NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to Anna University, Chennai)

K.R.NAGAR, KOVILPATTI – 628 503

www.nec.edu.in

REGULATIONS – 2013

DEPARTMENT OF

ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM AND SYLLABI OF

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

Department Of Electronics and Communication Engineering

VISION

- To produce communication engineers capable of generating a knowledge economy with social responsibility

MISSION

- To impart high quality education with ethical behavior.
- To equip the students compatible with recent trends in Electronic industries.
- To develop leadership qualities with humanity, wisdom, creativity and team spirit.
- To provide a passionate environment for continual learning.

Program Educational Objectives (PEO)

- Graduate will have successful technical career in core and related fields.
- Graduates will pursue higher education and work in Research and Development for solving real world problems.
- Graduates will have leadership qualities with social consciousness and ethics.

Program Outcomes (PO)

1. An ability to apply knowledge of mathematics, science, engineering and technology to solve complex Electronics and communication Engineering problems.
2. An ability to identify, formulate and analyze engineering problems using knowledge of Basic Mathematics and Engineering sciences.
3. An ability to provide solution and to design Electronics and Communication systems that meets out the social needs.
4. An ability to investigate the problems in an Electronics and Communication systems and rectifying it.
5. An ability to use latest hardware and software tools to solve complex engineering problems.
6. An ability to gain knowledge on contemporary issues which influence engineering design.
7. Awareness on society and environment to have sustainable solution for Electronics and Communication engineering problems.
8. An ability to demonstrate understanding of professional and ethical responsibilities.
9. An ability to work efficiently as an individual and in multidisciplinary teams.
10. An ability to communicate effectively and efficiently both in verbal and written form.
11. An ability to develop confidence for self education and understanding the value for life-long learning.
12. Able to implement Electronic system projects for real world applications.

REGULATIONS 2013 – CURRICULUM AND SYLLABI

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER I (Common to all B.E. / B.Tech., Degree Programmes)

S. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	SH100	Technical English – I	3	1	0	4
2.	SH101	Matrices and Differential Calculus	3	1	0	4
3.	SH102	Applied Physics	3	0	0	3
4.	SH103	Engineering Chemistry	3	0	0	3
5.	SH104	Fundamentals of Computing and Programming in C	3	0	0	3
6.	SH105	Engineering Graphics	2	3	0	4
PRACTICAL						
7.	SH106	C Programming Laboratory	0	0	3	2
8.	SH107	Physics and Chemistry Laboratory – I Part A – Physics Laboratory – I Part B – Chemistry Laboratory – I	0	0	3	2
9.	SH108	Engineering Practices Laboratory Part A – Mechanical and Civil Engineering Practices Part B – Electrical and Electronics Engineering Practices	0	0	3	2
		Total Number of Credits :				**27**

SEMESTER – II

S. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	13B20	Technical English – II (***Common to all***)	3	0	0	3
2.	13B21	Integral Calculus and Transforms (***Common to all***)	3	1	0	4
3.	13B22	Solid State Physics (***Common to ECE, CSE, EEE, EIE, and IT***)	3	0	0	3
4.	13B23	Chemistry of Electrical and Electronic Materials (***Common to ECE, CSE, EEE, EIE and IT***)	3	0	0	3
5.	13B24	Circuit Theory and Electron Devices (***ECE***)	3	1	0	4
6.	13B25	Basic Civil and Mechanical Engineering (***Common to ECE, CSE, EEE, EIE and IT***)	4	0	0	4
PRACTICAL						
7.	13B26	Computer Programming Laboratory (***Common to all***)	0	1	2	2
8.	13B27	Physics and Chemistry Laboratory – II (***Common to all***) Part A – Physics Laboratory – II Part B – Chemistry Laboratory – II	0	0	3	2
9.	13B28	Circuits and Devices Laboratory (***ECE***)	0	0	3	2
10.	13B29	English Language Skill Laboratory (***Common to all***)	0	0	3	2
		Total Number of Credits :				**29**

SEMESTER – III

S. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	13EC31	Fourier Transforms and Complex Analysis	3	1	0	4
2.	13EC32	Environmental Science and Engineering	3	0	0	3
3.	13EC33	Digital Electronics	3	1	0	4
4.	13EC34	Electromagnetic Fields	3	1	0	4
5.	13EC35	Electronic Circuits – I	3	1	0	4
6.	13EC36	C++ and Data Structures	3	0	0	3
PRACTICAL						
7.	13EC37	Electronic Circuits Laboratory	0	0	3	2
8.	13EC38	C++ and Data Structures Laboratory	0	0	3	2
		TOTAL	**18**	**4**	**6**	**26**

SEMESTER – IV

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	13EC41	Probability and Random Processes	3	1	0	4
2.	13EC42	Electronic Circuits – II	3	1	0	4
3.	13EC43	Electrical Engineering	3	0	0	3
4.	13EC44	Transmission Lines and Waveguides	3	1	0	4
5.	13EC45	Linear Integrated Circuits	3	0	0	3
6.	13EC46	Signals and Systems	3	1	0	4
PRACTICAL						
7.	13EC47	Electronic Circuits and Simulation Laboratory	0	0	3	2
8.	13EC48	Digital and Linear Integrated Circuits Laboratory	0	0	3	2
9.	13EC49	Communication Skills and Technical Seminar	0	0	3	2
		TOTAL	**18**	**4**	**9**	**28**

SEMESTER – V

S. No	Course Code	Course Title	L	T	P	C
THEORY						
1	13EC51	Communication Theory	3	1	0	4
2	13EC52	Digital Signal Processing	3	1	0	4
3	13EC53	Microprocessors and Microcontroller	3	1	0	4
4	13EC54	Control Systems Analysis and Design	3	1	0	4
5	13EC55	Professional Ethics and Human Values	3	0	0	3
6		Elective – I	3	0	0	3
PRACTICAL						
7	13EC57	Analog Communication and Signal Processing Laboratory	0	0	3	2
8	13EC58	Microprocessor and Microcontroller Laboratory	0	0	3	2
		TOTAL	**18**	**4**	**6**	**26**

SEMESTER – VI

S. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	13EC61	Digital Communication	3	1	0	4
2.	13EC62	Computer Architecture and Organization	3	0	0	3
3.	13EC63	Computer Communication Networks	3	1	0	4
4.	13EC64	Antennas and Wave Propagation	3	1	0	4
5.	13EC65	VLSI Technology and Design	3	1	0	4
6.		Elective – II	3	0	0	3
PRACTICAL						
7.	13EC67	Digital Communication and Networks Laboratory	0	0	3	2
8.	13EC68	VLSI Design Laboratory	0	0	3	2
		TOTAL	**18**	**4**	**6**	**26**

SEMESTER – VII

S. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	13EC71	Advanced Logic Design	3	0	0	3
2.	13EC72	Wireless Communication	3	1	0	4
3.	13EC73	Optical Communication and Networks	3	0	0	3
4.	13EC74	RF and Microwave Engineering	3	0	0	3
5.		Elective III	3	0	0	3
6.		Elective IV	3	0	0	3
PRACTICAL						
7.	13EC77	Electronic System Design Laboratory	0	0	3	2
8.	13EC78	Optical and Microwave Laboratory	0	0	3	2
9.	13EC79	Comprehension	0	0	3	1
		TOTAL	18	1	9	**24**

SEMESTER - VIII

S. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	13EC81	Principles of Management	3	0	0	3
2.	13EC82	Satellite Communication Systems	3	0	0	3
3.		Elective V	3	0	0	3
4.		Elective VI	3	0	0	3
PRACTICAL						
7.	13EC87	Project Work	0	0	12	6
		TOTAL	12	0	12	**18**

LIST OF ELECTIVES

S. No	Course Code	Course Title	L	T	P	C
SIGNAL AND IMAGE PROCESSING						
1	13ECAA	Fundamentals of Digital Image Processing	3	0	0	3
2	13ECAB	VLSI Digital Signal Processing	3	0	0	3
3	13ECAC	Digital Signal Processors	3	0	0	3
4	13ECAD	Wavelets and its Applications	3	0	0	3
5	13ECAE	Biosignal Processing	3	0	0	3
RF and COMMUNICATION ENGINEERING						
6	13ECBA	Radar and Navigational Aids	3	0	0	3
7	13ECBB	Statistical Theory of Communication	3	0	0	3
8	13ECBC	Multimedia Compression and Communication	3	0	0	3
9	13ECBD	Information Theory and Coding Techniques	3	0	0	3
10	13ECBE	Global Navigation Satellite System	3	0	0	3
11	13ECBF	Electromagnetic Interference and Compatibility	3	0	0	3
VLSI and EMBEDDED SYSTEM						
12	13ECCA	Open Source Based Embedded System Design*	3	0	0	3
13	13ECCB	Advanced Microprocessors	3	0	0	3
14	13ECCC	Advanced VLSI Design	3	0	0	3
15	13ECCD	Fundamentals of Semiconductor Chip Testing*	3	0	0	3
16	13ECCE	ARM Processor Architecture and Programming	3	0	0	3
17	13ECCF	Embedded and Real Time Systems	3	0	0	3
APPLIED ELECTRONICS						
18	13ECDA	Medical Electronics	3	0	0	3
19	13ECDB	Advanced Electronic System Design	3	0	0	3
20	13ECDC	Micro Electro Mechanical Systems	3	0	0	3
21	13ECDD	Electronic Instrumentation and Measurements	3	0	0	3
NETWORKS						
22	13ECEA	Mobile Adhoc Networks	3	0	0	3
23	13ECEB	Wireless Sensor Networks	3	0	0	3
24	13ECEC	High Speed Networks	3	0	0	3

		(Common to ECE, CSE & IT)				
25	13ECED	Principles of Network Security	3	0	0	3
MANAGEMENT						
26	13ECFA	Total Quality Management	3	0	0	3
27	13ECFB	Entrepreneurship Development	3	0	0	3
INTER – DISCIPLINARY COURSES						
(Maximum of 2 Electives to be opted)						
28	13ECGA	Principles of Operating Systems	3	0	0	3
29	13ECGB	Soft Computing	3	0	0	3
30	13ECGC	Internet and Web Technology (Common to CSE, ECE & IT)	3	0	0	3
31	13ECGD	Social Computing (Common to IT, ECE & CSE)	3	0	0	3
32	13ECGE	Mobile Computing (Common to IT, ECE and EEE)	3	0	0	3
33	13ECGF	Analytic Computing (Common to IT, ECE & CSE)	3	0	0	3
34	13ECGG	Cloud Computing (Common to IT, ECE, EEE & CSE)	3	0	0	3
35	13ECGH	Business Intelligence and its Applications (Common to CSE & ECE)	3	0	0	3
36	13ECGJ	Artificial Intelligence and Robotics (Common to CSE & ECE)	3	0	0	3

* - Industry Oriented subject

TRANS DISCIPLINIARY ELECTIVES

S. No.	Course Code	Course Title	L	T	P	C
Any one of the following course is compulsory						
1.	13TD01	Indian Business Laws	0	0	0	3
2.	13TD02	Leadership and Personality Development	0	0	0	3
3.	13TD03	International Business Management	0	0	0	3
4.	13TD04	Basics of Marketing	0	0	0	3
5.	13TD05	Retailing and Distribution management	0	0	0	3
6.	13TD06	International Economics	0	0	0	3
7.	13TD07	Indian Economy	0	0	0	3
8.	13TD08	Rural Economics	0	0	0	3
9.	13TD09	International Trade	0	0	0	3
10.	13TD10	Global Challenges and issues	0	0	0	3
11.	13TD11	Indian Culture and Heritage	0	0	0	3
12.	13TD12	Indian History	0	0	0	3
13.	13TD13	Sustainable Development and Practices	0	0	0	3
14.	13TD14	Women in Indian Society	0	0	0	3
15.	13TD15	Indian Constitution	0	0	0	3
16.	13TD16	Bio Mechanics in Sports	0	0	0	3

SH100 TECHNICAL ENGLISH – I
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
3 1 0 4

COURSE OUTCOMES

The Student will

- apply basic grammar in Writing and Speaking.
- prepare formal Letter Writings.
- come out with proper pronunciation.
- speak confidently in interactions.
- develop interest to read any article.

UNIT I **12**

Language Focus: Technical Vocabulary, Word Formation, Concord, Tense (Present).
Writing: Leave Application Letter, Paragraph writing.
Listening: Listening to correct pronunciation of words.
Speaking: Self - Introduction, Greetings.

UNIT II **12**

Language Focus: Words often misspelled, Articles, Tense (Past)
Writing: Permission letters (In-plant training/Seminar/Workshop), Chart description.
Listening: Listening to the Sentences with correct stress and Intonation.
Speaking: Situational Conversations.

UNIT III **12**

Language Focus: Compound nouns, Tense (Future), Preposition, Comparative Adjectives.
Writing: Invitation Letter, Acceptance Letter, Declining Letter.
Listening: Listening to the conversations.
Speaking: One minute speech.

UNIT IV **12**

Language Focus: Modal verbs, Gerund, Infinitives, Voice.
Writing: Writing Instructions, Letters to Editor.
Listening: Listening to the different Tonal Expressions.
Speaking: Giving Opinions.

UNIT V **12**

Language Focus: 'If' Conditionals, 'Wh' questions, Question Tags.
Writing: Reading and Note - taking
Speaking: Group Discussion.
Reading: ERC, one word questions from the suggested book.

SUGGESTED ACTIVITIES

1. Matching words and meanings – Using words in context – Making sentences.
2. Exercises on gap filling and correction of errors on Concord (Subject – Verb Agreement).
3. Gap filling exercises using the appropriate Tense forms.
4. Exercises on transferring information from Graph to Text – Bar charts, Flow charts.
5. Making sentences using Modal verbs to express probability, compulsion, etc.
6. Exercises on Writing Instructions.
7. Exercises on framing Questions.
8. Other relevant classroom activities.

L: 45 T: 15 TOTAL: 60 PERIODS

BOOK SUGGESTED FOR READING

1. R.K.Narayanan, “Malgudi Days”, Indian Thought Publications, 1943.

REFERENCES

1. Rizvi. M. Ashraf, “Effective Technical Communication”, McGraw Hill Companies, 2005.
2. P.K.Dutt, G.Rajeevan and C.L.N. Prakash, “A Course in Communication Skills”, Cambridge University Press India, 2007.
3. Andrea.J.Rutherford, “Basic Communication Skills for Technology”, Pearson Education, 2nd Edition, 2007.

SH101 MATRICES AND DIFFERENTIAL CALCULUS
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
3 1 0 4

COURSE OUTCOMES

- Ability to find inverse and integral powers of matrices and to perform transformations of matrices.
- Ability to find the evolutes of various curves.
- Ability to solve ordinary and partial differential equations.
- Ability to obtain constrained maxima and minima.

UNIT I MATRICES 12

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties (excluding proofs); Cayley – Hamilton theorem (excluding proof) – Inverse and integral powers of a matrix using Cayley – Hamilton theorem; Diagonalisation of a matrix by orthogonal transformation; Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II DIFFERENTIAL CALCULUS 12

Curvature in cartesian, parametric and polar forms; Centre, radius and circle of curvature; Evolutes.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives; Total derivatives; Differentiation of implicit functions; Jacobians; Maxima and Minima - Method of Lagrangian multipliers.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients; Method of variation of parameters; Cauchy's and Legendre's linear equations; Simultaneous first order linear equations with constant coefficients.

UNIT V PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations; Lagrange's linear equations; Solutions of standard types of first order partial differential equations; Linear partial differential equations of second and higher order with constant coefficients.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", Khanna Publications, Delhi, 40th Edition, 2007.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 8th Edition, Reprint 2011.

REFERENCES

1. Bali N. P. and Manish Goyal, "Text book of Engineering Mathematics", Laxmi Publications Private Limited, 7th Edition, Reprint, 2010.
2. Ramana.B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2007.
3. Jain.R.K. and Iyengar.S.R.K., "Advanced Engineering Mathematics", Narosa Publishing House Private Limited, 3rd Edition, 2007.
4. Veerarajan.T., "Engineering Mathematics for semester I and II", Tata McGraw Hill Education Private Limited, New Delhi, 3rd Edition, 2012.
5. Veerarajan.T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Private Limited, New Delhi, 2012.

SH102 APPLIED PHYSICS

(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
3 0 0 3

COURSE OUTCOMES

The students will be able to

- gain knowledge on the properties of matter and hydrodynamics.
- study and apply the ultrasonic methods for industrial and medical field.
- understand Lasers and to identify the appropriate Laser technique for industrial and medical field.
- understand the different types, fabrication, losses of optical fibers and the applications of fiber optics in communication and instrumentation.
- understand the physical properties of photons and electrons and to study the different Electron Microscopes.

UNIT I PROPERTIES OF MATTER AND HYDRODYNAMICS 9

Properties of Matter

Stress, Strain, Hooke's law; Types of moduli of elasticity; Torsional pendulum – Determination of Rigidity modulus of a wire; Bending of beams – Expression for bending moment – Measurement of Young's modulus by uniform and Non- uniform bending – I Shaped girders.

Hydrodynamics

Stream line flow, Turbulent flow, Poiseuille's formula for flow of liquid through a capillary tube, Determination of coefficient of viscosity of a liquid.

UNIT II ULTRASONICS 9

Production – magnetostriction effect – magnetostriction generator – piezoelectric effect – piezoelectric generator; Detection of ultrasonic waves; Properties – Cavitations – Velocity measurement – acoustic grating; Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non Destructive Testing – pulse echo system through transmission and reflection modes – A,B and C scan displays; Medical applications – Sonograms.

UNIT III LASERS 9

Principle of spontaneous emission and stimulated emission, Population inversion, Pumping, Einstein's A and B coefficients – derivation; Types of Lasers - CO_2 Laser, Nd-YAG Laser, Semiconductor Laser (Homojunction); Determination of wavelength of Laser using grating and Particle size; Applications of Lasers: Industrial applications – Welding, Cutting and Heat treatment; Medical applications; Holography (construction and reconstruction).

UNIT IV FIBER OPTICS AND ITS APPLICATIONS 9

Principle and propagation of light in optical fibers; Numerical aperture and Acceptance angle; Types of optical fibers – material, refractive index and mode; Double crucible technique of fiber drawing; Splicing – fusion splicing; Loss in optical fiber – attenuation, dispersion and bending; Fiber optical communication system (Block diagram); Advantages and Applications of optical fiber; Fiber optic sensors – temperature and displacement; Endoscope.

UNIT V QUANTUM PHYSICS AND MICROSCOPY 9

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh Jean's Law from Planck's theory; Photoelectric effect – Law of Photoelectric effect – Photoelectric equation; Matter Waves – De Broglie wavelength - Schrodinger's wave equation – time independent and time dependent equations – Particle in one dimensional box; Heisenberg's Uncertainty principle; Linear Harmonic oscillator; Electron microscope – scanning electron microscope – transmission electron microscope.

TOTAL: 45 PERIODS

TEXT BOOKS

1. R.K.Gaur and S.C.Gupta, "Engineering Physics", Dhanpat Rai Publications, New Delhi, 2009.
2. M.Arumugam, "Engineering Physics", Anuradha Publishers, 2010.

REFERENCES

1. David Halliday, Robert Resnick, Jearl Walker, "Fundamentals of Physics", John Wiley and Sons, Inc., USA, 9th Edition, 2013.
2. Arthur Beiser, "Concepts of Modern Physics", McGraw Hill Publications Private Limited, 5th Edition, 2008.
3. Richard P.Feynmann, Robert B.Leighton and Mathew Sands, "Feynmann's Lectures on Physics", Addison Wesley Publication, USA, 2010.
4. Yoav Peleg, Reuven Pnini, Elvahu Zaarur, Eugene Hecht, "Schaum's Outline of Quantum Mechanics", McGraw Hill Companies Limited, USA, 2nd Edition, 2010.

SH103 ENGINEERING CHEMISTRY
(Common to all B.E. / B.Tech., Degree Programmes)

L	T	P	C
3	0	0	3

COURSE OUTCOMES

The students will be able to

- select suitable water treatment techniques for industrial and domestic purpose.
- acquire knowledge of electrochemistry.
- apply the contextual knowledge of adsorption techniques for industrial applications.
- synthesize polymers for domestic and industrial applications.
- understand the knowledge of nano materials for their applications in Science and Engineering.

UNIT I WATER TREATMENT 9

Hardness: types of hardness, estimation of hardness of water – EDTA method – problems; disadvantages of hard water: scales and sludges – disadvantages of scales and sludges – boiler corrosion – priming and foaming – caustic embrittlement; domestic water treatment: screening, sedimentation, coagulation, filteration, disinfection – chlorine – UV method; water softening: demineralization process; desalination: definition, reverse osmosis.

UNIT II ELECTRO ANALYTICAL TECHNIQUES 9

Electrode potential: definition, measurement of electrode potential, Nernst equation – problems; EMF: definition, measurement of EMF – Poggendorff's method; reference electrode: standard hydrogen electrode, calomel electrode, glass electrode – measurement of pH using glass electrode; CO_2 sensing electrode; conductometric titrations: acid-base titration (HCI vs NaOH); potentiometric titrations: redox titration (Fe^{2+} vs $K_2Cr_2O_7$), precipitation titration (Ag^+ vs NaCl).

UNIT III CATALYSIS AND SURFACE PHENOMENA 9

Types of catalysis – homogeneous catalysis – heterogeneous catalysis, mechanism of catalytic action - contact theory, catalytic promoters, catalytic poison; enzyme catalysis: Michaelis-Menton equation; adsorption: definition, types – physical adsorption – chemical adsorption – differences between physical and chemical adsorption; adsorption isotherms: definition, Frendlich and Langmuir adsorption isotherms, applications of adsorption.

UNIT IV ENGINEERING POLYMERS 9

Polymerization – types of polymerization – addition – free radical addition polymerization mechanism – copolymerization – condensation polymerization; plastics: classification – thermoplastics and thermosetting plastics, preparation, properties and uses of commercial plastics – PVC, teflon, perlon – U, backelite; rubber: vulcanization of rubber, synthetic rubber – butyl rubber, SBR; composites: definition, types of composites – polymer matrix composites – FRP.

UNIT V NANO MATERIALS 9

Nanoparticles: definition, carbon nanotubes (CNT), types of carbon nano tubes – single walled and multi walled carbon nanotubes – fullerene; synthesis of carbon nanotubes: chemical vapour deposition – laser ablation – arc-discharge method; properties of CNT: mechanical, electrical, thermal and optical properties; applications of carbon nanotubes in chemical field, medicinal field, mechanical field and current applications.

TOTAL: 45 PERIODS

TEXT BOOKS

1. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 15th Edition, 2005.
2. S.S.Dara, "A text book of Engineering Chemistry", S. Chand and Company Limited, New Delhi, 12th Edition, 2006.

REFERENCES

1. J.Hammer Mark, "Water and Waste water Technology", Prentice Hall, New Arrivals, 2012.
2. G.Whitmore, "Electrochemistry and its Applications", Sarup book publishers, New Delhi, 2009.
3. G.Whitmore, "Adsorption and Catalysis", Sarup Book Publishers, New Delhi, 2008.
4. Fred.Bilmayer, "Text book of Polymer Science", Wiley, 1st Edition, 2007.
5. T.Pradeep, "Nano – The Essential", Tata McGraw Hill Education Private Limited, New Delhi, 2012.
6. S.C.Bhatia, "Engineering Chemistry", CBS Publishers and Distributors, 1st Edition, 2011.

SH104 FUNDAMENTALS OF COMPUTING AND PROGRAMMING IN C
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
3 0 0 3

COURSE OUTCOMES

- Learn the major components of a computer system.
- Formulate the algorithms and analyze their complexity.
- Identify the correct and efficient ways of solving problems.
- Acquire knowledge about dynamic memory allocation, modular programming and data organization.
- Develop real time applications using the power of C language features.

