Paraphrase file, I/O and mass storage structures

CO5: Outline the operating system principles with respect to Linux.

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	3	3									2	
CO2	3	3	3									2	
CO3	3	3	3									2	
CO4	2	3	3									2	
CO5	1	3	3									1	

3 – Substantial, 2 – Moderate, 1 – Slight

11CS603 .NET TECHNOLOGIES

(Common to ECE,CSE and IT branches)

3 0 0 3

MODULE – I **15**

.NET overview: .NET overview - The .NET Platform -.NET framework design goal- .NET framework- The common language runtime- CLR environment-CLR executables-Metadata-Assemblies and Manifests-Intermediate Language (IL)-The CTS and CLS-CLR execution. .NET programming -Common programming model -Core features and languages-Language integration,Working with .NET components- Deployment options-Distributed components-COM+ services in .NET-Message queuing.

MODULE – II **15**

Introduction to C#: C# Language fundamentals - Classes and Objects - Inheritance and Polymorphism - Operator Overloading – Structs – Interfaces- Arrays, Indexers, and Collections- Strings and Regular Expressions - Handling Exceptions - Delegates and Events - Threads and Synchronization.

MODULE – III **15**

Windows and Web Application: Windows Applications: Windows Forms – Namespace – Windows Forms Development. ADO.NET: Architecture – Benefits – Content Components. Web Applications: ASP – ASP.NET – Namespace – Web Form Syntax – Application Development – Data Binding and the Use of Templates – State Management and Scalability – Form Authentication. Case Study: Application Development for Conducting Online Examination.

TOTAL : 45

TEXT BOOKS

1. Thuan L. Thai, ".NET Framework Essentials", Third Edition, Hoang Lam Publisher: O'Reilly Media, 2003.
2. J. Liberty, "Programming C#", Second Edition, O'Reilly, 2002.

REFERENCE BOOKS

1. Schildt, Herbert, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
2. Robinson, et al, "Professional C#", Second Edition, WroxPress, 2002.
3. Troelsen,Andrew., "C# and the .NET Platform", A Press, 2003.
4. www.w3schools.com

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Outline the .NET framework architecture and acquire knowledge about fundamentals and advanced features of C#

CO2: Create web services and integrate with different applications Develop console applications using object oriented concepts and basic programming constructs of C#

CO3: Use ADO.NET to design event driven Windows and database Applications

CO4 Create web services and integrate with different applications

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	3	3										
CO2	2	3	3										
CO3	2	3	3						2			2	
CO4	2	3	3			2	2		2			2	

3 – Substantial, 2 – Moderate, 1 – Slight

11IT013 JAVA TECHNOLOGIES

(Common to ECE, CSE and IT branches)

3 0 0 3

MODULE – I **15**

Basics and Evolution: Overview of Java – J2SE, J2EE and J2ME – type casting – overloading – overriding – abstract classes – interfaces – remote interfaces – interface and implementation – serialization – Remote Method Invocation (RMI) – Remote Object Activation (ROA)

RMI and IIOP: Middleware – Interface Definition Language (IDL) – Object Request Broker (ORB) - RMI-IIOP – reflection – Java Native Interface (JNI) – Java Data Base Connectivity (JDBC)

MODULE – II **15**

Streams and Sockets: IO streams – sockets – TCP, UDP and multicast sockets – applets – servlets – cookies – session tracking – applet to applet communication – applet to servlet communication

JSP and Multimedia: Java Bean – Jar files – Java Server Pages (JSP) – JSP objects and directives – multimedia streaming – Java Media Framework (JMF), Java Server Faces(JSF), Google Web Tool kit(GWT)

MODULE – III **15**

J2EE: J2EE architecture – EJB – Session, Entity and Message driven beans – Model View Control (MVC) architecture – Java Naming and Directory Interface (JNDI) – eXtensible Markup Language (XML)

J2EE services and J2ME: Java Messaging Service (JMS) – Transactions – Java Transaction Service (JTS) – Java Connector Architecture (JCA) – Java Authentication and Authorization Service (JAAS) – J2ME overview – CLDC and CDC - J2ME architecture and development environment

TOTAL: 45

TEXT BOOKS

1. Asbury Stephen and Weiner Scott R., "Developing Java Enterprise Applications", Second Edition, Wiley publications, , 2001.
2. Schildt Herbert, "Java 2: The Complete Reference", Fifth Edition, Tata McGraw Hill, 2002.