UNIT I COMPUTER FUNDAMENTALS 10

Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations – Classification of Computers – Basic Computer organization – Number Systems – Problem Analysis – Algorithms – Flow charts – Computer Software – Types of Software.

UNIT II BASIC C PROGRAMMING 9

Structure of C Program – Keywords, Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making – Branching and Looping.

UNIT III FUNCTIONS, ARRAYS AND POINTERS 9

Functions: User-defined functions – Definitions – Declarations - Call by reference – Call by value. Arrays: Declaration – Definition – Multidimensional Arrays – Functions with array as arguments. Pointers: Initialization – Pointers as Arguments – Pointers to Pointers – Dynamic Memory Management Functions.

UNIT IV STRUCTURES AND UNIONS 9

Derived types – Structures: Declaration – Definition – Initialization of structures – Accessing structures – Nested structures – Arrays of structures – Structures and functions – Pointers to structures – Self-referential structures – Unions.

UNIT V FILE HANDLING 8

File structure – binary and text files – File handling functions – File I/O — File Manipulations.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", Oxford University Press, 1st Edition, 2009.
2. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India), 2011.

REFERENCES

1. Ashok.N.Kamthane, "Computer Programming", Pearson Education (India), 2008.
2. Stephen G.Kochan, "Programming in C", Pearson Education (India), 3rd Edition, 2005.
3. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc., 2005.

SH105 ENGINEERING GRAPHICS

(Common to all B.E. / B.Tech., Degree Programmes)

L	T	P	C
2	3	0	4

COURSE OUTCOMES

- Students will be able to use the drawing instruments effectively.
- An ability to draw the basic engineering curves and problems related to projections of points, straight lines, planes and solids.
- Able to apply the knowledge acquired on practical applications of sectioning and development of solids.
- Able to draw simple solids and its sections in isometric view and projections and also to draw its perspective views.

Drawing Instruments – IS specifications on lines – drawing sheets – Printing letters and dimensioning – scales (not for examination) – First angle projection should be followed.

UNIT I PLANE CURVES 12

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloids – Epi and Hypo cycloids - construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 12

Projection of points and straight lines located in the first quadrant – Traces – Determination of true lengths and true inclinations.

Projection of regular polygonal surfaces and circular lamina inclined to any one reference plane.

UNIT III PROJECTION OF SOLIDS 12

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

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 12

Sectioning of above solids 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, cylinder and cone – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 12

Principles of isometric projection – isometric scale – isometric projections of simple solids – cube – prisms, pyramids, cylinder and cone in simple position only, truncated prisms, pyramids, cylinders and cones.

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

TOTAL: 60 PERIODS

Note: In end semester examination from each unit one question with either or pattern may be asked. No short questions.

TEXT BOOK

1. N.D. Bhatt, "Engineering Drawing", Charotar Publishing House, 46th Edition, 2003.

REFERENCES

1. K.V.Natrajan, “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2006.
2. M.S.Kumar, “Engineering Graphics”, D.D. Publications, 2007.
3. K.Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International Private Limited, 2008.
4. M.B.Shah and B.C.Rana, “Engineering Drawing”, Pearson Education, 2005.
5. K.R.Gopalakrishnan, “Engineering Drawing” (Vol. I & II), Subhas Publications, 1998.
6. Dhananjay A.Jolhe, “Engineering Drawing with an Introduction to AutoCAD”, Tata McGraw Hill Publishing Company Limited, 2008.
7. Basant Agarwal and Agarwal.C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

SH106 C PROGRAMMING LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
0 0 3 2

COURSE OUTCOMES

- Acquire logical thinking and problem solving skills.
- Implement the algorithms and analyze their complexity.
- Identify the correct and efficient ways of solving problems.
- Acquire hands on practice in dynamic memory allocation, modular programming and data organization.
- Implement real time applications using the power of C language features.

LIST OF EXPERIMENTS

1. Solve problems such as temperature conversion, student grading, interest calculation.
2. Finding the 2's complement of a binary number.
3. Generation of the first 'n' terms of the Fibonacci sequence and prime sequence.
4. Computing Sine series and Cosine series.
5. Given distance traveled by a vehicle as $\mathbf{d = ut + 1/2at^2}$, where 'u' and 'a' are the initial velocity and acceleration. Calculate the distance traveled for different time intervals.
6. Solving the roots of a quadratic equation.
7. Designing a simple arithmetic calculator. (Use switch statement)
8. Performing the following operations: (Use loop statement)
    i. Generate Pascal's triangle.
    ii. Construct a Pyramid of numbers.
9. Performing the following operations to a string:
    i. To insert a sub-string into main string at a given position.
    ii. To delete 'n' characters from a given position in a string.
    iii. To replace a character of string either from beginning or ending or at a specified location.
10. Performing the following operations: (Use arrays)
    i. Matrix addition.
    ii. Transpose of a matrix.
    iii. Matrix multiplication by checking compatibility.
11. Performing the following operations: (Use recursive functions)
    i. To find the factorial of a given integer.
    ii. To find the GCD (Greatest Common Divisor) of two given integers.
    iii. To solve Towers of Hanoi problem.
12. Performing the Student Information Processing using File Handling concepts.

TOTAL: 45 PERIODS

SOFTWARE REQUIREMENTS

- Turbo C/ ANSI C Compiler
- Gcc compiler

SH107 PHYSICS AND CHEMISTRY LABORATORY – I

(Common to all B.E. / B.Tech., Degree Programmes)

L	T	P	C
0	0	3	2

PART A – PHYSICS LABORATORY – I

COURSE OUTCOMES

At the end of the Laboratory classes, the students are able to

- develop collaborative learning skills and to add some of their own ideas to the experiments and their explanations.
- understand the optical properties, mechanical properties and electrical properties.

LIST OF EXPERIMENTS

1. (a) Particle size determination using Diode Laser.
   (b) Determination of Laser parameters – Wavelength, and angle of divergence.
   (c) Determination of Numerical aperture and acceptance angle of an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of velocity of sound and compressibility of the liquid – Ultrasonic Interferometer.
4. Determination of Dispersive power of a prism using Spectrometer.
5. Determination of Young's modulus – Non-uniform bending method.
6. Determination of coefficient of viscosity of liquid – Poiseuille's method.
7. Determination of specific resistance of a given coil of wire – Carey Foster's Bridge.

• A minimum of FIVE experiments shall be offered.

PART B - CHEMISTRY LABORATORY – I

COURSE OUTCOMES

The student

- can estimate the amount of hardness and acidity present in the water sample.
- gain knowledge about the estimation of nickel in an alloy.
- quantify the electrolyte by measuring the conductance and pH.

LIST OF EXPERIMENTS

1. Estimation of hardness of Water sample by EDTA method.
2. Estimation of acidity of Water sample.
3. Estimation of Nickel by EDTA method.
4. Conductometric titration (HCl Vs NaOH).
5. Conductometric titration ($BaCl_2$ Vs Na_2SO_4).
6. pH metric titration (HCl Vs NaOH).
7. Determination of molecular weight and degree of polymerization using Viscometry.

• A minimum of FIVE experiments shall be offered.

• Laboratory classes on alternate weeks for Physics and Chemistry.

TOTAL: 45 PERIODS

SH108 ENGINEERING PRACTICES LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
0 0 3 2

COURSE OUTCOMES

- Students will be able to prepare the pipe connections and identify the various components used in plumbing.
- An ability to prepare simple wooden joints using wood working tools.
- An ability to prepare simple lap, butt and tee joints using arc welding equipments.
- An ability to prepare simple components using lathe and drilling machine.

PART A – MECHANICAL AND CIVIL ENGINEERING PRACTICES

I PLUMBING WORKS: **5**

Study of components related to plumbing.
Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

II CARPENTRY PRACTICES: **6**

Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planning and cutting.

III WELDING: **5**

Study of the tools used in welding Gas welding practice.
Preparation of butt joints, lap joints and tee joints using arc welding.

IV BASIC MACHINING: **7**

(a) Simple Turning and Taper turning.
(b) Drilling Practice.

REFERENCES

1. Ramesh Babu.V., "Engineering Practices Laboratory Manual", VRB Publishers Private Limited, Chennai, Revised Edition, 2013 – 2014.
2. Jeyachandran.K., Natarajan.S. and Balasubramanian.S., "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.
3. Bawa.H.S., "Workshop Practice", Tata McGraw Hill Publishing Company Limited, 2007.
4. Rajendra Prasad.A. and Sarma.P.M.M.S., "Workshop Practice", Sree Sai Publication, 2002.
5. Kannaiah.P. and Narayana.K.L., "Manual on Workshop Practice", Scitech Publications, 1999.

PART B – ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICES

COURSE OUTCOMES

- An ability to develop familiarity with rudimentary measurement equipment – signal generators, oscilloscopes, multimeters and power supplies.
- Ability to demonstrate and evaluate the parameters of basic electronic components (wires, resistors, capacitors, diodes etc.) based on their physical parameters and dimensions.
- Define, describe, and analyze fundamentals of Boolean algebra and digital logic gates.
- An ability to predict qualitatively and quantitatively compute the steady state AC responses of basic circuits using the phasor method.
- Gain experience in the documentation of measurements and procedures as well as the preparation of formal reports.

I ELECTRICAL ENGINEERING PRACTICE 10

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair-case wiring.
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of an electrical equipment.

II ELECTRONICS ENGINEERING PRACTICE 12

1. Study of Electronic components and equipments – Resistor, colour coding, measurement of AC signal parameters (peak-peak, rms period, frequency) using CRO
2. Study of logic gates AND, OR, XOR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

REFERENCES

1. K.Jeyachandran, S.Natarajan and S.Balasubramanian, “A Primer on Engineering Practices Laboratory”, Anuradha Publications, 2007.
2. T.Jeyapoovan, M.Saravanapandian and S.Pranitha, “Engineering Practices Lab Manual”, Vikas Publishing House Private Limited, 2006.
3. H.S.Bawa, “Workshop Practice”, Tata McGraw Hill Publishing Company Limited, 2007.
4. A.Rajendra Prasad and P.M.M.S.Sarma, “Workshop Practice”, Sree Sai Publication, 2002.
5. P.Kannaiah and K.L.Narayana, “Manual on Workshop Practice”, Scitech Publications, 1999.

13B20 TECHNICAL ENGLISH – II
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
3 0 0 3

COURSE OUTCOMES

The student will be able to

- apply correct form of language while Speaking and Writing.
- prepare his own Professional letter writings.
- interpret any passage after listening.
- interact at different situations fluently.

UNIT I **10**

Language Focus: Homonyms, Different grammatical forms of the same word, correct usage of words / phrases.
Writing: Recommendation writing.
Listening: Interpreting Poetic lines.
Speaking: Telephone English.

UNIT II **9**

Language Focus: Cause and Effect, Phrasal Verbs.
Writing: Quotation letter, Clarification Letter, Placing orders, Complaint Letter.
Listening: Conversations.
Speaking: Asking questions.

UNIT III **9**

Language Focus: Idioms and Phrases with animal names.
Writing: Checklist, Process Description.
Speaking: Presentations.

UNIT IV **9**

Language Focus: Technical Definitions, Transformation of Sentences.
Writing: Job Application Letter, Curriculum Vitae, Bio-data, Resume.
Speaking: Mock Interview.

UNIT V **8**

Language Focus: British and American Vocabulary, Numerical Expressions.
Writing: E-mail Writing, Report Writing.
Speaking: Group Discussion.

SUGGESTED ACTIVITIES

1. Making sentences using different grammatical forms of the same word.
2. Exercises on combining sentences using Cause and Effect expressions.
3. Writing Formal Letters.
4. Writing exercises on Recommendations.
5. Exercises on Idioms and Phrases.
6. Exercises on preparing letter of Job Application with annexure.
7. Exercises on British and American English words with meanings.

TOTAL: 45 PERIODS

BOOK SUGGESTED FOR READING

1. A.P.J.Abdul Kalam, Arun Tiwari, "Wings of Fire", an Autobiography, University Press Private Limited India, 1999, 30th Impression, 2007.

REFERENCES

1. T.M.Farhathullah, “Communication Skills for Technical Students”, Orient Longman Private Limited, 2002.
2. K.R.Lakshmi Narayanan, “English for Technical Communication”, SciTech Publications, 1999.
3. Jack.C.Richards, Jonathan Hull and Susan Protor, “English for International Communication”, Cambridge University Press, 3rd Edition, 2004.

13B21 INTEGRAL CALCULUS AND TRANSFORMS
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
3 1 0 4

COURSE OUTCOMES

- Ability to find area and volume of objects using double and triple integrals.
- Ability to analyze the concepts related to vector calculus and to apply them in engineering field.
- Ability to perform the ideas of Laplace transform and Z-transform in their respective engineering subjects.

UNIT I MULTIPLE INTEGRALS 12

Double integration – Cartesian and polar coordinates; Change of order of integration; Change of variables between cartesian and polar coordinates; Triple integration in cartesian coordinates; Area as double integral; Volume as triple integral.

UNIT II VECTOR CALCULUS 12

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields; Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT III LAPLACE TRANSFORM 12

Definition of Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties – Derivatives and Integrals of Transform – Transform of derivatives and integrals – Transform of unit step function and impulse function – Transform of periodic function – Initial and final value theorems.

UNIT IV INVERSE LAPLACE TRANSFORM 12

Definition of Inverse Laplace transform – Convolution theorem – Solution of linear ordinary differential equations of second order with constant coefficients using Laplace transformation techniques and solution of simultaneous differential equations of first order with constant coefficients using Laplace transformation techniques.

UNIT V Z – TRANSFORM 12

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Formation of difference equations – Solution of difference equations using Z-transform.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publications, New Delhi, 40th Edition, 2007.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 8th Edition, 2011.

REFERENCES

1. Bali.N.P. and Manish Goyal, "Text book of Engineering Mathematics", Laxmi Publications Private Limited, 7th Edition, 2008.
2. Ramana.B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2007.
3. Jain.R.K. and Iyengar.S.R.K., "Advanced Engineering Mathematics", Narosa Publishing House Private Limited, 3rd Edition, 2007.
4. Veerarajan.T., "Engineering Mathematics for semester I & II", Tata McGraw Hill Education Private Limited, 3rd Edition, New Delhi, 2012.
5. Veerarajan.T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Private Limited, New Delhi, 2012.

13B22 SOLID STATE PHYSICS
(Common to ECE, CSE, EEE, EIE and IT)

L	T	P	C
3	0	0	3

COURSE OUTCOMES

The Student will be able to

- identify the crystal lattices, their structures and how the structure influences its major properties at different levels.
- choose the major functional and structural properties required for specific applications of conducting materials
- check the parameter that satisfies superconducting behaviour.
- relate technology to the physics of semiconductor devices.
- classify the magnetic materials and their storage applications.
- design optical materials that are able to be manufactured and measured using the state of art optical fabrication technologies.

UNIT I CRYSTAL PHYSICS 9

Lattice, Unit cell, Bravais lattice, Lattice planes; Miller indices – d-spacing in cubic lattice; Calculation of number of atoms per unit cell, Atomic radius, Coordination number and Packing factor for SC, BCC, FCC and HCP structures; Crystal defects – point, line and surface defects; Burger vector.

UNIT II CONDUCTING MATERIALS AND SUPERCONDUCTORS 9

Conductors

Band theory of solids - Distinguish between conductors, semiconductors and insulators on the basis of band theory of solids; 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.

Superconductors

Superconductivity: Properties – Meissner effect – Isotopic effect; Types of superconductors – Type I and Type II superconductors; Applications of superconductors – Magnetic levitation.

UNIT III SEMICONDUCTORS 9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – variation of Fermi level with temperature – electrical conductivity – bandgap determination; Extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level – with temperature and impurity concentration; Hall effect – Determination of Hall coefficient – Applications.

UNIT IV MAGNETIC MATERIALS AND STORAGE DEVICES 9

Origin of magnetic moment, Bohr magneton, Dia and Para magnetism, Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials; Anti-ferromagnetic materials; Ferrites – structure and applications; magnetic recording and readout – storage of magnetic data – tapes, floppy, Hard disk and CD ROM.

UNIT V OPTICAL MATERIALS 9

Optical properties of metals, insulators and semiconductors; Phosphorescence and fluorescence; Excitons traps and color centre and their importance; Different phosphors used in CRO screens, liquid crystal display, LED – working of LED; Thermography and its applications; Solar cell – PN junction solar cell – Conversion efficiency and solar concentration – Hetero junction solar cell.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Charles Kittel, "Introduction to Solid State Physics", John Wiley and Sons, Singapore, 7th Edition, 2007.
2. Dr.N.Sankar, S.O.Pillai, "A Text book of Engineering Physics", New Age International Publications, New Delhi, 2009.

REFERENCES

1. Donald A.Neamen "Semiconductor Physics and Devices", Tata McGraw Hill Publication, New Delhi, 3rd Edition, 2007.
2. M.Arumugam, "Materials Science", Anuradha publications, Kumbakonam, 2010.
3. Calister, "Material Science and Engineering: An Introduction", John Wiley and Sons, 6th Edition, 2009.

13B23 CHEMISTRY OF ELECTRICAL AND ELECTRONIC MATERIALS
(Common to ECE, CSE, EEE, EIE and IT)

L T P C
3 0 0 3

COURSE OUTCOMES

The students can

- apply the knowledge in designing new energy storing devices.
- identify the types of corrosion and to design a method to control the corrosion.
- apply the knowledge of photochemistry in designing the various electronic materials.
- choose proper analytical technique for analyzing the synthesized electronic materials.

UNIT I ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear energy: definition – mass defect; types of nuclear reactions: nuclear fission – characteristics – nuclear chain reaction – fusion reactions – difference between nuclear fusion and fission reaction; nuclear reactor: components – light water nuclear reactor – breeder reactor; solar energy: solar cell – advantages; wind energy: wind mill – advantages; storage batteries: types – primary battery – alkaline battery – secondary battery – lead-acid, nickel-cadmium; lithium battery; fuel cell: H_2-O_2 fuel cell.

UNIT II CORROSION AND ITS CONTROL 9

Chemical corrosion: oxidation corrosion – Pilling-Bedworth rule; electrochemical corrosion: mechanism – hydrogen evolution mechanism – oxygen absorption mechanism – galvanic corrosion – differential aeration corrosion; factors influencing corrosion; corrosion control: cathodic protection: sacrificial anodic protection – impressed current cathodic protection – inhibitors; electroplating: methods of cleaning the article – electroplating of gold; electroless plating: advantages over electroplating – electroless plating of nickel.

UNIT III PHOTOCHEMICAL PROCESSES 9

Photochemical reactions: definition, characteristics; laws of photochemistry – Grothus-Draper's law – Stark-Einstein's law – Beer-Lambert's Law; quantum yield: definition, reason for low and high yield; photochemical equilibrium: photochemical synthesis of hydrogen chloride; photophysical processes: types – non radiative transition – internal conversion – inter system crossing – radiative transition – fluorescence – phosphorescence; chemiluminescence, thermoluminescence, photosensitization: definition, halogen photosensitizer, applications.

UNIT IV ELECTRONIC MATERIALS 9

Organic semiconducting materials: advantages; p-type and n-type semiconducting materials – pentacene – fullerens-C-60; organic dielectric material: definition, examples – polystyrene – PMMA; organic light emitting polymer: polythiophene; conducting polymers: types – intrinsically conducting polymer – doped conducting polymer – extrinsically conducting polymer – coordination conducting polymer, applications; polymer with piezoelectric, pyroelectric and ferroelectric properties: polyvinylidenefluoride; OLED materials: definition, polymer OLED material – polyphenylene vinylene.

UNIT V ANALYTICAL INSTRUMENTATION 9

UV-Visible spectroscopy: types of transitions – chromophore, auxochrome – instrumentation (block diagram only) – applications; IR spectroscopy: molecular vibrations – linear molecule – CO_2 – nonlinear molecule – H_2O – instrumentation (block diagram only) – applications; Atomic absorption spectroscopy: principle – instrumentation (block diagram only) – estimation of nickel by AAS; flame photometry: principle – instrumentation (block diagram only) – estimation of sodium by flame photometry; thermogravimetry (TG): definition – instrumentation (block diagram only) – characteristics of thermogram – factors influencing thermogravimetry – analyzing $CuSO_4.5H_2O$ thermogram – applications.

TOTAL: 45 PERIODS

TEXT BOOKS

1. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 15th Edition, 2002.
2. S.S.Dara, "A text book of Engineering Chemistry" S.Chand and Company Limited, New Delhi, 13th Edition, 2006.
3. B.S.Chauhan, "Engineering Chemistry", University science press, New Delhi, 3rd Edition, 2009.

REFERENCES

1. S.C.Bhatia, "Engineering Chemistry", CBS Publishers and Distributors, 1st Edition, 2011.
2. Kuriacoarse J.C., and Rajaram.J., "Chemistry in Engineering and Technology", Vol.1 & 2, Tata McGraw Hill Publishing Company Limited, New Delhi, 1989.
3. Hagen Klauk, "Organic Electronics: Materials, manufacturing and applications", Wiley - VCH, 2006.
4. S.Rao, Dr.B.B.Parulekar, "Energy Technology", Khana Publishers, New Delhi, 21st Edition, 2004.
5. Skoog, Holler, Crouch, "Instrumental Analysis", Cengage Learning India Private Limited, New Delhi, 2011.
6. R.Chaudhary, "Basics of Photochemistry", Anmol Publications and Company, New Delhi, 2009.

13B24 CIRCUIT THEORY AND ELECTRON DEVICES (ECE)

L T P C
3 1 0 4

COURSE OUTCOMES

Upon successful completion of this course, students will be able to

- Analyze the circuits using various network theorems
- Compute the transient response of RL, RC and RLC circuits for AC and DC inputs.
- Determine the resonance condition for series and parallel circuits.
- Describe the operation and characteristics of different types of semiconductor diodes.

UNIT I CIRCUIT ANALYSIS TECHNIQUES FOR DC CIRCUITS 12

Ohm's law, Kirchhoff's laws – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis – Voltage and current division – Source transformation – Star-delta conversion. **Network Theorems**: Thevenin's theorem, Superposition theorem, Norton's theorem, Maximum power transfer theorem.

UNIT II CIRCUIT ANALYSIS TECHNIQUES FOR AC CIRCUITS 12

Mesh current and node voltage method of analysis – Thevenin's theorem, Superposition theorem, Norton's theorem, Maximum power transfer theorem.

UNIT III RESONANT CIRCUITS 12

Voltage and current relation in pure Resistor, Inductor ,Capacitor, RL, RC and RLC circuits – Series and parallel circuits – Impedance diagram and Phasor diagram – Parallel and series resonances – their frequency response – Quality factor and bandwidth – Self and mutual inductance.

UNIT IV TRANSIENT RESPONSE FOR CIRCUITS 12

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and AC with sinusoidal input.

UNIT V SEMICONDUCTOR DIODES 12

Review of intrinsic and extrinsic semiconductors – Theory of PN junction diode – Energy band structure – current equation – space charge and diffusion capacitances – effect of temperature and breakdown mechanism – Zener diode and its characteristics – Tunnel diode- PIN diode – Varactor diode – Photodiode.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. A.Sudhakar, Shyammohan S. Palli, "Circuits and Networks-Analysis and Synthesis", Tata McGraw Hill, 4th Edition, 2010.
2. Joseph A. Edminister, Mahmood, Nahri, "Electric Circuits", Shaum series, Tata McGraw Hill, 2001.
3. S.Salivahanan, N. Suresh kumar and A.Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCES

1. William H. Hayt, J.V.Jack, E.Kemmebly and Steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 2011.
2. Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition, 2008.
3. J. Millman and Halkins, Satyebranta Jit, "Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition, 2008.
4. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008.

13B25 BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to ECE, CSE, EEE, EIE and IT)

L T P C
4 0 0 4

COURSE OUTCOMES

- An ability to identify the various systems and its components of various power plants.
- An ability to state and differentiate the working principles of IC engines.
- Students will be able to identify the various systems and components of refrigeration and air conditioning systems.

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

***Civil Engineering Materials*:** Bricks – stones – sand – cement – concrete – steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES 15

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV IC ENGINES 10

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10

Terminology of refrigeration and air conditioning – Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air Conditioner.

TOTAL: 60 PERIODS

REFERENCES

1. Shanmugam G. and Palanichamy M.S., "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Company Limited, New Delhi, 1996.
2. Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Company Private Limited, 1999.
3. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, 2005.
4. Venugopal K. and Prabhu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, 2000.
5. Shantha Kumar S.R.J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.

13B26 COMPUTER PROGRAMMING LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

L	T	P	C
0	1	2	2

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to:

- Demonstrate how to use the UNIX Shell commands.
- Use the Shell programming constructs.
- Learn tracing mechanisms (for debugging), user variables, Shell variables, read-only variables, positional parameters, reading input to a Shell script.
- Test on numeric values, test on file type, and test on character strings using shell scripts.
- Write moderately complex Shell scripts and make them executable.

Execute programs written in C under UNIX environment.

LIST OF EXPERIMENTS

1. Study of UNIX OS, vi Editor.

2. Use of Basic UNIX Shell Commands:
   ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.

3. Shell Programming:
   i. Interactive shell scripts
   ii. Positional parameters
   iii. Arithmetic Operators
   iv. if-then-fi, if-then-else-fi, nested if-else
   v. Logical operators
   vi. if - elif, case structure
   vii. while, until, for loops, use of break
   viii. Metacharacters

4. Shell scripts for the following:
   i. Showing the count of users logged in
   ii. Printing column wise list of files in your home directory
   iii. To count lines, words and characters in its input (do not use wc)

5. C Programming on UNIX:
   i. Dynamic Storage Allocation
   ii. Pointers
   iii. Functions
   iv. File Handling

TOTAL: 45 PERIODS

SOFTWARE REQUIREMENTS

- UNIX/LINUX OS
- Gcc compiler

13B27 PHYSICS AND CHEMISTRY LABORATORY – II
(Common to all B.E. / B.Tech., Degree Programmes)

L	T	P	C
0	0	3	2

PART A - PHYSICS LABORATORY – II

COURSE OUTCOMES

At the end of the Laboratory classes, the students

- demonstrate and report the elastic behaviour of materials
- demonstrate the interference property of light waves
- demonstrate the diffraction property of light waves
- measure the thermal properties of conducting materials
- identify the substance that deforms continuously when subjected to shearing stress.

LIST OF EXPERIMENTS

1. Determination of Young's modulus – Uniform bending method.
2. Determination of Band Gap of a semiconductor material.
3. Determination of Hall Co-efficient.
4. Determination of Radius of curvature of a Plano convex lens using Newton's rings Method.
5. Determination of wavelength of mercury spectrum using spectrometer and grating
6. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
7. Torsional pendulum – Determination of Moment of Inertia of the disc and Rigidity modulus of the material of the wire.

• ***A minimum of FIVE experiments shall be offered.***

PART B - CHEMISTRY LABORATORY – II

COURSE OUTCOMES

The student

- can estimate the amount of alkalinity and Dissolved Oxygen (DO) present in the water sample.
- gain knowledge in the estimation of copper in an alloy and iron in rust.
- quantify electrolyte and ion by measuring the conductance and emf.

LIST OF EXPERIMENTS

1. Estimation of copper in brass by EDTA method.
2. Determination of Dissolved Oxygen (DO) in water (Winkler's method)
3. Estimation of alkalinity of Water sample
4. Estimation of Fe^{2+} ion in rust by Dichrometry
5. Conductometric titration (Mixture of acids vs NaOH)
6. Potentiometric Titration (Fe^{2+} vs $K_2Cr_2O_7$)
7. Estimation of Fe^{2+} ion by spectrophotometry.

TOTAL: 45 PERIODS

• ***A minimum of FIVE experiments shall be offered.***
• ***Laboratory classes on alternate weeks for Physics and Chemistry.***

13B28 CIRCUITS AND DEVICES LABORATORY (ECE)

L T P C
0 0 3 2

COURSE OUTCOMES

Upon successful completion of this course, students will be able to

- Analyze the circuits using various network theorems and laws.
- Determine the parameters from the characteristics of diodes.
- Analyze the given circuit from their transient and steady state response

LIST OF EXPERIMENTS:

1. Verification of Ohm's laws
2. Verification of Mesh and Nodal analysis
3. Verification of KVL and KCL
4. Verification of Thevenin's Theorem
5. Verification of Norton's Theorem.
6. Verification of superposition Theorem
7. Verification of Maximum power transfer Theorem
8. Transient response of RL and RC circuits for DC input
9. Frequency response of series and parallel resonance circuits
10. Characteristics of PN diode
11. Characteristics of Zener diode
12. Characteristics of Photodiode

TOTAL: 45 PERIODS

13B29 ENGLISH LANGUAGE SKILL LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
0 0 3 2

COURSE OUTCOMES

The Student will

- improve their pronunciation skill.
- gather information from any speech.
- imbibe the stress and intonation of the native speakers' accent.

1. Micro Skills

- Spotting the Homonyms / Silent letter words / mispronounced words
- Identifying the missing words in native speech
- Finding the cluster words
- Marking correct punctuation
- Marking word chunks
- Identification of sentences

2. Content Comprehension and making inferences

- Listening to audio files of Speech, Poetry, Recent Issues, News clippings, etc
    a. True / False
    b. Multiple Choice Questions
    c. Filling the blanks
    d. Filling the charts

3. Listen and Act

- Drawing the map using audio
- Picture completing task
- Transferring data to Graph

4. Interpreting the video clippings

5. Listening to Conversations

TOTAL: 30 PERIODS

13EC31 FOURIER TRANSFORMS AND COMPLEX ANALYSIS

L	T	P	C
3	1	0	4

COURSE OUTCOMES

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

- Perform Fourier series analysis of the functions.
- Implement the properties of Fourier transforms and Compute the Fourier transforms of various function.
- Calculate the Fourier series solution of Wave and Heat equations.
- Grasp analytic functions and their properties and be introduced to the host of conformal mappings with suitable examples that have direct application.
- Understand the basics of complex integration and the concept of contour integration encountered in practice.

UNIT I FOURIER SERIES **12**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range Sine series – Half range Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.

UNIT II FOURIER TRANSFORMS **12**

Fourier Integral theorem (without proof) – Fourier transform pair – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **12**

Solutions of one dimensional wave equation – One dimensional equation of heat conduction– Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT IV ANALYTIC FUNCTIONS **12**

Functions of a complex variable – Analytic functions – Necessary and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic functions – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z and bilinear transformation.

UNIT V COMPLEX INTEGRATION **12**

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula (excluding proofs) – Taylor's and Laurent's expansions – Singular points – Residues – Residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour(excluding poles on boundaries).

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", Khanna Publishers, 40th Edition, 2007.
2. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Laxmi Publications Private Limited., 7th Edition, (Reprint 2010).

REFERENCES

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, Revised Edition, 2007.
2. Jain R.K and Iyengar S.R.K," Advanced Engineering Mathematics", Narosa Publishing House Private Limited, 3rd Edition, 2007
3. T.Veerarajan "Transforms and Partial Differential Equations", Tata McGraw-Hill Education Private Limited, updated Edition, 2012.

13EC32 ENVIRONMENTAL SCIENCE AND ENGINEERING **L T P C**
(Common to all B.E./B.Tech. Degree Programmes) **3 0 0 3**

COURSE OUTCOMES

Upon successful completion of course the student will be able to

- Understand the various ecosystem and biodiversity
- Classify the different types of natural resources and identify the role of individual in conservation of resources
- Identify and analyse the causes, effects and control measures of environmental pollution
- Identify the different types of environmental hazards and their management
- Analyse the social issues related to the environment and how human population affect the environment.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 9

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers– energy flow in the ecosystem – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) aquatic (pond) ecosystems. Field study of simple ecosystems –pond and forest. Introduction to biodiversity: definition- genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - India as a mega-diversity nation – hot spots of biodiversity –threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation. Field study of common plants, insects, birds.

UNIT II NATURAL RESOURCES 9

Forest resources: Use and over-exploitation, deforestation, case studies- dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide Problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, case studies – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain

UNIT III ENVIRONMENTAL POLLUTION 9

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Noise pollution (e) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – e-Waste: Definition-dimension of the problem - source-toxic Substances in e-waste - risks related to toxic substances - environmental problems-role of an individual in prevention of pollution.

UNIT IV ENVIRONMENTAL HAZARDS 9

Environmental hazards*:* Definition – Hazard- Types-Natural and man-made hazards – Natural hazards: Causes, effect and management of Earthquake, Flood, Landslide, Cyclones and Tsunami; Man-made Hazards*:* Hazards due to dams and reservoirs, hazards due to nuclear power plant, Industrial hazards. Case study: Chernobyl disaster, Bhopal gas tragedy.

UNIT V SOCIAL ISSUES, HUMAN POPULATION AND THE ENVIRONMENT 9

Water conservation: rain water harvesting-climate change: global warming, acid rain, ozone layer depletion-Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Ravikrishnan.A., "Environmental Science and Engineering", Sri Krishna Hitech Publishing Company Private Limited, 2010.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCES

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2004.
2. Rajagopalan. R, "Environmental Studies - From Crisis to Cure", Oxford University Press, 2005.
3. Natural Hazards – Local, National, Global: G. F. White (ed), Oxford University Press.

13EC33	DIGITAL ELECTRONICS	L	T	P	C
		3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to:

- Acquire knowledge about the fundamental concepts of digital logic and optimize the gates in the digital circuits using Boolean algebra, Karnaugh map and Tabulation method.
- Analyze and design combinational circuits using logic gates and digital IC's.
- Design a synchronous and asynchronous sequential circuit to meet the given specifications.
- Comprehend the basics of programmable logic devices and implement circuits using PLDs.

UNIT I MINIMIZATION TECHNIQUES 12

Minimization Techniques: Boolean postulates and laws, De-Morgan's Theorem, Principle of Duality, Boolean expression, Minimization of Boolean expressions Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method of minimization.

UNIT II COMBINATIONAL CIRCUITS 12

Design procedure, Half adder, Full Adder, Half subtractor, Full subtractor, Parallel binary adder, parallel binary Subtractor, Fast Adder, Carry Look Ahead adder, Serial Adder/Subtractor, BCD adder, Binary Multiplier, Binary Divider, Multiplexer/ Demultiplexer, Decoder, Encoder, Parity checker, Parity generators, Code converters, Magnitude Comparator.

UNIT III SEQUENTIAL CIRCUITS 12

Latches, Flip-flops - SR, JK, D, T, and Master-Slave, Characteristic table and equation, Application table, Edge Triggering, Level Triggering, Realization of one flip flop using other flip flops, Asynchronous Ripple or serial counter, Design of Synchronous counters**:** state diagram, State table, State minimization, State assignment, Excitation table and maps, Circuit implementation, Modulo-n counter, Registers, Shift registers, Universal shift registers, Shift register counters, Ring counter, Shift counters, Sequence generators.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 12

Moore mealey Circuit, Analysis procedure, Design of fundamental mode circuits, Problems in Asynchronous Circuits, Reduction of state and flow tables, Race –free state assignment, Hazards- Design Example.

UNIT V MEMORY DEVICES 12

Classification of memories, ROM - ROM organization, PROM, EPROM, EEPROM, EAPROM, RAM - 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, Programmable Logic Devices, Programmable Logic Array (PLA), Programmable Array Logic (PAL), Field Programmable Gate Arrays (FPGA), Implementation of combinational logic circuits using ROM, PLA, PAL.

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. M. Morris Mano, "Digital Design", Pearson Education (Singapore) Private Limited, New Delhi, 4th Edition, 2008.
2. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", Vikas Publishing House Private Limited, New Delhi, 3rd Edition, 2006.

REFERENCES

1. Thomas L. Floyd, "Digital Fundamentals", Prentice Hall, 10th Edition, 2008.
2. John F. Wakerly, "Outlines & Highlights for Digital Design: Principles and Practices", Pearson / PHI, 2010.
3. Jr. Charles H. Roth and Larry L Kinney, "Fundamentals of Logic Design", (with Companion CD-ROM), Thomson Learning, 6th Edition, 2009.
4. Raj Kamal, "Digital Systems: Principles and Design", Prentice Hall, 1st Edition, 2009.

13EC34 ELECTROMAGNETIC FIELDS

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

1. Apply vector calculus to understand the behavior of static electric and magnetic fields in standard configurations.
2. Calculate electric and magnetic fields from stationary and dynamic charge and current distributions.
3. Analyze various geometries of conductors, charge distribution, and current to determine the terminal behavior of capacitors and inductors.
4. Develop field equations starting from a basic knowledge of Maxwell's Equations.
5. Analyze the propagation of plane waves in various materials.

UNIT I STATIC ELECTRIC FIELDS 12

Introduction to Co-ordinate System - Rectangular, Cylindrical and Spherical Co- ordinate System, Introduction to line, Surface and Volume Integrals, Definition of Curl, Divergence and Gradient, Meaning of Stokes theorem and Divergence theorem.

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 Scalar Potential, Relationship between potential and electric field, Potential due to electrical dipole, Electric Flux Density, Gauss Law, Gauss Law application.

UNIT II STATIC MAGNETIC FIELD 12

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. Magnetic flux density, Magnetic moment, Magnetic Vector Potential.

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS 12

Poisson's and Laplace's equation, Electric Polarization, Nature of dielectric materials, Definition of Capacitance, Capacitance of various geometries using Laplace's equation, Electrostatic energy and energy density, Boundary conditions for electric fields, Electric current, Current density, point form of ohm's law. Definition of Inductance, Inductance of loops and solenoids, Definition of mutual inductance, simple examples. Energy density in magnetic fields, magnetization and permeability, magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS 12

Faraday's law, Maxwell's Second Equation in integral form from Faraday's Law, Equation expressed in point form. Displacement current, Ampere's circuital law in integral form, Modified form of Ampere's circuital law as Maxwell's first equation expressed in integral and point form. Poynting Vector and the flow of power, Power flow in a co-axial cable.

UNIT V ELECTRO MAGNETIC WAVES 12

Derivation of Wave Equation, Uniform Plane Waves, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect, Wave polarization.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. W H.Hayt & J A Buck, "Engineering Electromagnetics", TATA McGraw-Hill, 7th Edition, 2007.
2. E.C. Jordan & K.G. Balmain, "Electromagnetic Waves and Radiating Systems", Pearson Education, 4th Edition.

REFERENCES

1. Matthew N. O. Sadiku, "Elements of Electromagnetics", Oxford University Press, USA, 3rd Edition, 2010.
2. Jian-Ming Jin, "Theory and Computation of Electromagnetic Fields", Wiley-IEEE Press, 2010.
3. John.D.Kraus and Fleisch, "Electromagnetics with Applications", Tata McGraw-Hill, 5th Edition, 2010
4. David k. Cheng, "Field and Wave Electromagnetics", Pearson Education, 2009.

13EC35 ELECTRONIC CIRCUITS - I

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Compare the characteristics of various transistors.
- Analyze BJT and FET amplifier circuits with respect to various parameters such as dc biasing, Q-point stability.
- Derive expressions relating amplifier parameters based on various small-signal transistor models.
- Perform frequency analysis of BJT and FET amplifiers.
- Demonstrate knowledge of rectifier circuits, voltage regulators and filter circuits.

UNIT I TRANSISTORS AND SPECIAL SEMICONDUCTOR DEVICES 12

BJT: Construction and Operation of NPN and PNP Transistors - Study of CE, CB and CC Configurations and comparison of their characteristics – Breakdown in Transistors.

FET: Construction and Operation of N-Channel JFET – Expression for Drain Current, Comparison of JFET and BJT. **MOSFET:** Structure and Operation of Enhancement and Depletion MOSFET – Comparison of MOSFET with JFET

SPECIAL SEMICONDUCTOR DEVICES: SCR Characteristics and Two Transistor Equivalent model – UJT – DIAC and TRIAC – Phototransistor.

UNIT II TRANSISTOR BIASING AND STABILITY ANALYSIS 12

Need for Biasing – Fixed Bias Circuit: Load line and quiescent point, Selection of operating point, Variation of quiescent point – Stability Factors – Different Types of biasing circuits: Collector to base bias, Voltage divider bias (Self Bias) – Advantage of self-bias over other types of biasing – Bias compensation: Diode, Thermistor and Sensistor compensations – Biasing circuits for JFET and MOSFET.

UNIT III MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 12

Single stage CE, CB and CC Amplifiers - Two-Port Devices and Network Parameters – Hybrid model for Two-Port Network – Analysis of a Transistor Amplifier Circuit using ***h***-Parameters – Simplified CE hybrid model – Analysis of CE, CC and CB amplifiers using Approximate Model – Miller's Theorem – Methods of increasing input impedance using Darlington connection and Bootstrapping – Multistage Amplifiers. CS, CG and CD (FET) Amplifiers, Basic Emitter Coupled Differential Amplifier Circuit – Operation, CMRR, Use of constant current circuit to improve CMRR.

UNIT IV FREQUENCY RESPONSE OF AMPLIFIERS 12

General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency - Hybrid – Π equivalent circuit of BJTs - High frequency analysis of BJT amplifiers to obtain upper cutoff frequency, Gain bandwidth Product - 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 cutoff frequencies of multistage amplifiers - Amplifier rise time, sag and their relation to cutoff frequencies.

UNIT V RECTIFIERS AND POWER SUPPLIES 12

Classification of power supplies – Rectifiers: Half-wave, full-wave and bridge rectifiers with resistive load - Analysis for Vdc and ripple voltage with C, L, LC and CLC filters - Voltage multipliers - Voltage regulators: Zener diode shunt regulator, Transistorised series and shunt regulators - Switched mode power supply (SMPS) - Power control using SCR.

L: 45 T: 15 TOTAL: 60PERIODS

TEXT BOOKS

1. Millman.J and Halkias .C, "Electronic Devices and Circuits", TMH, 2008.
2. S.Salivahanan, N. Suresh Kumar and A.Vallavaraj, "Electronic Devices and Circuits", 3rd Edition, TMH, 2012.

REFERENCES

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 10th Edition, Prentice Hall, 2008.
2. Thomas L. Floyd and David M. Buchla, "Electronics Fundamentals: Circuits, Devices and Applications", Pearson College Div, 2009.
3. David A. Bell, "Fundamentals of Electronic Devices and Circuits", Oxford University Press, 2009.

13EC36 C++ AND DATA STRUCTURES L T P C
3 0 0 3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

- Recognize and use object oriented programming constructs to write object oriented programs
- Describe encapsulation, polymorphism and inheritance.
- Identify the suitable data organization structure and its implementation methods.
- Analyze the importance of self-balancing trees for effective organizing the data.
- Enumerate the systematic way of solving problems.

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 9

Introduction – Tokens – Expressions - C++ classes and objects - constructors and destructors – operators overloading and type conversions.

UNIT II ADVANCED OBJECT ORIENTED PROGRAMMING 9

Inheritance - Extending classes – Pointers - Virtual functions - polymorphism - File handling – Templates - Exception handling - Manipulating strings.

UNIT III LINEAR DATA STRUCTURES 9

Lists, Stacks and queues: Array and linked list implementation of List, Stack, Queue – Applications of List: Polynomial addition – sparse matrix – Applications of stack: Infix to Postfix – Evaluation of expression – Function calls.

UNIT IV NONLINEAR DATA STRUCTURES 9

Trees: Binary tree - Binary search tree - AVL tree - Graphs: Representations - Topological sort – Dijskstra's shortest path Algorithm - Prim's and Kruskal's Algorithms - Network flow problems.

UNIT V SORTING AND SEARCHING 9

Sorting: Insertion sort - Shell sort - Heap sort - Merge sort - Quick sort. Searching: Linear search – Binary search – Fibonacci search.

TOTAL: 45 PERIODS

TEXT BOOKS

1. E.Balagurusamy, "Object Oriented Programming with C++", McGraw Hill Company Limited, 2007.
2. M. A. Weiss, "Data Structures and Algorithm Analysis in C++", 3rd Edition, Addison - Wesley, 2007.
3. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", 1st Edition, Pearson Education, Reprint 2003.

REFERENCES

1. Bjarne Stroustrup, "Programming: Principles and Practice Using C++", Addison Wesley, 2008.
2. R. F. Gilberg, B. A. Forouzan, "Data Structures", 2nd Edition, Thomson India Edition, 2005.

13EC37 ELECTRONIC CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

COURSE OUTCOMES

. Upon successful completion of this course, students will be able to:

- Determine the parameters from the characteristics of transistors.
- Acquire a basic knowledge in Transistor amplifier and Various Biasing techniques.
- Construct a simple power supply circuit.
- Calculate the CMRR of differential amplifier.

LIST OF EXPERIMENTS

1. Characteristics of CE configuration.
   - Determination of h-parameters from I/O characteristics.
2. Characteristics of CB configuration.
   - Determination of h-parameters from I/O characteristics.
3. Characteristics of UJT and SCR.
   - Plot the V/I Characteristics
4. Characteristics of JFET.
   - Determination of FET parameters from I/O characteristics
5. Fixed Bias amplifier circuit using BJT.
   - Determination of bias resistance to locate Q-point at center of load line.
   - Plot the frequency response.
6. Voltage divider bias (self-bias) circuit using BJT.
   - Plot the frequency response.
7. Darlington Amplifier using BJT.
   - Measurement of gain, input resistance and output resistance.
8. Source follower with Bootstrapped gate resistance.
   - Measurement of gain, input resistance and output resistance with and without Bootstrapping.
9. Differential amplifier using BJT.
   - Measurement of CMRR.
10. Power Supply circuit - Full wave rectifier with simple capacitor filter and Zener Voltage Regulator.
    - Measurement of DC output voltage under different loading conditions.
    - Plot the Load regulation characteristics and calculate the Load regulation.

TOTAL: 45 PERIODS

13EC38 C++ AND DATA STRUCTURES LABORATORY L T P C
0 0 3 2

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

- Implement common data structures, such as trees, lists.
- Design and apply appropriate data structures for solving computing problems.
- Develop the appropriate objects required to solve a programming problem.
- Practice exception handling mechanisms to handle runtime errors.
- Solve problems using advanced object-oriented concepts like inheritance, polymorphism, and generic programming.

LIST OF EXPERIMENTS

1. Design C++ classes with static members, methods with default arguments, friend functions. (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication).
2. Develop C++ class hierarchy for various types of inheritances.
3. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor and overloading of assignment operator.
4. Design a simple application to demonstrate dynamic polymorphism and RTTI.
5. Design stack and queue classes with necessary exception handling
6. Implement singly and doubly linked lists.
7. Represent a polynomial as a linked list and write functions for polynomial addition.
8. Implement stack and use it to convert infix to postfix expression.
9. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
10. Implement binary search tree and AVL Tree.

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (PER BATCH)

HARDWARE

- 30 Personal Computers with Pentium III or Pentium IV
- RAM – 256 MB or higher
- Hard disk – 40 GB or higher

SOFTWARE

- Turbo C ++(freeware) – to be installed in all PCs
- OS – Linux (or) Windows 2000/ Windows XP/ NT.

13EC41 PROBABILITY AND RANDOM PROCESSES

L	T	P	C
3	1	0	4

COURSE OUTCOMES

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

- Have a well-founded knowledge of random variables and standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable.
- Understand and characterize the phenomena which evolve with respect to time in probabilistic manner.
- Implement the concepts of correlation and spectral densities.
- Analyze the response of random inputs to linear time invariant systems.

UNIT I RANDOM VARIABLES **12**

Discrete and continuous random variables – Moments - Moment generating function and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT II TWO DIMENSIONAL RANDOM VARIABLE **12**

Joint distributions - Marginal and conditional distributions - Covariance - Correlation and Regression – Transformation of random variables.