REFERENCE BOOKS

1. Elliotte Rusty Harold, "Java Network Programming", O'Reilly publishers, 2000.
2. Hortsmann and Cornell, "Core java 2 advanced features, Volume. II", Pearson Education, 2002.
3. Keogh James, "J2ME: The Complete Reference", Tata McGraw Hill edition, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Explore advanced java concept and techniques

CO2: Understand the concepts for different kinds of communication patterns

CO3: Identify ,formulate ,design and develop applications for rapid enterprises

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	-	-	1	2	-	-	-	-	-	-	1	2	2
CO2	-	-	2	1	-	-	-	-	-	-	1	2	2
CO3	-	-	2	3	-	-	-	-	-	-	2	1	3

1 – Slight, 2 – Moderate, 3 – Substantial

11IT016 SYSTEM SOFTWARE

(Common to ECE and IT branches)

3 0 0 3

MODULE – I **15**

Introduction: System software and machine architecture – SIC – CISC – MISC machine architectures – Memory – Data/ Instruction formats – Addressing modes – Instruction sets – I/O

Assemblers: Elements of assembly language programming – Basic assembler functions – SIC assembler – Assembler algorithm and data structures – Machine dependent assembler features – Machine independent assembler features – One pass assemblers and multi pass assemblers – Implementation – Example- MASM assembler

MODULE - II **15**

Loaders and Linkers: Basic loader functions – Design of an absolute loader – A simple bootstrap loader – Machine dependent loader features – Relocation – Program linking – Algorithm and data structures- Machine-independent loader features – Automatic library search – Loader options – Loader design options – Linkage editors – Dynamic linking – Bootstrap loaders – Implementation – Example – DOS linker

MODULE - III **15**

Macro Processors: Basic macro processor functions – Macro definition and expansion – Macro processor algorithm and data structures – Machine-independent macro processor features –Macro processor design options –Implementation example – MASM macro processor – ANSI C macro language

Compiler and System Software Tools: Basic compiler functions – Grammars – Lexical analysis – Syntactic analysis – Code generation- Database management systems- Text editors – Interactive debugging systems

TOTAL : 45

TEXT BOOK

1. Beck, Leland L., "System Software: An Introduction to Systems Programming", Third Edition, Pearson Education Asia, 2000.

REFERENCE BOOKS

1. Aho A.U., Sethi Ravi and Ullman J.D., "Compilers Principles Techniques and Tools", Addison Wesley, 1988.
2. Dhamdhere, "Systems Programming and Operating Systems", McGraw-Hill Education, New Delhi, 2003.
3. Donovan, John J. "Systems Programming", Tata McGraw-Hill Edition, 1972.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the need of system software

CO2: Know the basics of machine architecture and its relation with system software

CO3: Know the design and implementation of assemblers

CO4: Know the design and implementation of linkers and loaders

CO5: Understand macroprocessor and system software tool

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2		3					2					
CO2			3		2			2				3	
CO3	2				2							3	
CO4	2		3		2			2				3	
CO5								2					

3 – Substantial, 2 – Moderate, 1 – Slight

11MA011 NUMERICAL METHODS AND LINEAR PROGRAMMING

3 0 0 3

MODULE – I **15**

Solution of Simultaneous Equations: False Position method – Newton Raphson Method – Solution of Linear System of Gauss Elimination and Gauss Jordon Methods. Gauss Jacobi Method- Gauss – Seidal Method.

Interpolation: Newton's forward and backward difference formula – Lagrangian Polynomial.

MODULE – II **15**

Numerical Differentiation: Differentiation using Newton's forward and backward difference interpolation formula - Single step Methods - Taylor Series, Euler and Modified Euler methods - Fourth order Runge-Kutta method for solving first order equations.

Numerical Integration: Trapezoidal rule – Simpson's 1/3 rule.

MODULE – III **15**

Linear Programming Problem: Introduction– Basic Assumptions – Mathematical Formulation of Linear Programming Problem –Graphical Solution – Simplex Method to solve canonical form of Linear Programming Problem – Duality.

Transportation Model: Initial Basic Feasible Solution by Northwest Corner Rule, Least Cost Method, Vogel's Approximation method and optimal solution by MODI method – Assignment Model.

TOTAL: 45

TEXT BOOKS

1. Kandasamy P, Thilagavathi, K, Gunavathi, K, "Numerical Methods", S. Chand and Co., New Delhi, Reprint 2011.
2. Taha H.A., "Operations Research: An Introduction", Seventh Edition, Pearson Education, Asia, New Delhi, Reprint 2008.