UNIT III CLASSIFICATION OF RANDOM PROCESSES **12**

Definition and examples - First order, second order, strictly stationary, wide-sense stationary and ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process – Random telegraph signal process.

UNIT IV CORRELATION AND SPECTRAL DENSITIES **12**

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

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS **12**

Linear time invariant system - System transfer function – Linear systems with random inputs–Auto correlation and cross correlation functions of input and output – White noise.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Oliver C. Ibe, “Fundamentals of Applied probability and Random processes”, Elsevier, First Indian Reprint, 2007.
2. Peebles Jr. P.Z., “Probability Random Variables and Random Signal Principles”, Tata McGraw-Hill Publishers, 4th Edition, 2002.

REFERENCES

1. Miller,S.L and Childers, S.L, “Probability and Random Processes with applications to Signal Processing and Communications”, Elsevier Inc., First Indian Reprint 2007.
2. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw-Hill edition, 2004.
3. T.Veerarajan, “Probability Statistics and Random Processes with Queueing theory and Queueing Networks”, Tata McGraw-Hill Education Private Ltd., 3rd Edition, 2010.

13EC42 ELECTRONIC CIRCUITS – II

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Classify amplifiers by mode of operation.
- Compare the various feedback topologies to get desired performance.
- Construct a circuit to generate sine wave for a particular frequency.
- Design an amplifier to tune to the particular frequency.
- Design a square wave generator for a particular frequency.

UNIT I LARGE SIGNAL AMPLIFIERS 12

Classification of amplifiers, Class A large signal amplifiers, and second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio amplifier, efficiency of class A amplifier. Class B amplifier, efficiency, push-pull amplifier, distortion in amplifiers, complementary – symmetry (class B) push-pull amplifier, Class C, Class D amplifier, class S amplifier, MOSFET power amplifier, thermal stability and heat sink.

UNIT II FEEDBACK AMPLIFIERS 12

Block diagram, Loop gain, Gain with feedback, Effects of negative feedback, Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections, voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor.

UNIT III OSCILLATORS 12

Classification, Barkhausen Criterion, Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators, Hartley, Colpitts, Clapp, Franklin, Armstrong, Tuned collector oscillators, RC oscillators, phase shift, Wien bridge, Twin-T Oscillators, Frequency range of RC and LC Oscillators, Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators.

UNIT IV TUNED AMPLIFIERS 12

Small signal tuned amplifiers, Analysis of capacitor coupled single tuned amplifier, double tuned amplifier, effect of cascading single tuned and double tuned amplifiers on bandwidth, Stagger tuned amplifiers, large signal tuned amplifiers, Class C tuned amplifier, Efficiency and applications of Class C tuned amplifier, Stability of tuned amplifiers, Neutralization, Hazeltine neutralization method.

UNIT V WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 12

RC & RL Integrator and Differentiator circuits, Storage, Delay and Calculation of Transistor Switching Times, Speed-up Capacitor, Diode clippers, Diode comparator, Clampers. Collector coupled Astable multivibrator, Monostable multivibrator, Bistable multivibrators, Triggering methods for Bistable multivibrators, Schmitt trigger circuit using BJT.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Millman and Halkias. C., "Integrated Electronics", Tata McGraw-Hill, 2nd Edition 2010.
2. Schilling and Belove, "Electronic Circuits", TMH, 3rd Edition, 2002.
3. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, "Electronic Devices and Circuits", 2nd Edition, TMH, 2008.

REFERENCES

1. Chenming Hu, "Modern Semiconductor Devices for Integrated Circuits", Prentice Hall, 2009.
2. Jimmie J.Cathey, "Schaum's Outline of Electronic Devices and Circuits", McGraw-Hill, 2nd Edition, 2002.
3. Sedra / Smith, "Micro Electronic Circuits", Oxford University Press, 2004.
4. Millman J. and Taub H., "Pulse Digital and Switching waveform", McGraw-Hill, 2nd Edition, 2008

13EC43 ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

On the successful completion of the course, the students should be able to:

- Understand the constructional details and characteristics of DC machines.
- Illustrate the performance of single phase transformers under no load and loaded conditions.
- Discriminate the construction and operation of single phase and three phase induction motor.
- Evaluate the voltage regulation of synchronous machines and describe the operation of various special machines.
- Outline the basic structure of electrical power system and its components.

UNIT I D.C. MACHINES 9

Constructional details – EMF equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Principle of operation of D.C. motor – Back EMF and torque equation – Characteristics of series, shunt and compound motors - Starting of D.C. motors – Types of starters - Testing, brake test and Swinburne's test – Speed control of D.C. shunt motors.

UNIT II TRANSFORMERS 9

Constructional details – Principle of operation – EMF equation – Transformation ratio – Transformer on no load – Parameters referred to HV/LV windings – Equivalent circuit – Transformer on load – Regulation - Testing – Load test, open circuit and short circuit tests.

UNIT III INDUCTION MOTORS 9

Construction – Types – Principle of operation of three-phase induction motors –Equivalent circuit – Performance calculation – Starting and speed control – Single-phase induction motors (only qualitative treatment).

UNIT IV SYNCHRONOUS AND SPECIAL MACHINES 9

Construction of synchronous machines – types – Induced EMF – Voltage regulation; EMF and MMF methods – Brushless alternators – Reluctance motor – Hysteresis motor –Stepper motor.

UNIT V TRANSMISSION AND DISTRIBUTION 9

Structure of electric power systems – Generation, transmission and distribution systems- EHVAC and EHVDC transmission systems – Substation layout – Insulators – cables.

Total: 45 PERIODS

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, "Basic Electrical Engineering", Tata McGraw Hill publishing Company Limited, 2nd Edition, 2007 (Reprint).
2. C.L. Wadhwa, "Electrical Power Systems", New Age International, 4th Edition, 2007.

REFERENCES

1. S.K.Bhattacharya, "Electrical Machines", Tata McGraw Hill Publishing Company Limited, 2nd Edition, 2007.
2. V.K.Mehta and Rohit Mehta, "Principles of Power System", S.Chand and Company Limited, 2nd Edition, 2006.

13EC44 TRANSMISSION LINES AND WAVEGUIDES L T P C
3 1 0 4

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Explain the meaning and use of fundamental transmission line concepts: traveling and Standing waves, wavelength, characteristic impedance, attenuation.
- Analyze common transmission lines (coaxial, micro strip, etc.) and examine their Characteristic impedance.
- Use the Smith chart (generalized reflection coefficient plane) for fundamental Transmission line calculations.
- Design simple matching networks using lumped elements, quarter-wave sections, and Stub tuners.
- Discuss basic principles associated with waveguides (metallic and dielectric): mode (TM, TE, and TEM), cutoff frequency, guide wavelength, velocities.
- Select proper common waveguides (metallic parallel-plate and rectangular, dielectric Slab) for the given specifications such as frequency range, attenuation.

UNIT I LUMPED FILTERS 12

The neper - the decibel - Characteristic impedance of Symmetrical Networks – Current and voltage ratios - Propagation constant, Properties of Symmetrical Networks - Filter fundamentals – Low pass, High pass, band pass, band elimination filters and Constant K Filters - Behaviour of the Characteristic impedance- m derived sections - Filter circuit design - Filter performance - Crystal Filters.

UNIT II TRANSMISSION LINE PARAMETERS 12

A line of cascaded T sections - Transmission lines - General Solution, Physical Significance of the equations, the infinite line, wavelength, velocity, propagation, Distortion line, coaxial cable, Reflection on a line not terminated in Z_o, Reflection Coefficient, Open and short circuited lines, Insertion loss.

UNIT III THE LINE AT RADIO FREQUENCY 12

Parameters of open wire line and Coaxial cable at RF - Line constants for dissipation - voltages and currents on the dissipation less line - standing waves - nodes - standing wave ratio - input impedance of open and short circuited lines - power and impedance measurement on lines –$\lambda/4$ line, Impedance matching - single and double-stub matching, circle diagram, smith chart and its applications - Problem solving using Smith chart.

UNIT IV GUIDED WAVES BETWEEN PARALLEL PLANES 12

Application of the restrictions to Maxwell's equations - transmission of TM, TE and TEM waves between Parallel planes - wave propagation - Velocities of the waves - characteristic impedance – Attenuators.

UNIT V WAVEGUIDES 12

Application of Maxwell's equations to the Rectangular waveguide – TM and TE waves in Rectangular waveguide - Cylindrical waveguide - The TEM wave in coaxial lines - Excitation of wave guides - Guide termination and resonant cavities.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. John D.Ryder, “Networks, lines and fields”, Prentice Hall of India, 2nd Edition, 2006.
2. E.C.Jordan, K.G. Balmain, “E.M.Waves & Radiating System”, Pearson Education, 2006.

REFERENCES

1. Joseph Edminister, “Schaum's Series, Electromagnetics”, TMH, 2007
2. G S N Raju, “Electromagnetic Field Theory and Transmission Lines”, Pearson Education, 2006.

13EC45 LINEAR INTEGRATED CIRCUITS L T P C
3 0 0 3

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Describe the construction of OP-AMP IC and also DC, AC characteristics of OP-AMP.
- Design a circuit using OP-AMP for various applications such as Inverting, Non-inverting, Logarithmic and anti-logarithmic amplifiers, Precision rectifier, active filters etc.
- Design AM and FM modulator and demodulators using PLL logic.
- Design ADC Circuit using comparator and ADC IC.
- Design a function generator for various waveforms such as sine wave, triangular wave, square wave etc using 555 timer or OP amp ICs or 566 or 565 ICs.

UNIT I IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR ICs 9

Advantages of IC over discrete components, Manufacturing process of monolithic IC, Construction of monolithic bipolar transistor, Monolithic diodes, Integrated Resistors, Monolithic Capacitors, Inductors. Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, General operational amplifier stages, DC and AC performance characteristics, slew rate, Open and closed loop configurations.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters, Sine-wave generators, Triangular wave generator, Saw-tooth wave generator, Astable and Monostable Multivibrators.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analog Multiplier using Emitter Coupled Transistor Pair, Gilbert Multiplier cell, Variable transconductance technique, Analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS 9

Analog and Digital Data Conversions, D/A converter, specifications, weighted resistor type, R-2R Ladder type, Voltage Mode and Current Mode R-2R Ladder types, switches for D/A converters, high speed sample and hold circuits, A/D Converters, specifications, Flash type, Successive Approximation type, Single Slope type, Dual Slope type.

UNIT V TIMER, VOLTAGE REGULATORS AND FUNCTION GENERATOR ICs 9

Timer IC 555 - Description and Functional Diagram, Monostable operation, Astable operation, IC Voltage regulators, Three terminal fixed and adjustable voltage regulators, IC 723 general purpose regulator, IC L8038 function generator - Description and Functional Diagram, SMPS

TOTAL: 45 PERIODS

TEXT BOOKS

1. Sergio Franco, "Design with operational amplifiers and analog integrated circuits", 3rd Edition, Tata McGraw Hill, 2007
2. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Private Limited, 4th Edition, 2010.

REFERENCES

1. Johan H. Huijsing, "Operational Amplifiers: Theory and Design", Kluwer Academic Publishers, 2nd Edition, 2011.
2. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons Inc, 5th Edition, 2009.
3. S.Salivahanan & V.S.Kanchana Bhaskaran, "Linear Integrated Circuits", TMH, 1st Edition, 2008.

13EC46 SIGNALS AND SYSTEMS

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Recognize, analyze and manipulate basic continuous time (CT) and discrete time (DT) signals.
- Classify continuous and discrete time systems as to their linearity, time invariance, causality and stability.
- Represent and analyze both CT and DT Signals using appropriate transforms.
- Analyze both CT and DT Linear Time Invariant systems using appropriate transforms.

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 12

Continuous time signals (CT signals), Discrete time signals (DT signals), Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals, periodic and aperiodic, random signals, CT systems and DT systems, Basic properties of systems, Linear Time Invariant systems and properties.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 12

Fourier series analysis, Spectrum of CT signals, Fourier Transform and Laplace Transform in Signal Analysis.

UNIT III LINEAR TIME INVARIANT - CONTINUOUS TIME SYSTEMS 12

Differential equation, Block diagram representation, Impulse response, Convolution integral, frequency response, LTI systems analysis using Fourier and Laplace transforms, State variable equations and matrix representation of systems.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 12

Sampling of CT signals and aliasing, DTFT and properties, Z-transform and properties of Z-transform.

UNIT V LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS 12

Difference equation, Block diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT and Z-transforms, State variable equations and matrix representation of systems.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, “Signals and Systems”, Pearson Education, 2007.
2. Edward W Kamen and Bonnie's Heck, “Fundamentals of Signals and Systems”, Pearson Education, 2007.

REFERENCES

1. P. Ramesh Babu and R.Ananda Natarajan, “Signals and Systems”, SciTech Publications, 4th Edition, 2010.
2. Simon Haykin and Barry Van Veen, “Signals and Systems”, 2nd Edition, Willey Publication (Reprint), 2010.
3. Hwei P. Hsu, “Signals and Systems- Schaum's Outline Series”, Tata McGraw Hill, (Indian Reprint), 2nd Edition, 2010.
4. John Alan Stuller, “An Introduction to Signals and Systems”, Cengage Learning India Private Limited, 2008.
5. B.P Lathi, “Linear Systems and Signals”, 2nd Edition, Oxford University, 2008.

13EC47 ELECTRONIC CIRCUITS AND SIMULATION LABORATORY

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Acquire a basic knowledge in various Transistor feedback amplifier and Transistor as Multivibrator.
- Analyze and design analog electronic circuits using discrete components.
- Design, construct and measure various analog circuits through simulation software and compare the results in the laboratory with theoretical analysis.

LIST OF EXPERIMENTS

1. Design and Construct negative feedback amplifiers. Plot the Frequency response and Determine the Input, output impedance with and without feedback.
2. Design and construct RC Phase shift oscillator for the given specifications.
3. Design and construct Hartley Oscillator and Colpitts Oscillator for the given specifications.
4. Construct various types of Clippers and Clampers circuit.
5. Construct a Class A Power Amplifier and Determine the efficiency.
6. Construct a Class B Complementary Symmetry Power Amplifier and Determine the efficiency.
7. Construct and simulate Differential amplifier using PSPICE.
8. Construct and simulate Transistor based Astable, Monostable and Bistable multivibrator using PSPICE.
9. Construct and simulate Clipper, Clamper, Low pass RC circuit and High pass RC circuit using PSPICE.

TOTAL: 45 PERIODS

13EC48 DIGITAL AND LINEAR INTEGRATED CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Analyze, design, construct and troubleshoot broad range of combinational circuits using logic gates and digital IC's.
- Analyze, design, construct and troubleshoot broad range of sequential circuits using digital IC's.
- Experimentally verify the different kind of op-amp based circuits for the given design specifications.
- Design a simple DC power supply using discrete components and IC

LIST OF EXPERIMENTS

Digital IC's

1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154.
3. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147.
4. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters.
5. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.

LINEAR IC

6. Design and verification of Inverting amplifier, Non inverting amplifier, Integrator and Differentiator.
7. Design and verification of the Instrumentation amplifier
8. Design and verification of Active low pass, high pass and band pass filters.
9. Design and verification of Multivibrators, Phase shift and Wien bridge oscillators using op-amp.
10. Design and verification of Astable and Monostable multivibrators using NE 555 Timer.
11. Design and verification of PLL characteristics and its use as Frequency Multiplier.
12. Design and verification of DC power supply using LM317 and LM723.

TOTAL: 45 PERIODS

13EC49 COMMUNICATION SKILLS AND TECHNICAL SEMINAR

L	T	P	C
0	0	3	2

(Common to all B.E. / B.Tech. Degree Programmes)

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

- Express themselves fluently and appropriately in social and professional contexts.
- Develop the sub-skills required for paper presentations and group discussions.
- Acquire the soft skills and interpersonal skills which will help them to excel in their workplace.

A) LANGUAGE FUNCTIONS (15 hrs)

1. Compare and contrast
2. Giving reasons
3. Reporting
4. Expressing agreement and disagreement
5. Evaluating different standpoints
6. Analyzing a problem and giving solution
7. Describing daily routines, events, and weather
8. Describing Objects
9. Defending a point of view
10. Talking about future plans and intentions

Language Functions:

The teacher should build micro activities to develop the use of language required to handle these sub-functions of communication. In the process, the learners should get used to the linguistic Elements needed for these functions.

B) SPEECH PRACTICE (15 hrs)

The themes are:

1. Cloning
2. Artificial satellites
3. Renewable sources
4. Telecommunication
5. Cyber Revolution
6. Space research
7. Polythene pollution
8. Fossil fuels
9. Safety measures in Automobiles
10. Ecological threats
11. Water resources
12. Nuclear technology
13. Scientific farming
14. Thermal power plants
15. Nano Technology
16. Robotics
17. Artificial intelligence
18. Role of Fibre Optics
19. Exploration of Mars
20. Gas turbines
21. Indian space missions
22. Converting agricultural wastes for useful purposes
23. Developments in transportation
24. Scientific Farming
25. Impact of global warming
26. Desalination of water

27. Technology for national security
28. Industrial development and ecological issues
29. Recent trends in Automobiles
30. Hazards of E-waste
31. Mobile Jammer
32. Touch Screen Technology
33. Tidal Power
34. 3G Technology
35. Tsunami Warning System
36. Blue Tooth Technology

Seminar presentation on the themes allotted:

Each student should collect materials from Books, Internet, Journals and Newspapers for his/her theme and prepare a short Seminar Paper for 4 to 5 Pages. The presentation should be for 10 minutes using power point frames. It should be followed by a Viva Voce during which others should come forward to question, clarify, supplement or evaluate.

C) GROUP DISCUSSION / DEBATE (10hrs)

Grouping (each group consisting of 12 members)

Topics (12 topics – 3 topics to be selected by each group - to be practiced in cycles)

Group Discussion / Debate Topics:

1. Advertising is a legalized form of lying- Discuss.
2. Communicative competency in English is the golden key for success in the Global arena.
3. Is it just to force people to retire?
4. Attitude decides one's altitude in life.
5. Should an aspiring student go for a course which is in demand or for a course which he/she likes?
6. Is westernization a cultural degradation or enrichment?
7. Is Brain drain a threat to India?
8. Can Nuclear Energy be replaced by solar energy? – Discuss.
9. Do Mobile phones spoil the youth?
10. No two generations see eye to eye- Discuss.
11. Is scientific advancement a boon or a bane?
12. Does ragging develop friendship?

D) SPEAKING ON THE GIVEN PICTURE/DIAGRAM/CHART/TABLE (5 hrs)

RECORD LAY OUT:

Every student has to maintain a record in which he/she has to incorporate the following details.

- First page containing learner details and the topic of specialization
- Use of appropriate Language used in Language Function should be listed.
- Three news paper cuttings or journal or internet sources related to the specialized theme. (To be pasted on the pages)
- 10 Quiz questions of the specialized topic with expected answers.
- The seminar paper presented by the learner (to be pasted).
- Notes of observation - Lab. (Details about Interview skills – GD – Soft skills)
- The record should be duly signed by the course teacher and submitted to the External Examiner for verification during the semester practical.

TOTAL: 45 PERIODS

REFERENCES

1. Rizvi.M.Ashraf, "Effective Technical Communication", The MC Graw Hill Education Private Limited, Companies, New Delhi, 2010.
2. Sangeetha Sharma and Binod Mishra, "Communication Skills for Engineers and scientists", PHI Learning Private Limited, 2009.

13EC51 COMMUNICATION THEORY L T P C
3 1 0 4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Analyze, Generate and detect non-linear and linear AM.
CO 2: Analyze, Generate and detect FM.
CO 3: Model the components of continuous wave communication systems
CO 4: Characterize the noise and theoretically predict SNR, Figure of merit of analog communication systems in AWGN channel.
CO 5: Explore the basic concepts of pulse communication.

UNIT I AMPLITUDE MODULATION TECHNIQUES 12

An overview of electronic communication system, Spectrum of AM, AM power calculations, Generation and detection of AM, DSBSC, SSBSC and VSB modulation techniques, Comparison of AM techniques.

UNIT II ANGLE MODULATION TECHNIQUES 12

Phase Modulation, Frequency Modulation, Narrow band FM, Wide band FM, Spectrum of FM, Transmission band width of FM, Generation and Detection of FM, Comparison of AM & FM Techniques.

UNIT III ANALOG COMMUNICATION SYSTEMS 12

Block schematic of AM transmitters, TRF receiver, Super heterodyne receiver, AM Receiver using PLL, Block Schematic of FM Transmitters and Receivers, Multiplexing systems – Frequency Division Multiplexing, Quadrature carrier multiplexing, case study: Television system.

UNIT IV NOISE THEORY 12

Noise sources and types, Shot noise, Thermal noise, White Noise, Narrow band noise and its representation models, Noise figure and noise temperature, Signal to Noise Ratio, Noise Analysis in AM and FM Receivers, Pre-emphasis and De-emphasis in FM.

UNIT V PULSE ANALOG MODULAION TECHNIQUES 12

Sampling Theory- Sampling of Continuous time signal- Spectrum of sampled signal. Ideal sampling and Reconstruction, Aliasing effect, Practical sampling, Pulse Amplitude Modulation, Time Division Multiplexing.

L:45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Simon Haykin, “Communication Systems”, Wiley Publications, 5th Edition, 2009.
2. A. Bruce Carlson, “Communication Systems”, McGraw-Hill, 5th Edition, 2009

REFERENCES

1. B.P.Lathi and Zhi Ding, “Modern Digital and Analog Communication Systems”, Oxford University Press, 4th Edition, 2009.
2. Herbert Taub & Donald L Schilling, “Principles of Communication Systems”, 3rd Edition, Tata McGraw Hill, 2008.

13EC52 DIGITAL SIGNAL PROCESSING

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the relationship between DTFT, DFT and FFT and computation of DFT.
CO 2: Design analog and digital IIR filters and realize them.
CO 3: Design digital FIR filters and realize them.
CO 4: Analyse the finite word length effects in signal processing.
CO 5: Explain the concepts of Multirate signal processing.

UNIT I DISCRETE FOURIER TRANSFORM 12

DFT and its properties, Relation between DTFT, DFT and FFT, DFT computations using Decimation in time and Decimation in frequency algorithms, Inverse DFT using FFT algorithms, Use of FFT in linear filtering, Sectionalized convolution-overlap add and save procedure.

UNIT II INFINITE IMPULSE RESPONSE DIGITAL FILTERS 12

Review of design of analog Butterworth and Chebyshev Filters, Frequency transformation in analog domain - Design of IIR digital filters using impulse invariance technique - Design of digital filters using bilinear transform - pre warping - Realization using direct, cascade and parallel forms.

UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS 12

Symmetric and Antisymmetric FIR filters - Linear phase FIR filters - Design using Hamming, Hanning, Blackman and Kaiser Windows - Frequency sampling method - Realization of FIR filters - Transversal, Linear phase and Polyphase structures.

UNIT IV FINITE WORD LENGTH EFFECTS 12

Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error - Overflow error - Roundoff noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling

UNIT V MULTIRATE SIGNAL PROCESSING 12

Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion-Design of narrow band filters -Applications of Multirate signal processing.

L:45, T:15,TOTAL: 60 PERIODS

TEXT BOOKS

1. John G Proakis and Manolakis, "Digital Signal Processing Principles, Algorithms and Applications", Pearson Education, 4th Edition, 2007.
2. S.Salivahanan, C. Gnanapriya, "Digital Signal Processing", Tata McGraw-Hill, 2nd Edition, 2011.

REFERENCES

1. E.C. Ifeachor and B.W. Jervis, “Digital signal processing - A practical approach”, Pearson, 2nd Edition, 2002.
2. S.K. Mitra, “Digital Signal Processing- A Computer Based approach”, Tata McGraw-Hill, 4th Edition, 2010.
3. P. Ramesh Babu, “Digital Signal Processing”, Scitech Publications, 4th Edition, 2011.
4. Johny R. Johnson, “Introduction to Digital Signal Processing”, PHI, 2006.

13EC53 MICROPROCESSORS AND MICROCONTROLLER

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Describe the fundamental features and operation of contemporary Microcontroller and Microprocessor.

CO 2: Explain the pin configuration and Memory organization of a typical 8085 Micro-processor & 8051 Microcontroller.

CO 3: Analyze the Instruction Set of 8085 Micro-processor and 8051 Micro controller.

CO 4: Develop assembly language source code for applications that use I/O ports, timer and single/multiple interrupts.

CO 5: Produce interfacing examples using 8085 Micro-processor & 8051 Microcontroller.

UNIT I INTRODUCTION **12**

Introduction to 8085 microprocessor architecture-Memory Interfacing-I/O Data transfer concepts-Addressing modes-Timing diagram-Interrupts system-Instruction set- Simple programming in 8085, Architecture of 8086.

UNIT II MICROPROCESSOR PERIPHERAL INTERFACING **12**

Introduction, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel 8255, Programmable Keyboard & display (8279), Programmable Interval timers (Intel 8253), UART (8251), D-to-A converter, A-to-D converter, DMA controller , Interrupt controller.

UNIT III 8051 MICROCONTROLLER **12**

Introduction to 8051 Micro-controller, Architecture, Memory organization, Special function registers, Port Operation, Memory Interfacing, I/O Interfacing, Interrupts.

UNIT IV 8051 INSTRUCTION SET AND PROGRAMMING **12**

Programmer's model of 8051, Operand types, Operand addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions, Simple Programs.

UNIT V SYSTEM DESIGN USING 8051 **12**

Traffic light control, washing machine control, RTC Interfacing using I^2C Standard- Motor Control using Relay, PWM, DC & Stepper Motor control, Electronic lock system.

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Ramesh S Gaonkar, "Microprocessor Architecture, Programming and application with 8085", Penram International Publishing, New Delhi, 5th Edition, 2002.
2. Mohammed Ali Mazidi and Janice Gillispie Mazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education, New Delhi, 2nd Edition, 2008.

REFERENCES

1. Amar K. Ganguly and Anuva Ganguly, "Microprocessors and Microcontrollers: 8085, 8086 and 8051", Alpha Science Intl Ltd, 1st Edition, 2012.
2. Kenneth J Ayala, "The 8051 Microcontroller Architecture Programming and Application", Penram International Publishers (India), New Delhi, 3rd Edition, 2004.

13EC54 CONTROL SYSTEMS ANALYSIS AND DESIGN L T P C
3 1 0 4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Develop the mathematical model and describe the transfer function of electrical and electronic systems using block diagrams and signal flow graph.

CO 2: Analyze the time response and steady state error of the first order and the second order control systems.

CO 3: Investigate the control systems using frequency domain plots.

CO 4: Determine the stability of the control systems in time, frequency and spatial domain representations.

CO 5: Derive the state space representation of the control system and determine its controllability and observability.

UNIT I CONTROL SYSTEM MODELING 12

Control systems – Terminology and Basic Structure, Open loop and Closed loop systems, Differential equation, Transfer function, Mathematical Modeling of Electrical and Op-amp based Electronic systems, Block diagram reduction Techniques, Signal flow graph.

UNIT II TIME RESPONSE ANALYSIS 12

Standard test signals, First order systems, Impulse and Step Response analysis of second order systems, Time domain specification, Steady state errors and error constants.

UNIT III FREQUENCY RESPONSE ANALYSIS 12

Frequency response analysis, Bode plot, Polar plot, Nyquist plot, Frequency Domain specifications from the plots, Lead Lag Compensator design and analysis.

UNIT IV STABILITY ANALYSIS 12

Routh-Hurwitz Criterion, Root Locus Technique- Construction of Root Locus, Stability Analysis, Nyquist Stability Criterion, Relative Stability.

UNIT V STATE VARIABLE ANALYSIS 12

State space representation of Continuous Time systems, State equations, Transfer function from State Variable Representation, Solutions of the state equations, Concepts of Controllability and Observability, State space representation for Discrete time systems.

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.

REFERENCES

1. Charles L. Phillips and John Parr, "Feedback Control Systems", Prentice Hall, 5th Edition, 2010.
2. Farid Golnaraghi and Benjamin C. Kuo, "Automatic Control Systems", Wiley Publications, 9th Edition, 2009.
3. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Prentice Hall, 12th Edition, 2010.

13EC55 PROFESSIONAL ETHICS AND HUMAN VALUES (Common to all branches)

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO1: recognize the core values that shape the ethical behavior of an engineer
CO2: expose awareness on professional ethics and human values.
CO3: distinguish their role in technological development

UNIT I HUMAN VALUES 9

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issued - 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.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

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 - Intellectual Property Rights (IPR) - discrimination.

UNIT V GLOBAL ISSUES 9

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.

L:45 TOTAL: 45PERIODS

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw-Hill, New York, 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.
3. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)

REFERENCES

1. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)

2. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
3. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

13EC57	ANALOG COMMUNICATION AND SIGNAL PROCESSING LABORATORY	L	T	P	C
		0	0	3	2

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Discuss the instruction set of DSP Processor and apply them in signal processing.

CO 2: Design and apply DSP concepts like convolution, filtering on various signals and get familiarized with MATLAB codings.

CO 3: Apply MATLAB coding to obtain Spectral response of a signal, sampling principles and finite-word-length effects in signal processing.

CO 4: Demonstrate the behaviour of various types of modulators and demodulators for analog modulation techniques.

CO 5: Construct the TDM/FDM circuit/ pre-emphasis, de-emphasis circuits and demonstrate their significance

LIST OF EXPERIMENTS

1. Study of AM modulator & demodulator
2. Study of FM modulator & demodulator
3. Study and verification of Time Division Multiplexing/Frequency Division Multiplexing.
4. Study of pre-emphasis and de-emphasis circuits
5. Verification of Sampling Theorem and effects of aliasing using MATLAB
6. Study and verification of Linear and Circular Convolution using MATLAB.
7. Designing of FIR/IIR Filters using MATLAB.
8. Calculation of FFT of a signal using MATLAB.
9. Study of various addressing modes using TMS320C64XX/67XX processor.
10. Implementation of linear &circular convolution using TMS320C64XX/67XX processor.
11. Implementation of FIR Filter using TMS320C64XX/67XX processor.
12. Wave form generation using TMS320C64XX/67XX processor.
13. Calculation of FFT using TMS320C64XX/67XX processor.

P:45 TOTAL: 45 PERIODS

13EC58	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	L	T	P	C
		0	0	3	2

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Perform Arithmetic, Logical and Bit Manipulation operations in 8085 microprocessor and 8051 microcontroller.

CO 2: Establish serial and parallel communication between two microprocessors.

CO 3: Interface 8051/8085 with ADC, DAC, Stepper motor, 8279, 8259 and 8253.

CO 4: Verify Timer, Interrupts and UART operations in 8051 microcontroller

LIST OF EXPERIMENTS

1. Programs for arithmetic & logical operations using 8085 Microprocessor.
2. Programs for Sorting & Searching using 8085 Microprocessor.
3. Parallel communication between two kits using 8255 interfacing card.
4. Waveform generation using 8255 and 8253/8254 interfacing card.
5. Interfacing ADC and DAC using 8051 Micro-controller.
6. Programming arithmetic, logical & Bit manipulations operations using 8051Micro-controller.
7. Programming and verifying Timer, Interrupts and UART operations in 8051 Micro-controller.
8. Interfacing of LED and LCD with 8051Micro-controller.
9. Interfacing of stepper motor traffic light control with 8051Micro-controller.
10. Serial Communication between 8051 Micro-controller kit and PC.

P:45 TOTAL: 45 PERIODS

13EC61 DIGITAL COMMUNICATION

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Compute the channel capacity and describe digital communication systems.

CO 2: Calculate signal to quantization noise ratio for PCM, DPCM, ADPCM, DM & ADM.

CO 3: Design an encoder and decoder for error control.

CO 4: Analyze baseband reception techniques.

CO 5: Evaluate the error performance of coherent detection systems.

UNIT I INFORMATION THEORY AND INTRODUCTION TO DIGITAL COMMUNICATION SYSTEM **12**

Measure of information – Entropy – Source coding theorem – Discrete memoryless channels, Mutual information, Channel capacity, Shannon-Fano coding,
Digital Communication Systems – Functional description, Channel classification, Bandwidth, Mathematical Models of Communication Channel.

UNIT II BASEBAND FORMATTING TECHNIQUES **12**

Quantization – Uniform and Non-uniform; Encoding Techniques – Temporal waveform encoding -PCM, Bandwidth of PCM system, Noise in a PCM system, SNR of PCM system with quantization noise, Adaptive PCM, DPCM, SNR improvement in DPCM, Delta modulation, SNR of DM system, Adaptive Delta modulation.

UNIT III CHANNEL CODING TECHNIQUES AND LINE CODES **12**

Error Control Codes - Block Codes, Convolutional Codes, Concept of Error Free Communication; Classification of line codes, desirable characteristics and power spectra of line codes.

UNIT IV BASEBAND RECEPTION TECHNIQUES **12**

Geometric representation of Signals, Gram Schmidt Orthogonalization Procedure, Noise in Communication Systems; Receiving Filter – Correlator type, Matched Filter type; Equalizing Filter - Signal and system design for ISI elimination, Implementation, Eye Pattern analysis; Detector – Maximum Likelihood Detector, Error Probability, Figure-of-Merit for Digital Detection.

UNIT V BANDPASS SIGNAL TRANSMISSION AND RECEPTION **12**

Memoryless modulation methods - Representation and Spectral characteristics, Binary ASK, Binary PSK, Binary FSK, QAM, QPSK; Band pass receiving filter, Error performance – Coherent detection systems:ASK,FSK,PSK.Introduction to spread spectrum techniques.

L:45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Amitabha Bhattacharya, “Digital Communications”, Tata McGraw Hill, 1st Edition, 2006.
2. Simon Haykins, “Communication Systems”, John Wiley, 5th Edition, 2009.

REFERENCES

1. Simon Haykin, "Digital Communications", John Wiley, 5th Edition, 2006.
2. John. Proakis, "Fundamentals of Communication Systems", Pearson Education, 5th Edition, 2006.
3. Michael. B. Purrsley, "Introduction to Digital Communication", Pearson Education, 2006.
4. Bernard Sklar, "Digital Communication", Pearson Education, 2nd Edition, 2006.

13EC62	COMPUTER ARCHITECTURE AND ORGANIZATION	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the organization of digital computers and the basic operations of different components.

CO 2: Describe the representation and manipulation of data on the computer.

CO 3: Design the system level components and analyze the issues of pipelining.

CO 4: Posses the knowledge of memory hierarchy and its impact on computer cost/performance.

CO 5: Analyze how various computer components interact in order to exchange information.

UNIT I INTRODUCTION 9

Functional units- Basic Operational Concepts, Bus Structures, Software Performance – Memory locations & addresses – Memory operations – Instruction and instruction sequencing – addressing modes – assembly language – Basic I/O operations – stacks and queues.

UNIT II DATA PATH DESIGN 9

Addition and subtraction of signed numbers – Design of fast adders – multiplication of positive numbers- signed operand multiplication and fast multiplication – non restoring division algorithm – Combinational ALU - floating point numbers and operations

UNIT III BASIC PROCESSING UNIT 9

Fundamental concepts – Execution of a complete Instruction – Multiple bus organization – Hardwired control – micro programmed control, Multiplier control unit – Pipelining – Basic concepts – data hazards – instruction hazards – influence on Instruction sets – Data path and control consideration.

UNIT IV MEMORY SYSTEM 9

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

UNIT V I/O ORGANIZATION 9

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface Circuits – Standard I/O Interfaces.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organization", 5th Edition, McGraw-Hill Inc, 2002.
2. John P.Hayes, "Computer architecture and Organization", Tata McGraw-Hill, 3rd Edition, 2002.

REFERENCES

1. Morris Mano, "Computer System Architecture" (Low price edition), Prentice-Hall of India, 2nd Edition, 2005.
2. Parhami, "Computer Architecture", Oxford Press, 2006.
3. P.Pal Chaudhuri, "Computer organization and design", Prentice Hall of India, 2nd Edition, 2007.

13EC63 COMPUTER COMMUNICATION NETWORKS

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Describe and Discuss the concepts of networks, types and architectures.

CO 2: Identify error free transmission of data and analyse data collision with various protocols.

CO 3: Apply various routing algorithms over a network to provide optimal path.

CO 4: Examine the addressing entities of a network with implementation of TCP,UDP protocols.

CO 5: Illustrate the real time applications of networks.

UNIT I INTRODUCTION TO COMPUTER COMMUNICATION NETWORKS AND PHYSICAL LAYER **12**

Data Communications – Networks - Networks models – OSI model – Layers in OSI model – Addressing – Guided and Unguided Transmission media, Line Coding, Switching: Circuit switched networks – Data gram Networks – Virtual circuit networks.

UNIT II DATA LINK LAYER **12**

Data link control: Framing – Flow and error control –Protocols for Noiseless and Noisy Channels- Error Detection: Parity, LRC, VRC, CRC – HDLC

Multiple access: Random access – Controlled access

Wired LANS: IEEE standards – standard Ethernet – changes in the standard – Fast Ethernet – Gigabit Ethernet.

Wireless LANS: IEEE 802.11: Architecture, MAC Sub layer, Addressing Mechanism– Bluetooth.

UNIT III NETWORK LAYER **12**

Logical addressing: IPv4, IPv6 addresses Internet Protocol: Internetworking – IPv4, IPv6 - Address mapping – ARP, RARP, BOOTP, DHCP, ICMP, IGMP, Delivery - Forwarding - Routing protocols – DSDV, OSPF.

UNIT IV TRANSPORT LAYER **12**

Process-to-Process delivery - User Datagram Protocol (UDP) – Transmission Control Protocol (TCP)/ Internet Protocol (IP) Suite – Congestion Control – Quality of services (QoS) – Techniques to improve QoS.

UNIT V APPLICATION LAYER **12**

Domain Name System (DNS) – E-mail – FTP – WWW – HTTP –Network Security: Cryptography – Data Encryption Standard, RSA - Digital signature – Management of Public keys.

L:45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill, 5th Edition, 2012.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, 4th Edition, Morgan Kauffmann Publishers Inc., 2007.

REFERENCES

1. Andrew S. Tannenbaum, "Computer Networks", Pearson Education, 5th Edition, 2010.
2. Wayne Tomasi, "Introduction to Data Communication and Networking", 1st Edition, Pearson Education, 2005.
3. James.F.Kurouse & W.Rouse, "Computer Networking: A Top down Approach featuring the internet", 2nd Edition, Pearson Education, 2002.
4. William Stallings, "Data and Computer Communication", 9th Edition, Pearson Education, 2010.

13EC64 ANTENNAS AND WAVE PROPAGATION L T P C
3 1 0 4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Distinguish the properties and parameters of antenna such as radiation pattern, radiation impedance, directivity, antenna gain, effective area.

CO 2: Design an antenna system with the radiating elements in an array, given the radiation parameters such as radiation pattern, gain, operating frequency, transmit/receive power.

CO 3: Design aperture and special antennas for the given specification.

CO 4: Analyze and classify the antennas for wireless applications.

CO 5: Identify the mechanism of the atmospheric effects on radio wave propagation.

UNIT I PHYSICAL CONCEPT OF RADIATION 12

Basic properties of transmitting and receiving antenna, Antenna parameters: Radiation pattern, Directivity, Gain, Radiation resistance ,Mutual impedance, Input impedance, Polarization, Bandwidth, Beamwidth, Effective aperture, Vector effective length, Antenna temperature. Reciprocity principle and its applications, Friss transmission formula.

Wire antennas: Short dipole, Radiation resistance and Directivity, Half wave Dipole, Monopole, Small loop antennas.

UNIT II THEORY OF ARRAY ANTENNAS 12

Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Array with non-uniform Excitation-Binomial Array, log-periodic dipole arrays and Yagi-uda arrays.

UNIT III APERTURE ANTENNAS AND SPECIAL ANTENNAS 12

Aperture Antennas -Slot antenna, Horn Antenna, Reflector Antenna, Lens Antenna, **Special Antennas** - Long wire, V and Rhombic Antenna, Helical Antenna, Biconical Antenna, Despun antenna.

UNIT IV ANTENNA MEASUREMENTS AND ANTENNAS FOR MOBILE APPLICATIONS 12

Microstrip Patch Antenna-Planar-Coplanar, Intenna, PIFA, Basic Concepts of Smart Antennas-Beamforming- Fixed weight beamforming - Adaptive beamforming.

Antenna Measurements: Radiation Pattern measurement, Gain and Directivity Measurements, Anechoic Chamber.

UNIT V RADIO WAVE PROPAGATION 12

Ground Wave Propagation - Free-space Propagation - Ground Reflection, Tropospheric Propagation-Tropospheric Scatter, Ionospheric propagation - Structure of ionosphere, skip distance, Virtual height, Critical frequency, MUF, Electrical properties of ionosphere, Faraday rotation, Whistlers.

L:45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. E.C.Jordan and Balmain, “Electromagnetic waves and Radiating Systems”, Pearson Education, 2nd Edition, 2006.
2. A.R.Harish, M.Sachidanada, “Antennas and Wave propagation”, Oxford University Press, 1st Edition, 2007

REFERENCES

1. K.D Prasad, "Antennas and Wave Propagation", Sathya Prakasan Publications, 2nd Edition, 2001.
2. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, "Antennas for all Applications", Tata McGraw-Hill Book Company, 4th Edition, 2010.
3. G.S.N.Raju, "Antenna Wave Propagation", Pearson Education, 1st Edition, 2006.
4. Constantine A. Balanis, "Antenna Theory Analysis and Design", John Wiley, 2nd Edition, 2007.
5. C.Rowell, E.Y.Lam," Mobile Phone Antenna Design", IEEE Antenna & Propagation Magazine, Vol.54, No.4, Pages (14-34), 2012.

13EC65 VLSI TECHNOLOGY AND DESIGN

L	T	P	C
3	1	0	4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the basic CMOS circuits and the CMOS process technology.
CO 2: Design Combinational and Sequential circuits.
CO 3: Discuss the concepts of CMOS Testing.
CO 4: Model the digital system using Verilog HDL.

UNIT I CMOS TECHNOLOGY **12**

MOS Transistor Theory - Ideal I-V and C-V Characteristics of MOS Transistor, Nonideal I-V Effects, DC Transfer Characteristics of CMOS Inverter, n well, twin tub and SOI CMOS processes, Lambda based design Rules, CMOS Process Enhancements, Technology-related CAD Issues, Manufacturing Issues.

UNIT II CLASSIFICATION OF ICs AND CMOS CIRCUIT CHARACTERIZATION **12**

SSI, MSI, LSI, VLSI definitions, ASIC classification - Full Custom ASICs, Standard-Cell Based ASICs, Gate-Array-Based ASICs, Channeled, Channelless, Structured Gate Array and Architecture of Generic FPGA. Delay Estimation, Logical Effort and Transistor Sizing, Power Dissipation, Interconnect, Design Margin, Reliability, Scaling.

UNIT III COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN **12**

Combinational Circuit Design: Circuit Families – Static CMOS, Ratioed Circuits, Dynamic Circuits, Pass-transistor Circuits, Low power Logic Design, Comparison of Circuit Families **Sequential Circuit Design**: Sequencing Static Circuits, Circuit design of Latches and Flip-Flops.

UNIT IV CMOS TESTING **12**

Need for testing, Testers, Text Fixtures and Test Programs, Logic Verification Principles, Silicon Debug Principles, Manufacturing Test Principles, Design for Testability, Built-in Self-Test, JTAG Boundary scan.

UNIT V SPECIFICATION USING VERILOG HDL **12**

Design Methodologies – Modules – Instances – Test bench – Operators – Number Specification – Identifiers and Keywords – Data Types – Modules and Ports – Gate-Level Modeling - Dataflow Modeling – Behavioral Modeling: Structured Procedures, Procedural Assignments, Timing Controls, Conditional Statements, Multiway Branching, Loops, Sequential and Parallel Blocks. Structural gate level description of decoder, equality detector, comparator, priority encoder, half adder, full adder, Ripple carry adder, Behavioral modeling of 'n' bit comparator, D flip-flop, T flip-flop, Structural modeling of Asynchronous counter, shift register, PRBS.

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

1. Weste and Harris, "CMOS VLSI DESIGN: A Circuit and Systems Perspective", 3rd Edition, Pearson Education, 2007. (4th Reprint)
2. Samir Palnitkar, "Verilog HDL, A Guide to Digital Design and Synthesis" 2nd Edition, Pearson Education, 2005.

REFERENCES

1. M.J.S Smith, "Application Specific integrated circuits", Pearson Education, 2008. (5th reprint
2. Jan Rabaey, Anantha Chandrakasan, B.Nikolic, "Digital Integrated Circuits: A Design Perspective", PHI, 2nd Edition, 2003.
3. D.A. Pucknell & K.Eshraghian, "Basic VLSI Design", PHI, 3rd Edition, 2003.
4. Wayne Wolf, "Modern VLSI design", Pearson Education, 3rd Edition, 2007.
5. Uyemura J.P, "Introduction to VLSI circuits and systems", Wiley, 2002.

13EC67	DIGITAL COMMUNICATION AND NETWORKS LABORATORY	L	T	P	C
		0	0	3	2

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Demonstrate techniques to Detect and Correct errors during transmission.
CO 2: Demonstrate understanding of the routing algorithms employed for reliable Computer Communication Networks.
CO 3: Demonstrate the behavior of various types of modulators and demodulators for digital Modulation techniques.

LIST OF EXPERIMENTS

1. PC to PC Serial communication using RS 232C.
2. Analysis of logical link control layer protocols - Stop & wait, Sliding window.
3. Ethernet LAN protocol / to create scenario and study the performance of CSMA/CD, CSMA/CA protocol ethereal simulation.
4. Implementation of distance vector/ Link state routing algorithm.
5. Implementation of VLAN/ NAT.
6. Simulation of Data encryption/decryption algorithm.
7. Simulation of a Wired Environment using NS – 2.
8. Study of Pulse Modulation- PAM using discrete components
9. Study of Digital Modulation schemes – ASK, PSK, QPSK, and FSK using discrete components and MATLAB
10. Study of AWGN channel characteristics using MATLAB.

P: 45 TOTAL: 45 PERIODS

13EC68 VLSI DESIGN LABORATORY

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Design and Implement a digital circuit for given specifications and analyze it using FPGA based software tools.

CO 2: Perform the ASIC based circuits design for given specifications and analyze it in terms of Speed, Area and Power consumption using ASIC based software tools.

LIST OF EXPERIMENTS

1. Design entry and simulation of combinational logic circuits (8 bit adders, 4 bit multipliers, address decoders, multiplexers), test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
2. Design entry and simulation of sequential logic circuits (Counters, PRBS generators, Accumulators), test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
3. Combinational logic circuits design using CADENCE tool. Concepts of floor plan, timing analysis, area analysis & power consumption analysis to be highlighted.
4. Sequential logic circuits design using CADENCE tool. Concepts of floor plan, timing analysis, area analysis & power consumption analysis to be highlighted.
5. Implementation of combinational and sequential logic circuits simulated in experiment 1 and experiment 2 in FPGA.
6. Design the schematic of CMOS inverter, perform layout simulation, parasitic extraction and performance analysis using CADENCE Tool.
7. Design a 4 input NAND and NOR gates for different CMOS families. Obtain the layout for the design and compare the delay performance.
8. Design a carry look ahead adder using standard cell approach.