REFERENCE BOOKS

1. Venkataraman M.K, "Numerical Methods", National Publishing Company, Chennai, 1991.
2. Kandasamy P, Thilagavathi, K, Gunavathi, K, "Numerical Methods", S. Chand and Co., New Delhi, Reprint 2011.
3. Sankara Rao K, "Numerical Methods for Scientists and Engineers", Second Edition, Prentice Hall India, New Delhi, 2004.
4. Kanti Swarup, P K Gupta, Man Mohan " Operations Research", Sultan Chand & Co,Reprint 2010.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Know the various methods of solving algebraic and transcendental equations numerically

CO2: Understand the concept of interpolation techniques

CO3: Understand the concepts of numerical differentiation and integration

CO4: Know the methods of solving boundary value problems and initial value problems

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	-	-	2	3	-	-	-	-	-	-	-	-
CO2	3	-	-	2	3	-	-	-	-	-	-	-	-
CO3	3	-	-	2	3	-	-	-	-	-	-	-	-
CO4	3	-	-	2	3	-	-	-	-	-	-	-	-

1 – Slight, 2 – Moderate, 3 – Substantial

11GE011 ENTREPRENEURSHIP DEVELOPMENT

(Common to all Engineering and Technology branches except Civil Engg.)

3 0 0 3

MODULE – I **15**

Entrepreneurship Concepts: Meaning and Concepts of Entrepreneurship – Definition and Characteristics of an Entrepreneur – Entrepreneurial Process – The scope of Entrepreneurship in India. Entrepreneurial Motivation – Factors creating Entrepreneurship – Classification of Entrepreneurs – Intrapreneurship - Barriers to Entrepreneurship – Creativity, Innovation & Entrepreneurship - Role of Entrepreneurship in Economic Development.

MODULE – II **15**

Business Plan: Business Planning Process – Idea generation, Environmental Scanning, Feasibility Analysis, Drawing Functional Plan - Marketing Plan – Production/Operations Plan –Organizational Plan – Financial Plan – Human Resource Plan – Project Report Preparation , Evaluation, Control and Review.

MODULE – III **15**

Managing a Small Business: Sources of Finance - Institutions Supporting Entrepreneurs - EDPs. Small Scale Industry – The Strengths and Weaknesses of Small Business - Growth strategies – Sickness - Evaluation, Symptoms, Causes and Assessment – Rehabilitation of Sick Industries.

TOTAL :45

TEXT BOOKS

1. Madhurima Lall and Shikha Sahai, " Entrepreneurship", Excel Books, New Delhi, 2006
2. S.S.Khanka, " Entrepreneurial Development", S.Chand & Company Ltd, 2005

REFERENCE BOOKS

1. Robert D Hisrich, Michael P Peters and Dean A Shepherd, "Entrepreneurship", Sixth Edition, Tata McGraw Hill, New Delhi, 2009.
2. Mary Coulter, "Entrepreneurship in Action", Second Edition, Prentice Hall of India, New Delhi, 2005.
3. Jain P.C., "Handbook for New Entrepreneurs", Oxford University Press, Oxford, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: understand the concepts of entrepreneurship and its importance

CO2: understand the traits of an entrepreneur and the sources of his motivation

CO3: understand the components of a business plan

CO4: demonstrate knowledge of various sources of finance and institutions supporting entrepreneurship

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1			2	2				2	2				3
CO2			2	2				2	2				3
CO3			2	2				2	2				3
CO4			2	2				2	2				3

3 – Substantial, 2 – Moderate, 1 – Slight

11MT012 MICRO ELECTRO MECHANICAL SYSTEMS

(Common to Mechatronics, ECE, EEE, and EIE branches)

3 0 0 3

MODULE - I **15**

Microsystems, Microsensors and Actuators: Overview-Microsystems - Working principle of Microsystems - Scaling laws - Scaling in geometry - Scaling in rigid body dynamics - Scaling in electrostatic forces - Scaling in electromagnetic forces - Scaling in electricity - Scaling in fluid mechanics - Scaling in heat transfer - Micro actuation techniques - Micro sensors- Micropump – Micromotors – Microvalves – Microgrippers - Micro accelerometers.