P: 45 TOTAL: 45 PERIODS

13EC71	ADVANCED LOGIC DESIGN	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Design sequential circuits using ASM Charts.
CO 2: Perform fault detection and location in combinational and sequential circuits.
CO 3: Explain various programmable logic devices.
CO 4: Write VHDL Coding for a given logic circuit.

UNIT I ALGORITHMIC STATE MACHINES 9

ASM-ASM Charts-Synchronous sequential network design using ASM charts: Sequence Recognizer, Parallel(unsigned) Binary multiplier-state assignments-ASM Tables-ASM Realizations

UNIT II FAULT DETECTION AND LOCATION IN COMBINATIONAL CIRCUITS 9

Fault detection and location: classical methods- Path sensitizing method- equivalent normal form method-Two level circuit fault detection-Multilevel circuit fault detection- Boolean difference method-SPOOF Method.

UNIT III FAULT DETECTION AND LOCATION IN SEQUENTIAL CIRCUITS 9

Circuit test approach-Initial state identification- final state identification- design of fault detection experiment for diagnosable machines.

UNIT IV PROGRAMMABLE LOGIC DEVICES 9

Complex Programmable Logic Devices- Xilinx XC9500 functional block - I/O block – Switch matrix - Field-Programmable Gate Arrays: Xilinx XC4000 CLB, I/O block, Programmable interconnects, Xilinx Virtex II logic cell - I/O block – Interconnects, FPGA Design flow – Constraints – Programming file generation

UNIT V VHDL PROGRAMMING 9

Introduction to VHDL – VHDL Modules, Signals and Constants, Data types, Arrays – VHDL Operators, Packages and Libraries, IEEE Standard Logic – Gate level description of Combinational Logic: Multiplexer, Demultiplexer, Encoder, Decoder and Comparator – Behavioral description of Sequential Logic: – Flip-Flops, Registers and Counters. Digital System Design: Serial Adder, Binary Multiplier and Binary Divider.

L: 45; TOTAL: 45 PERIODS

TEXT BOOKS

1. Samuel C.Lee, “Digital circuits and Logic design”, Prentice hall of India, 5th Edition 2013.
2. Charles H. Roth Jr., “Fundamentals of Logic design”, Cengage Learning, 5th Edition, 2012.
3. J.Bhasker, “A VHDL Primer”, Prentice hall of India, Pearson Education, 3rd Edition 2006

REFERENCES

1. John F. Wakerly, “Digital Design: Principles and Practices”, Pearson, 4th Edition, 2011.
2. Donald G. Givone, “Digital principles and Design”, Tata McGraw Hill, 2002.

13EC72	WIRELESS COMMUNICATION	L	T	P	C
		3	1	0	4

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Illustrate the concept of cellular communication and the multiple access techniques.

CO 2: Analyze the large scale fading channels and to predict the received signal strength.

CO 3: Analyze the multipath channels and categorize the various types of fading.

CO 4: Comprehend the techniques to improve the signal quality.

CO 5: Discuss the various wireless systems and standards.

UNIT I INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS **12**

Introduction, frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Trunking and Grade of Service, Improving coverage & Capacity in cellular systems, Multiple access in cellular System- TDMA- FDMA-CDMA SDMA.

UNIT II MOBILE RADIO WAVE PROPAGATION - LARGE SCALE FADING **12**

Radio wave propagation – Transmit and receive signal models – Free space pathloss – Ray tracing – Empirical path loss models – Simplified path loss model –Shadow fading – Combined path loss and shadowing – Outage probability under pathloss & shadowing – Cell coverage area.

UNIT III MOBILE RADIO WAVE PROPAGATION - SMALL SCALE FADING AND MULTIPATH **12**

Small scale multipath propagation – Impulse response model of a multipath channel – Small scale multipath measurements – Parameters of mobile multipath channels – Types of fading (fading effects due to Multipath time delay spread & Doppler spread) – Rayleigh and Ricean Distribution.

UNIT IV CAPACITY, DIVERSITY AND EQUALIZATION IN WIRELESS SYSTEM **12**

Capacity in AWGN – Capacity of Flat fading channels – Channel and System Model Channel Distribution Information known – CSI at Receiver. Diversity technique – Selection combining – Equal Gain Combining – Maximum ratio combining – Feedback – Time – Frequency – Rake Receiver – Interleaving. Equalization – Linear Equalization – Non linear (DFE & MLSE) – Algorithm of Adaptive Equalization – Zero Forcing algorithm – LMS algorithm – Recursive Least Square algorithm.

UNIT V WIRELESS SYSTEMS AND STANDARDS **12**

GSM System – Services and features – Architecture – Radio Subsystem – GSM Call – Frame Structure –Signal Processing. CDMA Digital Cellular Standard (IS-95) – Frequency & Channel Specification – Forward CDMA channel – Reverse CDMA channel. Introduction to OFDM system – Cyclic prefix – Matrix representation, Case study: IEEE 802.11a wireless LAN.

L: 45; T:15; TOTAL: 60 PERIODS

TEXT BOOKS

1. Rappaport T.S, "Wireless Communications: Principles and Practice", Pearson Education, 2nd Edition, 2009.
2. William Stallings, "Wireless Communication & Networking", Pearson Education Asia, 2009.
3. Schiller, "Mobile Communication", Pearson Education Asia, 2008.

REFERENCES

1. Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2005.
2. Lee W.C.Y., "Mobile Communications Engineering: Theory & Applications", McGraw Hill, New York, 2nd Edition, 1998.

13EC73 OPTICAL COMMUNICATION AND NETWORKS L T P C
3 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Explain the basic elements of optical fiber transmission link, fiber modes configurations and structures.
CO 2: Analyze the different losses and dispersion effects of fiber.
CO 3: Choose the appropriate optical sources and detectors to design an optical system.
CO 4: Measure the fiber attenuation and dispersion.
CO 5: Compare the performance of the optical networks.

UNIT I INTRODUCTION 9

Introduction**,** Ray theory transmission- Total internal reflection - Acceptance angle – Numerical aperture –Skew rays – Electromagnetic mode theory of optical propagation – EM waves – Modes in Planar guide – phase and group velocity – cylindrical fibers – SM fibers.

UNIT II TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS 9

Attenuation – Material absorption losses in silica glass fibers – Linear and Non linear Scattering losses - Fiber Bend losses – Mid band and far band infra red transmission – Intra and Inter Modal Dispersion – Over all Fiber Dispersion – Polarization- non linear Phenomena. Optical fiber connectors**,** Fiber alignment and Joint Losses – Fiber Splices – Fiber connectors – Expanded Beam Connectors – Fiber Couplers.

UNIT III OPTICAL SOURCES AND RECEIVERS 9

Optical sources: Light Emitting Diodes - LED structures - surface and edge emitters, mono and hetero structures - quantum efficiency, injection laser diode - ILD structures - comparison of LED and ILD.

Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Performance comparison, Fundamental receiver operation, Pre amplifiers, Error sources, Receiver Configuration.

UNIT IV FIBER OPTIC MEASUREMENTS 9

Fiber Attenuation- Dispersion– Fiber Refractive index profile– Fiber cut- off Wave length – Fiber Numerical Aperture– Fiber diameter, OTDR – OTDR Field application: OTDR Trace, Attenuation measurement using OTDR, Fiber fault location.

UNIT V OPTICAL NETWORKS 9

Basic Networks – SONET / SDH – Broadcast and select WDM Networks –Wavelength Routed Networks – Performance of WDM - Solitons – Optical CDMA – Ultra High Capacity Networks.

L:45; TOTAL: 45 PERIODS

TEXT BOOKS

1. John M. Senior, “Optical Fiber Communication”, Pearson Education, 2nd Edition, 2007.
2. Gerd Keiser, “Optical Fiber Communication”, Mc Graw Hill, 4th Edition, 2010.

REFERENCES

1. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.
2. Rajiv Ramaswami, "Optical Networks", 2nd Edition, Elsevier, 2004.
3. Govind P. Agrawal, "Fiber-optic communication systems", 3rd Edition, John Wiley & sons, 2004.
4. R.P. Khare, "Fiber Optics and Optoelectronics", Oxford University Press, 15th Reprint, 2013.

13EC74 RF AND MICROWAVE ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Understand the properties of S parameters for two port and N-port networks.
CO 2: Analyze and design RF amplifier and understand the concepts of MMIC fabrication.
CO 3: Calculate the S parameters for different types of Microwave components.
CO 4: Compare different types of Microwave semiconductor devices & its applications.
CO 5: Describe the operation of various microwave oscillators and amplifiers.
CO 6: Discuss different microwave measurement techniques.

UNIT I TWO PORT AND N-PORT RF NETWORKS - CIRCUIT REPRESENTATION **9**

Low frequency parameters- impedance, admittance, hybrid and ABCD. High frequency parameters-Formulation of S parameters, properties of S parameters-Reciprocal and lossless networks, transmission matrix, Scattering matrix -Concept of N port scattering matrix representation-Properties of S matrix- S matrix formulation of two-port junction. Introduction to component basics - wire, resistor, capacitor and inductor - applications of RF.

UNIT II RF TRANSISTOR AMPLIFIER DESIGN AND MMIC TECHNOLOGY **9**

Amplifier power relation, stability considerations, gain considerations, noise figure, Parametric devices -Principles of operation - applications of parametric amplifier, Microwave Monolithic Integrated Circuit (MMIC) - Materials and fabrication techniques.

UNIT III MICROWAVE PASSIVE COMPONENTS **9**

Microwave frequency range, significance of microwave frequency range -. Microwave junctions - Tee junctions- E plane tee- H plane Tee-Magic Tee - Rat race - Corners –bends and twists, Directional couplers -two hole directional couplers- Ferrites -Gyrator- Isolator Circulator - Attenuator - Phase changer.

UNIT IV MICROWAVE SEMICONDUCTOR DEVICES **9**

Microwave semiconductor devices- operation - characteristics and application of BJTs and FETs- MESFET, HEMT -Principles of tunnel diodes , Varactor and Step recovery diodes, Transferred Electron Devices -Gunn diode- Avalanche Transit time devices- IMPATT and TRAPATT devices.

UNIT V MICROWAVE TUBES AND MEASUREMENTS **9**

Microwave tubes- High frequency limitations – Principle of operation of two cavity and four cavity Klystron, Reflex Klystron, Traveling Wave Tube and Magnetron. Microwave measurements -power, wavelength, impedance, SWR, attenuation, Q factor and Phase shift.

L:45; TOTAL: 45 PERIODS

TEXT BOOKS

1. Samuel Y Liao, “Microwave Devices & Circuits”, Pearson Education, 3rd Edition, 2003.
2. M.M.Radmanesh, “RF & Microwave Electronics Illustrated”, Pearson Education, 2007.

REFERENCES

1. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata McGraw Hill, 18th Reprint, 2004.
2. Reinhold.Ludwig and Pavel Bretshko, "RF Circuit Design", Pearson Education, 2006.
3. Robert E.Colin, "Foundations for Microwave Engineering", McGraw Hill, 2nd Edition, 2001.
4. D.M.Pozar, "Microwave Engineering.", John Wiley & sons, 2006.

13EC77	ELECTRONIC SYSTEM DESIGN LABORATORY	L	T	P	C
		0	0	3	2

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Design and implement hardware in FPGA for Serial Communication Protocol

CO 2: Design and implement digital filters in FPGA.

CO 3: Write C programs for Signal Processing in Digital Signal Processor.

CO 4: Understand the GSM concept.

LIST OF EXPERIMENTS

1. Implementation of channel coding in FPGA.
2. Implementation of FIR & IIR filters on FPGA.
3. Design of 4-bit processor in FPGA.
4. Design and Implementation of serial communication.
5. Implementation of echo cancellation in TMS digital signal processor.
6. Design a wireless system based on GSM module to monitor the parameter at remote end.
7. Microcontroller based system design.
8. Design of energy meter using low power microcontroller.

P:45 TOTAL: 45 PERIODS

13EC78 OPTICAL AND MICROWAVE LABORATORY

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Measure various parameters of optical fibers.
CO 2: Select a fiber optic link for communication.
CO 3: Calculate S parameters of various microwave components.
CO 4: Measure the parameters of different microwave antennas.

LIST OF EXPERIMENTS

OPTICAL EXPERIMENTS:

1. Study of various parameters of Optical Fibers.
2. Setting up a fiber optic analog communication links.
3. Setting up a fiber optic digital communication links.

MICROWAVE EXPERIMENTS:

1. Study of Microwave components and determining its S-Matrix
2. Study the characteristics of Reflex Klystron Oscillator.
3. Study of Microwave setup under VSWR and Attenuation.
4. Determination of guide wavelength and frequency.
5. Radiation Pattern of Microwave antennas.
6. Performance measure of Passive Devices.

P:45 TOTAL: 45 PERIODS

13EC79	COMPREHENSION	L	T	P	C
		0	0	3	1

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Acquire and comprehend the technical knowledge.

CO 2: Prepare for GATE like competitive examinations and interviews.

CO 3: Get motivated to pursue the higher education.

COURSE CONTENT AND LAYOUT

The students will select a particular group of subjects as mentioned below to review their competency level:

GROUP A:

1. Circuit Theory
2. Analog and Digital Circuits
3. Control Systems
4. Analog and Digital Communication
5. Signals and Systems
6. Microprocessor

GROUP B:

1. Embedded Systems
2. Computer Networks
3. VLSI Design
4. Data Structures and OOPS and
5. Communication Skills

1. The staff-coordinator per group is responsible for scheduling the session plans, monitoring the activities and recording the continual assessments.
2. The technical seminars and group discussions will be assisted by subject experts in the department.
3. Each student must participate in all the activities and their performance assessment must be recorded.

SUGGESTED ACTIVITIES

- Group Discussion
- Technical Seminars
- Objective type test solving skills
- Mock GATE Examination
- Comprehensive Viva

P:45 TOTAL: 45 PERIODS

13EI71 PRINCIPLES OF MANAGEMENT L T P C
(Common to all branches) **3 0 0 3**

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO1: discuss the development of management thoughts and different types of Business organization.
CO2: practice the process of planning and decision making in an industrial situations.
CO3: design the suitable selection process for a particular job description.
CO4: apply different motivational techniques and leadership skills in the organization.
CO5: justify the various controlling techniques and tools in the organization.

UNIT I INTRODUCTION 9

Historical developments – approaches to management – Management and Administration – Development of Management Thoughts – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organization, Meaning, features merits and demerits - Social responsibility.

UNIT II PLANNING 9

Nature and Purpose– Steps in Planning Process – Objectives – Setting Objectives – Process of Managing through Objectives – Strategies – Policies and Planning Premises – Forecasting – Importance, Methods of Forecasting - Decision-making, Decision making Process and Types of Decisions.

UNIT III FUNCTIONAL AREA OF ORGANISATION 9

Formal and Informal organization – Organization Chart – Structure and Process – Departmentation by different strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process - Techniques – HRD – Managerial Effectiveness.

UNIT IV DIRECTION 9

Objectives– Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication – Process of Communication – Types of Communication – Barriers and Breakdown - Effective Communication - Electronic Media in Communication.

UNIT V CONTROLLING STRATEGIES 9

System and process of Controlling – Requirements for effective control – The Budget as Control Technique – Information Technology– Computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and Preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Harold Koontz and Heinz Weihrich, "Essentials of Management – An International Perspective", Tata Mcgraw Hill, 8th Edition, 2009.
2. Hellriegel, Slocum and Jackson, "Management – A Competency Based Approach", ThomsonSouth Western, 11th Edition, 2008.

REFERENCES

1. Stephen P. Robbins and Mary Coulter, "Management", Prentice Hall of India", 8th Edition, 2012.
2. Charles W.L Hill, Steven L McShane, "Principles of Management", Mcgraw Hill Education, Special Indian Edition, 2007.
3. Vijayaraghavan G.K and Sivakumar M. "Principles of Management", Lakshmi Publications, 1st Edition, 2012.
4. Ramachandran. S. "Principles of Management", Air Walk Publications, 1st Edition, 2012.
5. Andrew J. Dubrin, "Essentials of Management", Thomson South western, 9th Edition, 2011.

13EC82 SATELLITE COMMUNICATION SYSTEMS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Understand the orbital mechanics.
CO 2: Classify different launch vehicles and illustrate the working of the space segment subsystems.
CO 3: Evaluate the satellite link budget and estimate the performance impairments.
CO 4: Measure different earth station parameters.
CO 5: Illustrate the different applications of satellite.

UNIT I SATELLITE ORBITS **9**

Kepler's Laws, Newton's laws, orbital parameters, orbital perturbations, Station keeping, Geo stationary and non-Geo-stationary orbits - Look Angle Determination- Limits of visibility – eclipse - Sub satellite point -Sun transit outage.

UNIT II SPACE SEGMENT AND LAUNCH VEHICLES **9**

Launching Procedures, Hohmann Transfer, Different types of latest Indian Launch Vehicles, Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Telemetry, Tracking and Command. Thermal control and Propulsion, Communication, Payload and supporting subsystems.

UNIT III SATELLITE LINK DESIGN **9**

Satellite uplink and downlink Analysis and Design, link budget, C/N calculation, Performance impairments-system noise, inter modulation distortion, interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

UNIT IV EARTH SEGMENT **9**

Earth Station Technology - Terrestrial Interface, Transmitter and Receiver, Antenna Subsystems, DBS, DTH, TVRO, MATV, CATV, Test Equipment, Measurement of G/T, C/N_0, EIRP, Antenna Gain.

UNIT V SATELLITE APPLICATIONS **9**

GSAT Series, INSAT, VSAT, Mobile Satellite Services: GSM, GPS, IRNSS, INMARSAT, LEO, MEO, Satellite Navigational System, Digital Audio Broadcast (DAB), Remote sensing satellites, Weather forecasting satellites, RADARSAT.

L: 45; TOTAL: 45 PERIODS

TEXT BOOKS

- Dennis Roddy, "Satellite Communication", McGraw Hill International, 4th Edition, 2006.
- Anil K. Maini, Varsha Agrawal, "Satellite Communication", Wiley India, 3rd Edition, 2014.

REFERENCES

1. Bruce R. Elbert, "Introduction to Satellite Communication", Artech House Bostan London, 3rd Edition, 2008.
2. M.Richharia, "Satellite Communication Systems-Design Principles", Macmillan, 2nd Edition, 2006.
3. Tri T. Ha, "Digital Satellite Communication", McGraw Hill, 2nd Edition, 2009.

13EC87	PROJECT WORK	L	T	P	C
		0	0	12	6

COURSE OUTCOMES

Upon completion of this course, the students will be able to

CO1: Select a good project and able to work in a team leading to development of hardware / software product.

CO2: Prepare a good technical report and able to present the ideas with clarity

A Project topic must be selected either from published lists or the students themselves may propose suitable topics in consultation with their guides. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.

The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated jointly by external and internal examiners constituted by the Head of the Department based on oral presentation and the project report.

P: 180 TOTAL: 180 PERIODS

13ECAA	FUNDAMENTALS OF DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Describe the principles of image fundamentals and apply the mathematical knowledge to process the images.

CO 2: Apply the image enhancement techniques to gray scale and color images for improving the visual content of the image.

CO 3: Apply the proper restoration techniques for a specific application.

CO 4: Analyze the segmentation methods for a specific application.

C0 5: Evaluate the rate of image compression achieved for different techniques.

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Elements of digital image processing systems, Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II IMAGE ENHANCEMENT 9

Spatial filtering - Intensity Transformation- Histogram equalization and specification techniques, Noise distributions, Image Smoothing, Image sharpening, Median, Geometric mean, Harmonic mean - Contraharmonic mean filters - Homomorphic filtering - Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - degradation model, Inverse filtering- Wiener filtering, constrained filtering, Geometric transformations-spatial transformations.

UNIT IV IMAGE SEGMENTATION 9

Edge detection- Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and Merging – Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION 9

Need for data compression- Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Prentice Hall, 3rd Edition, 2009.
2. Anil K. Jain, “Fundamentals of Digital Image Processing”, Pearson Education, 2003.

REFERENCES

1. Kenneth R. Castleman, “Digital Image Processing”, Pearson Education, 2nd reprint, 2008.
2. William K. Pratt, “Digital Image Processing”, John Wiley, New York, 4th Edition, 2007.
3. Milan Sonka et. al., “Image Processing, Analysis And Machine Vision”, Brookes/Cole, Vikas Publishing House, 3rd Edition, 2007

13ECAB VLSI DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the concepts of pipelining, parallel processing.
CO 2: Apply optimization techniques to design IIR and FIR filters.
CO 3: Discuss scaling and round-off noise issues and their impact on performance.
CO 4: Explain the concepts of numerical strength reduction and wave pipelining.

UNIT I DSP SYSTEMS, PIPELINING AND PARALLEL PROCESSING 9

Introduction – Representations of DSP algorithms - Iteration Bound - data flow graph representations, loop bound and iteration bound, Longest path Matrix algorithm; Pipelining and parallel processing - Pipelining of FIR digital filters, parallel processing, pipelining and parallel processing for low power.

UNIT II RETIMING, UNFOLDING AND RANK ORDER FILTERS 9

Retiming - definitions and properties; Unfolding - an algorithm for Unfolding, properties of unfolding, parallel processing application; Algorithmic strength reduction in filters and transforms - 2-parallel FIR filter, 2-parallel fast FIR filter, parallel architectures for rank-order filters, Odd- Even Merge- Sort architecture, parallel rank-order filters.

UNIT III FAST CONVOLUTION, PIPELINING AND PARALLEL PROCESSING OF IIR FILTERS 9

Fast convolution - Cook-Toom algorithm, modified Cook-Toom algorithm; Pipelined and parallel recursive filters - inefficient/efficient single channel interleaving, Look Ahead pipelining in first- order IIR filters, Look-Ahead pipelining with power-of-two decomposition, Clustered Look-Ahead pipelining, parallel processing of IIR filters, combined pipelining and parallel processing of IIR filters.

UNIT IV ROUNDOFF NOISE AND BIT-LEVEL ARITHMETIC ARCHITECTURES 9

Scaling and roundoff noise- scaling operation, roundoff noise, state variable description of digital filters, scaling and roundoff noise computation, roundoff noise in pipelined first-order IIR filters; Bit-Level Arithmetic Architectures- parallel multipliers with sign extension, parallel carry-ripple array multipliers, parallel carry-save multiplier, 4x 4 bit Baugh- Wooley carry-save multiplication, design of Lyon's bit-serial multipliers using Horner's rule.

UNIT V NUMERICAL STRENGTH REDUCTION AND WAVE PIPELINING 9

Numerical Strength Reduction - subexpression elimination, multiple constant multiplications, iterative matching, Two-phase clock generator, clock skew in edge triggered single-phase clocking, two-phase clocking, wave pipelining.

L:45 TOTAL: 45 PERIODS

TEXT BOOK

1. Keshab K.Parhi, "VLSI Digital Signal Processing systems, Design and implementation", John Wiley, 2009.

REFERENCES

1. U. Meyer - Baese, "Digital Signal Processing with Field Programmable Arrays", Springer, 2nd Edition, 2007.
2. Shoab Khan, "Digital Design of Signal Processing Systems: A Practical Approach", Wiley, 2011.

13ECAC DIGITAL SIGNAL PROCESSORS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Perform the fixed and floating point arithmetic operation and analyze the computational accuracy.
CO 2: Explain the basic architectural features of Programmable DSP's.
CO 3: Explain the architecture and addressing modes of 'C54XX processor.
CO 4: Explain the architecture and addressing modes of 'C6X processor.
CO 5: Discuss the recent trends in DSP system design.

UNIT I COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS 9

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT II ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES 9

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT III PROGRAMMABLE DIGITAL SIGNAL PROCESSORS 9

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX Processors, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT IV ARCHITECTURE OF 'C6X PROCESSORS 9

Features of 'C6x Processors – Internal Architecture – General purpose register files – Functional Units and its instructions – data paths – Fixed point instructions – Conditional operations – Parallel operation – Floating point instructions – Pipeline operations – Application Programs.

UNIT V RECENT TRENDS IN DSP SYSTEM DESIGN 9

An overview of Open Multimedia Applications Platform (OMAP) – Evolution of FPGA based system design – Softcore Processors – FPGAs in Telecommunication Applications.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Venkataramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", TMH, 2nd Edition, 2011.
2. S.Srinivasan and Avtar Singh, "Digital Signal Processing, Implementations using DSP Microprocessors with Examples from TMS320C54X", Brooks/Cole, 2004.

REFERENCES

1. K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, "A Practical Approach to Digital Signal Processing", New Age International, 2nd Edition, 2013.
2. Jonatham Stein, "Digital Signal Processing", John Wiley, 2005.
3. Lapsley, "DSP Processor Fundamentals, Architectures and Features", John Wiley, 2000.
4. Rulph Chassaing, "Digital Signal Processing and Applications with the C6713 and C6416 DSK", John Wiley & Sons, 2005.

13ECAD WAVELETS AND ITS APPLICATIONS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Use Fourier tools to analyze signals

CO 2: Discuss about MRA and representation using wavelet bases

CO 3: Acquire knowledge about various wavelet transforms and design wavelet transform

CO 4: Apply wavelet transform for various signal & image processing applications

UNIT I FUNDAMENTALS 9

Vector Spaces – Properties– Dot Product – Basis – Dimension, Orthogonality and Orthonormality – Relationship Between Vectors and Signals – Signal Spaces – Concept of Convergence – Hilbert Spaces for Energy Signals- Fourier Theory: Fourier series expansion, Fourier transforms, Short time Fourier transforms, Time-frequency analysis.

UNIT II MULTI RESOLUTION ANALYSIS 9

Definition of Multi Resolution Analysis (MRA) – Haar Basis – Construction of General Orthonormal MRA – Wavelet Basis for MRA – Continuous Time MRA Interpretation for the DTWT – Discrete Time MRA – Basis Functions for the DTWT – PRQMF Filter Banks.

UNIT III CONTINUOUS WAVELET TRANSFORMS 9

Wavelet Transform – Definition and Properties – Concept of Scale and its Relation with Frequency – Continuous Wavelet Transform (CWT) – Scaling Function and Wavelet Functions (Daubechies Coiflet, Mexican Hat, Sinc, Gaussian, Bi Orthogonal)– Tiling of Time – Scale Plane for CWT.

UNIT IV DISCRETE WAVELET TRANSFORM 9

Filter Bank and Sub Band Coding Principles – Wavelet Filters – Inverse DWT Computation by Filter Banks – Basic Properties of Filter Coefficients – Choice of Wavelet Function Coefficients – Derivations of Daubechies Wavelets – Mallat's Algorithm for DWT – Multi Band Wavelet Transforms Lifting Scheme- Wavelet Transform Using Polyphase Matrix Factorization – Geometrical Foundations of Lifting Scheme – Lifting Scheme in Z –Domain.

UNIT V APPLICATIONS 9

Wavelet methods for signal processing- Image Compression Techniques: EZW–SPHIT Coding – Image Denoising Techniques: Noise Estimation – Shrinkage Rules – Shrinkage Functions – Edge Detection and Object Isolation, Image Fusion, and Object Detection.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Rao R M and A S Bopardikar, "Wavelet Transforms Introduction to theory and Applications", Pearson Education, Asia, 2000.
2. L.Prasad & S.S.Iyengar, "Wavelet Analysis with Applications to Image Processing", CRC Press, 1997.

REFERENCES

1. J. C. Goswami and A. K. Chan, "Fundamentals of wavelets: Theory, Algorithms and Applications", WileyInterscience Publication, John Wiley & Sons Inc.,2004
2. M. Vetterli, J. Kovacevic, "Wavelets and subband coding", Prentice Hall Inc, 1995.

3. Stephen G. Mallat, "A wavelet tour of signal processing", 2nd Edition, Academic Press, 2000.
4. Soman K P and Ramachandran K.I, "Insight into Wavelets From Theory to practice", Prentice Hall, 2004.

13ECAE BIOSIGNAL PROCESSING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Categorize and model the biomedical signals.
CO 2: Analyze and process neurological signals.
CO 3: Develop a practical diagnosis system to analyze cardiological signals.
CO 4: Investigate optimal and adaptive filtering techniques for removing artifacts.
CO 5: Exploit the latest trends and their applications in biomedical signal processing.

UNIT I INTRODUCTION TO BIOMEDICAL SIGNAL 9

Nature of Biomedical Signals, Typical Sources of Biomedical Signals, Biomedical Signal Analysis: Objectives and Difficulties-Computer Aided Diagnosis. Concurrent, Coupled and Correlated Processes: Illustration with case studies, Application-segmentation of PCG.

UNIT II NEUROLOGICAL SIGNAL PROCESSING 9

The Brain and its potentials, Electrophysiological origin of brain waves, EEG signal and its characteristics, EEG analysis, Linear prediction theory, AR Method for EEG, Recursive estimation of AR parameters, Spectral error measure, Adaptive segmentation, Transient detection and elimination, Overall Performance.

UNIT III CARDIOLOGICAL SIGNAL PROCESSING 9

Basic electrocardiography, ECG Data Acquisition, ECG lead systems, ECG parameters and their estimation, Use of multi scale analysis for parameter estimation, Arrhythmia analysis monitoring, Long-term continuous ECG recording.

UNIT IV FILTERING FOR REMOVAL OF ARTIFACTS 9

Time-domain Filters, Frequency-domain Filters, Optimal Filtering - Wiener Filter, Adaptive Filters for Removal of Interference, Selecting an Appropriate Filter, Application: Removal of Artifacts in the ECG, Maternal - Fetal ECG and Muscle-contraction Interference.

UNIT V BIOSIGNAL CLASSIFICATION AND DIAGNOSTIC DECISION 9

Diagnostic of bundle-branch block-Illustration, Pattern classification, Supervised and Unsupervised pattern classification, probabilistic models and statistical decision. Training test steps, Neural Networks and Applications.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. D.C. Reddy, "Biomedical Signal Processing Principles and Techniques", Tata McGraw-Hill, 2nd reprint, 2006.
2. Rangaraj M. Rangayyan, "Biomedical Signal Analysis: A Case-Study Approach", Wiley, 2002.

REFERENCES

1. Willis J Tompkins, "Bio Medical Digital Signal Processing", Prentice Hall of India, New Delhi, 2003.
2. Eugene N. Bruce, "Biomedical Signal Processing and Signal Modeling", John Wiley& Sons, 2001.
3. John L. Semmlow, "Biosignal And Biomedical Image processing Matlab Based Applications", Marcel Dekker Inc., 2004.
4. Leif Sörnmo and Laguna**,** "Bioelectrical Signal Processing in Cardiac and Neurological Applications", Elsevier, 1st Edition, 2005.
5. Metin Akay, "Biomedical Signal Processing", Academic Press Inc., 1994.

13ECBA RADAR AND NAVIGATIONAL AIDS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to:

CO 1: Explain the fundamentals of Radars and its propagation.
CO 2: Analyze the detection of signals in the presence of noise.
CO 3: Discuss the concepts of Radar transmitter and receiver
CO 4: Identifying various types of navigation system

UNIT I RADAR EQUATIONS **9**

Radar Block Diagram & operation - Radar Frequencies – The Radar Equation - Detection of Signals in Noise- Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency- Antenna Parameters- System losses and propagation effects.

UNIT II MTI AND PULSE DOPPLER RADAR **9**

Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Moving Target Detector – Limitations to MTI Performance - MTI from a Moving Platform (AMIT) - Pulse Doppler Radar –Non-Coherent MTI –CW conical Scan and sequential Lobing – Introduction of Synthetic Aperture Radar (SAR).

UNIT III RADAR SIGNAL DETECTION AND PROPAGATION OF WAVES **9**

Detection Criteria – Detectors – Automatic Detector - Integrators – Constant False-Alarm Rate Receivers – Ambiguity Diagram– Pulse Compression– Introduction to Clutter– Surface clutter RADAR equation– anomalous propagation and diffraction – Radar Displays.

UNIT IV RADAR NAVIGATION **9**

Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders - Decca Navigation System –Decca Receivers - Range and Accuracy of Decca -The Omega System - Tactical Air Navigation – Instrument landing System – Ground Controlled approach.

UNIT V RADAR TRANSMITTER AND RECEIVER **9**

Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems. Inertial Navigation - Principles of Operation - Navigation Over the Earth - Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems - Accuracy of Inertial Navigation Systems. Satellite Navigation System - The Transit System - Navstar Global Positioning System (GPS) – RADAR Receiver – Receiver Noise Figure.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Merrill I. Skolnik, “Introduction to Radar Systems”, Tata McGraw-Hill, 3rd Edition, 2004.
2. Peyton Z. Peebles, “Radar principles”, John Wiley and Sons, 2009. (Reprint)
3. Mark A.Richards, James A. Scheer, William A.Holm, “Principles of Modern RADAR”, 2012. (Reprint)

REFERENCES

1. J.C Toomay, “Principles of Radar”, PHI, 3rd Edition, 2010.
2. Dr. AK Sen and Dr. AB Bhattacharya, “Radar Systems and Radio Aids to Navigation”, Khanna Publishers, 2010.
3. G.S.N.Raju, “Radar Engineering and fundamentals of navigational Aids”, I.K. International Publication, 2012
4. Byron Edpe, “Principles, Technology, Application of Radar”, Pearson Education, 2004.

13ECBB STATISTICAL THEORY OF COMMUNICATION

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of the course, the students will able to

CO 1: State the basic of classical detection and estimation theory.
CO 2: Formulate signal parameters
CO 3: Formulate continuous waveforms and Linear systems

UNIT I CLASSICAL DETECTION AND ESTIMATION THEORY 9

Introduction – Simple binary hypothesis tests – M Hypothesis – Estimation theory – Composite hypothesis – General Gaussian problem – Performance bounds and approximations.

UNIT II REPRESENTATIONS OF RANDOM PROCESSES 9

Deterministic functions: Orthogonal representations – Random process characterization – Homogeneous Integral equations and Eigen functions – Periodic processes – Infinite time interval: Spectral decomposition – Vector Random processes.

UNIT III DETECTION OF SIGNALS – ESTIMATION OF SIGNAL PARAMETERS 9

Detection and Estimation in White Gaussian and Non-White Gaussian noise – Signals with unwanted parameters: The Composite hypothesis problem – Multiple channels – Multiple parameter estimation.

UNIT IV ESTIMATION OF CONTINUOUS WAVEFORMS 9

Derivation of Estimator equations – A Lower bound on the mean square estimation error – Multidimensional waveform estimation – Non random waveform estimation.

UNIT V LINEAR ESTIMATION 9

Properties of Optimum processors – Realizable Linear filters: Stationary processes, Infinite past: Wiener filters – Kalman-Bucy filters – Linear Modulation: Communications context - Fundamental role of the Optimum linear filter.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Harry L. Van Trees, "Detection, Estimation and Modulation theory", Part I, John Wiley & Sons, NY, USA, 2nd Edition, 2013.
2. P. Eugene Xavier, "Statistical theory of Communication", New Age International Ltd. Publishers, New Delhi, 2007.
3. Prof. B.R. Levin, "Statistical communication theory and its applications", MIR Publishers, Moscow, 1982.

REFERENCES

1. L. L. Scharf, "Statistical Signal Processing: Detection, Estimation, and Time Series Analysis", Addison Wesley, 1991.
2. S. M. Kay, "Fundamentals of Statistical Signal Processing: Estimation Theory (Vol.-I), Detection Theory (Vol.-II)", Prentice Hall, 1998.

13ECBC MULTIMEDIA COMPRESSION AND COMMUNICATION

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the characteristics of different multimedia components.
CO 2: Analyze the algorithms used for text and image compression.
CO 3: Illustrate the different audio and video compression principles.
CO 4: Explain the basic concepts and the protocols of VoIP technology.
CO 5: Illustrate the service requirements, protocols and mechanisms used for different multimedia applications.

UNIT I MULTIMEDIA COMPONENTS 9

Introduction, Special features of multimedia, Multimedia components and their characteristics - Text, audio, images, graphics, animation, video.

UNIT II TEXT AND IMAGE COMPRESSION 9

Compression principles, text compression - static Huffman coding, dynamic Huffman coding, Arithmetic coding, Lempel Ziv-Welch Compression, Image compression – JPEG Standard, JPEG 2000 Standard, EZW, SPIHT.

UNIT III AUDIO AND VIDEO COMPRESSION 9

Audio compression - DPCM, Adaptive PCM, adaptive predictive coding, linear predictive coding, code excited LPC, perpetual coding. Video compression principles - H.261, H.263, MPEG 1, 2, 4.

UNIT IV VoIP TECHNOLOGY 9

Basics of IP transport, VoIP challenges, H.323 & SIP -Network Architecture – Protocols - Call establishment and release, VoIP and SS7, Quality of Service, CODEC Methods, VOIP applicability.

UNIT V MULTIMEDIA NETWORKING 9

Multimedia networking applications, Streaming stored audio and video, Making the best Effort service, Protocols for real time interactive Applications, Distributing multimedia, Beyond best effort service, Scheduling and policing mechanisms, Integrated services, Differentiated Services, RSVP.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Fred Halshall, “Multimedia communication - Applications, networks, protocols and standards”, Pearson Education, 1st Edition, 2011.
2. Khalid Sayood, “Introduction to Data Compression”, Morgan Kauffman, 4th Edition, 2012.
3. Clint Smith, Daniel Collins, “3G Wireless Networks”, McGraw Hill, 2nd Edition, 2006.
4. Kurose and W.Ross, “Computer Networking - a Top down approach”, Pearson education, 6th Edition, 2012.

REFERENCES

1. Ze-Nian Li, Mark S Drew, "Fundamentals of Multimedia", Prentice Hall, 1st Edition, 2010.
2. K.R.Rao, Z.S.Bojkovic, D.A.Milovanovic, "Multimedia Communication Systems: Techniques, Standards, and Networks", Prentice Hall, 1st Edition, 2007.
3. Ranjan Parekh, "Principles of Multimedia", TMH, 2nd Edition, 2012.
4. Ralf Steinmetz, Klara Nahrstedt, "Multimedia Computing, Communications and Applications", Pearson Education, 6th reprint, 2009.

13ECBD INFORMATION THEORY AND CODING TECHNIQUES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Define entropy, mutual information and channel capacity.

CO 2: Apply Source coding techniques for Text, Audio, speech, image and video.

CO 3: Analyze Error detecting and correcting capabilities of block codes and convolutional codes.

UNIT I INFORMATION THEORY 9

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT II SOURCE CODING: TEXT, AUDIO AND SPEECH 9

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm, **Audio:** Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3, **Speech:** Channel Vocoder, Linear Predictive Coding

UNIT III SOURCE CODING: IMAGE AND VIDEO 9

Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard.

UNIT IV ERROR CONTROL CODING: BLOCK CODES 9

Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder – CRC.

UNIT V ERROR CONTROL CODING: CONVOLUTIONAL CODES 9

Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. R Bose, “Information Theory, Coding and Cryptography”, TMH, 2007.
2. Fred Halsall, “Multimedia Communications: Applications, Networks, Protocols and Standards”, Pearson Education Asia, 2007.

REFERENCES

1. K Sayood, “Introduction to Data Compression”, 4th Edition, 2012.
2. S Gravano, “Introduction to Error Control Codes”, Oxford University Press, 2007.
3. Amitabha Bhattacharya, “Digital Communication”, TMH, 2006.

13ECBE GLOBAL NAVIGATION SATELLITE SYSTEM

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Describe the working of GPS.

CO 2: Discuss the satellite constellation, signal structure and errors in GPS.

CO 3: Explain the applications of GPS.

UNIT I OVERVIEW OF GPS **9**

Introduction to Global navigation satellite system, Kepler's law and orbital dynamics, Satellite Orbital parameters, Orbital Perturbations, GPS observables, Basic Equations for finding user position, pseudorange measurement in receiver, user position determination from pseudoranges.

UNIT II GPS SATELLITE CONSTELLATION AND SIGNAL STRUCTURE 9

GPS System segments - signals - signal generation – Signal characteristics – signal power levels, Determination of GPS satellite coordinates, GPS data formats: receiver independent exchange format (RINEX)

UNIT III DIFFERENTIAL GPS **9**

Basic concepts of DGPS, Local area DGPS, Extension of Range of Accurate DGPS, Real time and Post processing DGPS, Data link, RTCM format

UNIT IV GPS RECEIVERS AND ERRORS **9**

GPS receiver, Signal conditioning, Signal Acquisition, Carrier and code tracking, Converting tracking outputs to Navigation data, Subframe matching and Parity check, GNSS antennas, Weak signals and their Acquisition, GPS Error sources, Error correction models, Receiver noise, Ionospheric effects on GPS signals

UNIT V GLOBAL NAVIGATION SATELLITE SYSTEM **9**

GLONASS components – Constellation details – Signal structure – Time and Co-ordinate systems, NAVSTAR GPS, GALILEO

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. G S Rao, "Global Navigation Satellite Systems", McGraw-Hill publications, New Delhi, 2010.
2. B. Bhatta, "Global Navigation Satellite Systems", B.S publications, 2010

REFERENCES

1. B. Hoffman-Wellenhof, H. Liehtenegger and J. Collins, "GPS – Theory and Practice", Springer – Wien, New York, 2001.
2. James Ba – Yen Tsui, "Fundamentals of GPS receivers – A software approach", John Wiley & Sons, 2001.
3. Ahmed El-Rabbany, "Introduction to GPS: The Global Positioning System", 2nd Edition, 2006.
4. Gunter Seeber, "Satellite Geodesy", Walterde Gruyter Publisher, 2003.

13ECBF	ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain EMI Sources and EMI problems.
CO 2: Discuss the concepts of EMI coupling in cables and other equipments.
CO 3: Describe the mitigation techniques for EMI.
CO 4: Explain the standards and regulations for EMI/EMC.
CO 5: Discuss the various EMI test methods.

UNIT I BASIC CONCEPTS 9

Definition of EMI and EMC, Intra and Inter system EMI, Sources and victims of EMI, Conducted and Radiated EMI emission and susceptibility, Transient & ESD, Case Histories, Radiation Hazards to humans.

UNIT II COUPLING MECHANISM 9

Common mode coupling, Differential mode coupling, Common impedance coupling, Ground loop coupling, Field to cable coupling, Cable to cable coupling, Power mains and Power supply coupling.

UNIT III EMI MITIGATION TECHNIQUES 9

Shielding - principle, choice of materials for H, E and free space fields, and thickness, EMI gaskets, Bonding, Grounding - circuits, system and cable grounding, Filtering, Transient EMI control devices and applications, PCB Zoning, Component selection, mounting, trace routing.

UNIT IV STANDARDS AND REGULATION 9

Units of EMI; National and International EMI Standardizing Organizations - IEC, ANSI, FCC, CISPR, British standard, EN Emission and Susceptibility standards and specifications; MIL461E Standards.

UNIT V EMI TEST METHODS AND INSTRUMENTATION 9

EMI test sites - Open area site, TEM cell, GTEM cell, Shielded chamber, Shielded Anechoic chamber, EMI test receivers, Spectrum Analyzer, Antennas and factors, Current probes and calibration factor; MIL-STD test methods, Civilian STD Test methods.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. V.P. Kodali, "Engineering EMC Principles, Measurements and Technologies", IEEE Press, Newyork, 2001.
2. Henry W.Ott., "Noise Reduction Techniques in Electronic Systems", A Wiley Inter Science Publications, John Wiley and Sons, Newyork, 1988.

REFERENCES

1. Don R.J.White Consultant Incorporate, "Handbook of EMI/EMC", Vol I-V, 1988.
2. Bemhard Keiser, "Principles of Electromagnetic Compatibility", 3rd Edition, Artech house, Norwood, 1987.
3. Henry Walter Ott, "Electromagnetic Compatibility Engineering", Wiley, 1st Edition, 2009.
4. David Morgan, "A Hand book for EMC Testing and Measurements", IET, London.

13ECCA OPEN SOURCE BASED EMBEDDED SYSTEM DESIGN

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the architecture of OMAP-3 and its peripherals.
CO 2: Explore the embedded system development using crane board.
CO 3: Identify the android application development.
CO 4: Analyze Linux device driver development

UNIT I CONCEPTS OF OPEN SOURCE BASED EMBEDDED SYSTEM 9

Concepts of Embedded Systems - Different types of processors - How and why Linux – Contributing to Open source - General Linux architecture - Device Driver architecture - High level code walk through of Linux kernel - Configuring a Linux kernel - Detailed review of the Linux boot process.

UNIT II OMAP-3 AND CRANE BOARD 9

Introduction to OMAP-3 -Introduction to Crane board - Basic introduction to hardware handling - Crane board and its peripherals - Interfacing external peripherals on Crane board - Basics of reading and understanding a schematic.

UNIT III SYSTEM FIRMWARE FOR CRANE BOARD 9

Configuring and building the system firmware for the Crane board- Using the firmware to boot the Crane board - Simple C application on the Crane board - Interfacing an external peripheral.

UNIT IV CROSS TOOLS AND DEVICE DRIVER DEVELOPMENT 9

Cross Tools and development – Tool chain and their components -Using a cross compiler – Device driver development - Development of a basic driver -Development of a simple character driver.

UNIT V ANDROID APPLICATION DEVELOPMENT 9

Introduction to Android SDK- Development of a simple Android application- Steps involved in bringing up Android on Crane board.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Neil Matthew and Richard Stones, “Beginning Linux Programming”, Wiley India, 4th Edition, 2007.
2. Venkateswaran Sreekrishnan, “Essential Linux Device Drivers”, Pearson Education, 1st Edition, 2009.

REFERENCES

1. Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, “Linux Device Drivers”, O’REILLY, 3rd Edition, 2005.
2. http://www.linux-journal.com.
3. http://free-electrons.com.
4. http://www.linuxforu.com/tag/linux-device-driversseries.
5. http://www.tldp.org

13ECCB ADVANCED MICROPROCESSORS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of the course, the students will able to

CO 1: Furnishes complete knowledge about the background of ARM family, specifically ARM Cortex – M3

CO 2: Imparts essential knowledge for programming in Cortex- M3 (assembly directives, operands, data structures and instruction set) **.**

CO 3: Provides fundamental skill on programming with interrupts.

CO 4: Provides a detailed study on methodologies that allow modularity in programming.

UNIT I ARM CORTEX – M3 PROCESSOR 9

Overview of ARM Cortex-M3 Processor- Background of ARM and ARM Architecture-Architecture versions-ARM Nomenclature- Thumb and Jazelle Architecture- Cortex M3 Processor Applications- Registers- General Purpose Registers, Special purpose Registers-Operation Modes-Memory Map-Bus Interface-MPU-interrupts and Exceptions-Stack Memory Operations-Reset Sequence-Debugging Support.

UNIT II ASSEMBLY DIRECTIVES AND OPERANDS 9

Concept of the directive-Different directives: Directives for simple memory reservation, directive for memory reservation with initialization, directives for memory management, directive for project management, Special directive like CN, DCFSU,ENTRY,IMPORT,EXPORT-**Operands of Instruction:** Operands for Common instruction, immediate operand, memory access operands, initialization and use of operands, Addressing modes-Structure of program.

UNIT III ALGORITHMIC AND DATA STRUCTURES FOR CORTEX PROGRAMMING 9

Alternative Structures: Simple alternative, complete alternative, special case of alternative, multiple choice alternative-Iterative Structures: Repeat until loop, while do-loop, for loop-Compound condition: Alternative with AND, Iterative with AND, Alternative with OR, Iterative with OR-Data Structure: Table in one dimension, Tables in multiple dimensions, Registration, Non-dimensional table, Queue, stack- Cortex instruction set-Simple Assembly programming with CORTEX M3.