MODULE - II **15**

Micro System Fabrication Process and Manufacturing: Substrates - Single crystal silicon wafer formation – Photolithography - MEMS materials - Ion implantation - Diffusion - Oxidation - CVD - Physical Vapor Deposition - Deposition by epitaxy - Etching process - Bulk Micromanufacturing Surface Micromachining – LIGA - SLIGA

MODULE - III **15**

Micro System Design and Application: Micro system packaging – Materials - Die level - Device level - System level - Packaging techniques - Surface bonding - Wire bonding – Sealing - Design considerations - Process design - Mask layout design - Applications of micro system in – Automotive - Bio medical – Aero space – Telecommunications field. Basic exposure to software for MEMS design - Intellisuite

TOTAL: 45

TEXT BOOKS

1. Gad-el-Hak, Mohamed, "The MEMS Hand book", CRC Press, Florida, 2002.
2. Tai-Ran Hsu, "MEMS and Microsystems: Design and Manufacture", Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. Fatikow, S. and Rembold, U, "Microsystem Technology and MicroRobotics", Springer-Verlag, Berlin Heidelberg, 1997.
2. Gardner, Julian W., Varadan, Vijay K. and AwadelKarim Osama, O., "Microsensors MEMS and Smart Devices", John Wiley & sons, New York, 2001.
3. Marc Madou, Fundamentals of Microfabrication, CRC press, New York, 1997
4. W.Trimmer, Editor, Micromechanics and MEMS: Classic and Seminar papers to 1990, IEEE press, 1996.
5. Tay, Francis E.H. and Choong, W.O, "Microfludics and BioMEMS Applications", Springer, Berlin, 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: assess the scaling laws in microsystems

CO2: select suitable micro sensors and actuators

CO3: fabricate microsystems for specific applications

CO4: design and develop microsystem manufacturing process and packaging

CO5: develop a design procedure for microproducts

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	3		2								3	
CO2	3	3		2								3	
CO3	3	3		2								3	
CO4	3	3		2								3	
CO5	3	3		2								3	

3 – Substantial, 2 – Moderate, 1 – Slight

11MT801 AUTOMOTIVE ELECTRONICS

(Common to Mechatronics Engineering and ECE branches)

3 0 0 3

MODULE - I **15**

Basics of Automotive Electrical and Electronics: Need for electronics in automotive systems: Performance (speed, power, and torque), Control (emission, fuel economy, drivability, and safety) and Legislation (environmental legislation for pollution & safety norms). Overview of vehicle electronic systems - Basic electrical components and their operation in an automobile: power train subsystem (starting systems, charging systems - ignition systems – electronic fuel control), chassis subsystem (abs, tcs,& esp) – comfort and safety subsystems (night vision, airbags, seatbelt tensioners, cruise control-lane-departure-warning, parking).

MODULE - II **15**

Embedded Systems for Automotive Electronics: Introduction to Embedded Systems: H/W Module: Program Memory (PM), Data Memory (DM), Parallel Port Structures, Timer, Input Capture & Output Compare Units, ADC, PWM, Introduction to an embedded board S/W Module: IDE; generating different Files; Programming, testing and debugging using different Emulators, debuggers. Introduction to Embedded RTOS: Tasks and Task states, Tasks and Data, Semaphores and shared data, Inter-task Communication. Use of MicroC/OS-II and other software Tools for development of Embedded Systems. Features of Micro/OS-II. In vehicle networks: CAN, LIN, FLEXRAY, MOST, KWP2000-Diagnostics systems in modern automobiles

MODULE - III **15**

Embedded System in Automotive Applications: Engine management systems – Gasoline / Diesel systems, various sensors used in system –Electronic transmission control - Vehicle safety system – Electronic control of braking and traction – Body electronics – Infotainment systems – Navigation systems – System level tests – Software calibration using engine and vehicle dynamometers – Environmental tests for Electronic Control Unit - Application of Control elements and control methodology in Automotive System.

TOTAL: 45

TEXT BOOKS

1. Tom Denton, "Automobile Electrical and Electronics Systems", Edward Arnold Publishers, London, 2000.
2. David E. Simon, "An Embedded Software Primer", Addison-Wesley Professional, 1999.
3. Raj Kamal, "Embedded Systems - Architecture, Programming and Design", Tata McGraw Hill, New Delhi, Second Edition, 2003

REFERENCE BOOKS

1. Hollembeak, Barry, "Automotive Electricity, Electronics & Computer Controls", Delmar Publishers, New York, 2001.
2. Jean J. Labrosse, "MicroC OS II: The Real Time Kernel", CMP Books, Second Edition, 2002
3. William B. Ribbens, "Understanding Automotive Electronics", Butterworth-Heinemann, Burlington, 2003.
4. Bosch Automotive Hand Book, 8th Edition, 2011.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Elaborate the basic concepts and working principle of various vehicle electronic and safety systems

CO2: Analyze the importance of embedded systems and vehicle networking systems in automotive Applications.

CO3: Apply the concept of embedded system in automotive for developing engine management system and control elements

Mapping of COs with POs

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1	2	-	-	3	-	-	-	-	-	-	3	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	2	1	-	3	-	-	-	-	-	-	3	-

1 – Slight, 2 – Moderate, 3 – Substantial