UNIT IV MANAGING EXCEPTIONS 9

Process after reset-possible exceptions: NMI, TRAPS like hard fault, memory management fault, bus fault, usage fault, SV Call trap, monitor, PENDSV service, Internal SYSTICK timer-Interrupts-Priority management: Priority levels and sublevels, nested mechanism-Entry and return in exception processing – NVIC registers for exception handling- Simple Assembly programming with CORTEX M3.

UNIT V INTERNAL MODULARITY AND EXTERNAL MODULARITY 9

Internal Modularity: Concepts of procedure-procedure arguments: Arguments by value and by reference, passing arguments by general registers, passing arguments by stack, passing arguments by system stack, local data & its reservation, chained list- Simple Assembly programming with CORTEX M3.

External Modularity: Different tools in ARM tool chain-Role of Assembler: Files produced by Assembler, placement counters, symbol table, translation, relocation table-Role of the linker: Functioning principle, product of the linker like map file and executable file image, scatter loading file-loader and debugging unit- Simple Assembly programming with CORTEX M3.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

- Vincent Mahout, "Assembly Language programming-ARM Cortex M3", John Wiley & Sons, 2012.
- Joseph Yiu, "The Definitive Guide to the ARM Cortex-M3", Elsevier, 2nd Edition, 2010.

REFERENCES

1. Andrew N.Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide Designing and Optimizing System Software", Morgan Kaufmann, 1st Edition, 2004.
2. Steave Furber, "ARM System-On-Chip Architecture", Addison Wesley, 2nd Edition, 2000.
3. Daniel W. Lewis, "Fundamentals of Embedded Software with the ARM Cortex-M3", Prentice Hall, 1st Edition, 2012.

13ECCC	ADVANCED VLSI DESIGN	L	T	P	C
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COURSE OUTCOMES

Upon successful completion of this course, the students will be able to:

CO 1: Discuss the concepts of ASIC Logic cells.
CO 2: Analyze the various programmable ASICs.
CO 3: Acquire the knowledge about the concepts of Logic synthesis and simulation.
CO 4: Explain the ASIC construction concepts.

UNIT I INTRODUCTION TO ASICS, CMOS LOGIC AND ASIC LIBRARY DESIGN **9**

Types of ASICs - Design flow - CMOS transistors - Combinational Logic Cell - Sequential logic cell - Data path logic cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical effort - Library cell design - Library architecture.

UNIT II PROGRAMMABLE ASICS, PROGRAMMABLE ASIC LOGIC CELLS AND PROGRAMMABLE ASIC I/O CELLS **9**

Anti fuse - static RAM - EPROM and EEPROM technology - PREP benchmarks - Actel ACT - Xilinx LCA - Altera FLEX - Altera MAX - DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks.

UNIT III PROGRAMMABLE ASIC INTERCONNECT AND PROGRAMMABLE ASIC DESIGN SOFTWARE **9**

Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000 - Altera FLEX - Design systems - Logic Synthesis - Half gate ASIC.

UNIT IV LOW LEVEL DESIGN ENTRY, LOGIC SYNTHESIS AND SIMULATION **9**

Schematic entry - Low level design language - PLA tools – EDIF - CFI design representation- Logic synthesis - Definition - A Logic synthesis example (Verilog) - Types of Simulation (definitions only).

UNIT V ASIC CONSTRUCTION, FLOOR PLANNING, PLACEMENT AND ROUTING **9**

System Partitioning - Objectives of Partitioning - A Simple Partitioning example; Floor planning - Goals and Objectives - Measurement of Delay in floor planning - Channel definition - I/O and Power Planning - Clock Planning; Placement - Terms and definitions - Goals and Objectives - an example with simple placement - physical design flow; Global routing - Objectives and methods - Detailed routing - Objectives - Detailed routing with left edge algorithm - Special routing - Circuit extraction and DRC.

L:45 TOTAL: 45 PERIODS

TEXT BOOK

1. M.J.S. Smith, “Application - Specific Integrated Circuits”, Pearson Education, 6th Reprint, 2009.

REFERENCES

1. Weng Fook Lee, “VLIW Microprocessor Hardware Design: On ASIC and FPGA”, McGraw-Hill, 1st Edition, 2007.
2. Khosrow Golshan, “Physical Design Essentials: An ASIC Design Implementation Perspective”, Springer, 2010.

13ECCD FUNDAMENTALS OF SEMICONDUCTOR CHIP TESTING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the need for IC testing.
CO 2: Explain various IC testing techniques.
CO 3: Calculate DC, AC parameters, Timing parameters from the testing.
CO 4: Compare the various features of CAD tools used for IC testing.

UNIT I INTRODUCTION TO SEMICONDUCTOR IC TESTING 9

Design and manufacturing cycle of an IC – Manufacturing defects in an IC – Need for CHIP testing – Types of CHIP testing – Engineering testing, production testing, QA testing, Customer inspection testing. ATE – Automated Test Equipment and its components – digital subsystem analog subsystem – mixed signal subsystem – ATE subsystems – Test head, Main frame, Test computer, Manipulator. Common accessories of an ATE – Load boards, Probe cards.

UNIT II DIGITAL DOMAIN TESTING – CONCEPTS AND METHODS 9

Introduction to testing in digital domains – Functional Testing Basics – VIL/VIH, VOL/VOH, IIL, IIH, IOL, IOH – DC Parametric test, continuity test, leakage test, IDD static test, IDD dynamic test, Digital Functional Test – Pattern, Timing, Levels – IO Signals – Input Signal Generation, Output Signal Compare Test Vectors – BIST, MBIST, PBIST techniques. AC Parameters Test – AC Timing Tests – Setup Time, Hold Time, Propagation Delay, ATE Time Measurement subsystem, Timing Calibration.

UNIT III AUTOMATIC TEST EQUIPMENT ARCHITECTURE 9

Architecture of a mixed signal ATE – DC Subsystem, Digital subsystem, Clock, DSP, VI Source, DC Matrix, Pogo blocks, Waveform generators, digitizers. Digital subsystem – Drivers, Comparators, PMU, Timing and formatting units, Sequence controller, Digital source memory, digital capture memory, ATE Pin Electronics.

UNIT IV TESTING OF SEMICONDUCTOR DEVICES 9

Project Plan, Specifications and Test Program. Test Plan Specifications – Design Test, Devices, Sample Test Program – Types, Considerations, Test Flow, Binning. Common Categories of Test for Semiconductor Devices – Continuity Test, leakage test, IDD test, DC test, Functional, AC tests, Specifications of Devices – Data Sheets.

UNIT V CAD TOOLS FOR TESTING 9

Debug Tools and data analysis, Characterization methods – Tools – Datalog, Histogram, Shmoo, pin margin, Pattern Debugger, Waveform Tool. Trouble Shooting Techniques – Statistical process control, process capability (CP), Process capability index (CPK), Standard deviation, mean, six sigma quality, gauge repeatability and reproducibility, guard banding, Gaussian statistics.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Mark burns & Gordon W Roberts, "An Introduction to mixed signal IC testing and measurement", Oxford University Press, 1st Edition, 2000.

2. Michael L. Bushnell & Vishwani D. Agrawal, "Essentials of electronic testing" Kluwer academic publishers, 2000.

REFERENCES

1. A Text book on semiconductor IC testing using Automatic Test Equipment, Tessolve Services – Private circulation manual.
2. William J. Greig, "Integrated Circuit Packaging, Assembly and Interconnections", Springer, 2007.
3. Artur Balasinki, "Semiconductors: Integrated Circuit Design foe Manufacturability", CRC Press, 1st Edition, 2011.

13ECCE ARM PROCESSOR ARCHITECTURE AND PROGRAMMING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Compare the different ARM processors.
CO 2: Explain different types of instruction used in ARM.
CO 3: Develop ARM assembly programmes.
CO 4: Design interfacing circuit with ARM processor.

UNIT I ARM PROCESSOR FUNDAMENTALS 9

Introduction to ARM Processors, ARM programmers model, ARM architecture Revisions, ARM Nomenclature, Functional block diagram of ARM Processor Families: ARM 7, ARM 9, ARM 11 and Cortex, Comparison of Cortex families.

UNIT II ARM INSTRUCTION SET 9

Data Processing Instructions, MOVE Instructions, Barrel Shifter Operations, Arithmetic Instructions, Logical Instructions, Comparison and Test Instructions, Multiply Instructions, Branch Instructions, Load – Store Instructions, Single Register Transfer, Single Register Load Store Addressing Modes, Multiple Register Transfer, Addressing Modes for Stack Operations, Swap Instruction, Software Interrupt Instruction, PSR, MRS and MSR Instructions, Coprocessor Instructions.

UNIT III ARM ASSEMBLY PROGRAMMING 9

Instruction Scheduling – Register Allocation – Conditional Execution – Looping Constructs – Bit manipulation – Efficient switches – Handling unaligned data-Simple ARM assembly program for calculating: Division, Square roots, Transcendental functions, Random Number Generation, Saturated and Rounded Arithmetic.

UNIT IV EXCEPTION AND INTERRUPT HANDLING 9

Exception Handling, ARM Processor Exceptions and Modes, Exception Priorities, Link Register Offsets, Interrupts, Interrupt Latency, Vector table, Basic Interrupt Stack Design and Implementation, Nested Vector interrupt controller of Cortex M3 Processor.

UNIT V ARM INTERFACING APPLICATIONS 9

ARM – GSM Interfacing, ARM – ZigBee Interfacing, ARM – Motor Interfacing, ARM – Display Interfacing, ARM- Keypad Interfacing, ARM – Sensor Interfacing (Ultrasonic, Temperature, Piezoelectric & Pressure).

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Steve Furber, "ARM System-on-chip architecture", Pearson Education, 2nd Edition, 2005.
2. Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide Designing and Optimizing System Software", Morgan Kaufmann, 2004.

REFERENCE

1. ARM 7 Architecture Reference manual, ARM Limited.

13ECCF EMBEDDED AND REAL TIME SYSTEMS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the fundamental concept of design of embedded and real time systems.
CO 2: Analyze the various platforms used for embedded computing and the performance of embedded systems design.
CO 3: Distinguish the software architectures for embedded system design.
CO 4: Summarize the basic properties of a real time operating system.
CO 5: Describe the services of operating system.

UNIT I INTRODUCTION TO EMBEDDED COMPUTING 9

Complex systems and micro processors – Design example: Model train controller – Embedded system design process – Formalism for system design – Instruction sets Preliminaries – ARM Processor – CPU: Programming input and output – Supervisor mode, exception and traps. Coprocessor – Memory system mechanism – CPU performance – CPU power consumption.

UNIT II COMPUTING PLATFORM AND DESIGN ANALYSIS 9

CPU buses – Memory devices – I/O devices – Component interfacing – Design with microprocessors – Development and Debugging – Program design – Model of programs Assembly and Linking – Basic compilation techniques – Analysis and optimization of execution time, power, energy, program size – Program validation and testing.

UNIT III SOFTWARE ARCHITECTURES 9

Round-Robin – Round-Robin with Interrupts – Function-Queue-Scheduling Architecture – Real-Time Operating System Architecture – Selecting Architecture.

UNIT IV PROCESS AND OPERATING SYSTEMS 9

Multiple tasks and multi processes – Processes – Context Switching – Operating Systems Scheduling policies - Multiprocessor – Inter Process Communication mechanisms – Message Mailboxes – Message Queues – Evaluating operating system performance.

UNIT V TASK MANAGEMENT AND MEMORY MANAGEMENT 9

Task Management: Creating Tasks – Task Stacks-Stack Checking-Task's Priority – Suspending Task – System Time – Memory Management: Memory Control Blocks – Creating Partition – Obtaining a Memory Block function – Returning a Memory Block Function.

L:45 TOTAL: 45 PERIODS

TEXT BOOK

1. Wayne Wolf, "Computers as Components - Principles of Embedded Computer System Design", Morgan Kaufmann, 2nd Edition, 2008.

REFERENCES

1. Jean J. Labrosse, "Micro C/OS-II: The Real Time Kernel", CMP Books, 2nd Edition, 2002.
2. David E-Simon, "An Embedded Software Primer", Pearson Education, 2007.
3. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dreamtech Press, 2005.

4. Tim Wilmshurst, “An Introduction to the Design of Small Scale Embedded Systems”, Pal grave Publisher, 2004.
5. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc-Graw Hill, 2004.
6. Tammy Noergaard, “Embedded Systems Architecture”, Elsevier, 2006.

13ECDA	MEDICAL ELECTRONICS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Analyze the human functioning system and its instrumentations with respect to bioelectric potential and biochemical reactions.

CO 2: Define the quantities from diagnostic equipments and assist with therapeutic equipments.

CO 3: Discuss and handle radiological and nuclear equipments for diagnosis.

CO 4: Explain the safety consequences in usage of recording instruments and avoiding electrical shock.

CO 5: Explore the wireless communication technology for biotelemetry and telemedicine.

UNIT I BIOPOTENTIAL AND BIO-CHEMICAL MEASUREMENTS 9

Sources of Bioelectric potentials, Electrode Theory, Biopotential Electrodes, Biochemical Transducers, Bioelectric amplifiers, Electrocardiograph – ECG waveform, standard lead systems and ECG Machine. Electroencephalograph. Blood Gas Analyzer - pH, pO_2, pCO_2 measurement, Colorimeter, Auto analyzer

UNIT II CLINICAL DIAGNOSIS AND THERAPEUTIC EQUIPMENTS 9

Blood flow meter, Cardiac Output Measurement, Blood cell counters, Pacemakers, Defibrillators, Hemodialysis Machine, Heart-Lung machine

UNIT III RADIOLOGY AND NUCLEAR EQUIPMENTS FOR DIAGNOSIS 9

Basis of Diagnostic Radiology, Nature of X-rays, Production of X-rays, X-ray Machine, Visualization of X-rays, X-ray Computed Tomography, Radio-isotopes in Medical Diagnosis, Physics of Radioactivity, Radiation Detectors, Single Photon Emission Computed Tomography, Positron Emission Tomography

UNIT IV LATEST MEDICAL EQUIPMENTS AND ELECTRICAL SAFETY 9

Magnetic Resonance Imaging, Ultrasonic Imaging, Thermal Imaging, Laser in Medicine, Physiological Effects of Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention

UNIT V BIO-TELEMETRY AND TELEMEDICINE 9

Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, Components of a Biotelemetry System, Single Channel and Multi-channel Wireless Telemetry Systems, Multi-patient Telemetry, Implantable Telemetry systems, Telemedicine.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Lesile Cromwell, “Biomedical instrumentation and measurement”, Prentice Hall of India, New Delhi, 2007.
2. Khandpur, R.S., “Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi, 2nd Edition, 2003.

REFERENCES

1. A.P.F. Turner, I. Karube & G.S. Wilson, "Biosensors: Fundamentals & Applications", Oxford University Press, Oxford, 1st Edition, 1995.
2. John G.Webster, "Medical Instrumentation Application and Design", John Wiley and Sons, (Asia) Private Limited, 4th Edition, 2009.
3. B. H. Brown et. Al, "Medical Physics and Biomedical Engineering", Overseas Press India Private Limited, 2005.
4. Joseph.J, Carr and John M.Brown, "Introduction to Biomedical Equipment Technology", Pearson Education Inc., 2004.

13ECDB ADVANCED ELECTRONIC SYSTEM DESIGN L T P C
3 0 0 3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Explain the RF components such as resonator, filter, transmission lines, etc.
CO 2: Apply optimization techniques to design of RF amplifiers using transistors.
CO 3: Discuss modern Power Supplies using SCR and SMPS technology
CO 4: Explain about signal shielding & grounding techniques and study of A/D and D/A Converters.

UNIT I INTRODUCTION TO RF DESIGN 9

RF behaviour of passive components, Chip components and circuit board considerations, Review of transmission lines, Impedance and admittance transformation, Parallel and series connection of networks, ABCD and scattering parameters, Analysis of amplifier using scattering parameter. RF filter – Basic resonator and filter configurations – Butterworth and Chebyshev filters. Implementation of microstrip filters design. Band pass filter and cascading of band pass filter elements.

UNIT II RF TRANSISTOR AMPLIFIER DESIGN 9

Impedance matching using discrete components. Microstrip line matching networks. Amplifier classes of operation and biasing networks – Amplifier power gain, Unilateral design(S12 =0) –Simple input and output matching networks – Bilateral design - Stability circle and conditional stability, Simultaneous conjugate matching for unconditionally stable transistors. Broadband amplifiers, High power amplifiers and multistage amplifiers.

UNIT III DESIGN OF POWER SUPPLIES 9

DC power supply design using transistors and SCRs, Design of crowbar and fold back protection circuits, Switched mode power supplies, Forward, flyback, buck and boost converters, Design of transformers and control circuits for SMPS .

UNIT IV DESIGN OF DATA ACQUISITION SYSTEMS 9

Amplification of Low level signals, Grounding, Shielding and Guarding techniques, Dual slope, quad slope and high speed A/D converters, Microprocessors Compatible A/D converters, Multiplying A/D converters and Logarithmic A/D converters, Sample and Hold, Design of two and four wire transmitters.

UNIT V DESIGN OF PRINTED CIRCUIT BOARDS 9

Introduction to technology of printed circuit boards (PCB), General lay out and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Reinhold Luduig and Pavel Bretchko, “RF Circuit Design – Theory and Applications”, Pearson Education, 2nd Edition, 2009.
2. Sydney Soclof, “Applications of Analog Integrated Circuits”, Prentice Hall of India, 2004.

REFERENCES

1. Keith H.Billings, "Switchmode Power Supply Handbook", McGraw-Hill Professional, 3rd Edition, 2010.
2. Ali Emadi, Alireza Khaligh, Zhong Nie and Young Joo Lee, "Integrated Power Electronic Converters and Digital Control", CRC Press, 1st Edition, 2009.
3. Muhammad H.Rashid, "Power Electronics – Circuits, Devices and Applications", Prentice Hall, 3rd Edition, 2003.
4. Walter C.Bosshart, "Printed circuit Boards – Design and Technology", TATA McGraw- Hill, 31st reprint, 2008.

13ECDC MICRO ELECTRO MECHANICAL SYSTEMS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Integrate the knowledge of semiconductors and solid mechanics to fabricate MEMS devices.

CO 2: Analyze various Electrostatic and Thermal sensors.

CO 3: Differentiate Piezoresistive and Piezoelectric sensors.

CO 4: Categorize different etching techniques used for Micro machining.

CO 5: Summarize the use of Polymer in MEMS.

UNIT I INTRODUCTION **9**

The Intrinsic characteristics of MEMS, Sensors and Actuators – Energy domains and Transducers - Sensor Considerations, Actuator considerations, Introduction to Microfabrication – Silicon based MEMS Processes-New Materials and Fabrication Processes, Review of Electrical and Mechanical Concepts – Semiconductor materials – Stress and strain analysis – Flexural Beam Bending Analysis-Torsional Deflections.

UNIT II ELECTROSTATIC AND THERMAL SENSORS **9**

Electrostatic sensors and Actuators - Parallel plate capacitors, Applications of Parallel plate capacitors, Inter digitated Finger capacitor, Applications of Comb drive devices, Thermal Sensing and Actuation-Thermal Expansion, Thermal couples, Thermal resistors, Applications, Magnetic Actuators – Micromagnetic components, Case studies of MEMS in magnetic actuators.

UNIT III PIEZORESISTIVE AND PIEZOELECTRIC SENSORS **9**

Piezoresistive sensors - Piezoresistive sensor materials, Stress analysis of mechanical elements, Applications of Piezoresistive sensors, Piezoelectric sensors and actuators-piezoelectric effects, piezoelectric materials, Applications of Piezoelectric sensors.

UNIT IV MICRO MACHINING **9**

Silicon Anisotropic Etching – Anisotropic wet etching – Dry Etching and Deep reactive Ion Etching – Isotropic wet Etching – Gas phase Etchants, Surface Micromachining –Structural and Sacrificial materials-Acceleration of Sacrificial Etch-Stiction and Anti-stiction Etch, Assembly of 3D MEMS, Foundry Process.

UNIT V POLYMER AND OPTICAL MEMS **9**

Polymer in MEMS - Polymide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon Applications of Polymer in MEMS, Optical MEMS – Lenses and Mirrors - Actuators for Active Optical MEMS.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Chang Liu, “Foundations of MEMS”, 2nd Edition, Pearson Education, 2012.
2. P.Rai-Choudhury, “MEMS and MOEMS Technology and Applications”, Prentice Hall of India, 2009.

REFERENCES

1. Nitaigour Premchand Mahalik, “MEMS”, Tata McGraw Hill, New Delhi, 2007.
2. Tai Ran Hsu, “MEMS & Microsystems design and Manufacture”, Tata McGraw Hill, New Delhi, 2002.

13ECDD	ELECTRONIC INSTRUMENTATION AND MEASUREMENTS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to:

CO 1: Discuss the basic concepts and definitions in measurements.

CO 2: Operate and develop various electrical and electronic systems.

CO 3: Measure and construct various instruments.

CO 4: Explain the operation and design of electronic instruments for parameter measurement.

UNIT I BASIC MEASUREMENT CONCEPTS 9

Measurement systems - Static and dynamic characteristics - Units and Standards of measurements - Error analysis - Moving coil, Moving iron meters - Multimeters - True RMS Meters - Bridge measurements-Maxwell, Hay, Schering, Anderson and Wien bridge - Q meters.

UNIT II BASIC ELECTRONIC MEASUREMENTS 9

Electronic multimeters - Cathode ray oscilloscope - Block schematic – Applications - Sampling oscilloscopes – Spectrum Analyzer- Network analyzer – Wave Analyzer.

UNIT III TRANSDUCERS 9

Classification of transducers - selecting a transducer - strain gauges – Temperature transducer - LVDT - capacitive transducers - Piezo electric transducers – Optoelectronic transducers - Measurement of pressure and velocity, Smart transducer-Introduction-Types-principle-comparison of conventional and smart transducers.

UNIT IV DIGITAL INSTRUMENTS 9

Digital voltmeter – Multimeters - Frequency counters - Measurement of frequency and time interval - Extension of frequency range - Measurement errors - Display devices – Touch Screen, LCD.

UNIT V DATA ACQUISITION SYSTEMS 9

Elements of a digital data acquisition system-Interfacing of transducers - Multiplexing - computer controlled instrumentation- IEEE 488 bus – LIN Bus – MOD Bus – VME Bus.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Ernest, Doeblin, Dhanesh and N.Manik, “Measurement Systems- Application and Design”, Tata McGraw-Hill, 2007.
2. Albert D.Helfrick and William D.Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, PHI, 2003.

REFERENCES

1. B.C.Nakara, K.K.Chaudhry, “Instrumentation Measurement and Analysis”, Tata McGraw-Hill, 2004.
2. Joseph J.Carr, “Elements of Electronics Instrumentation and Measurement”, PHI, 2003.
3. Alan. S. Morris, “Principles of Measurements and Instrumentation”, PHI, 2003.
4. http://www.lin-subbus.org.
5. Patranabis D “Sensors & Transducers”, Wheeler Publication, 2nd Edition, 2004.

13ECEA MOBILE ADHOC NETWORKS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Summarize the challenges in the design of wireless adhoc networks.

CO 2: Categorize and analyze the proposed protocols at MAC and routing layers of adhoc networks

CO 3: Analyze the attacks pertaining to network layer.

CO 4: Elaborate the QoS requirements and Energy Management schemes.

UNIT I INTRODUCTION **9**

Introduction to adhoc networks – Definition - Characteristics features, applications. Characteristics of Wireless channel, adhoc Mobility Models: - Indoor and outdoor models. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT II MEDIUM ACCESS PROTOCOLS **9**

MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas.

UNIT III NETWORK PROTOCOLS **9**

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Hybrid routing algorithm, Hierarchical Routing – Tree-Based and Mesh-Based Multicast routing algorithms.

UNIT IV END-END DELIVERY AND SECURITY **9**

Transport layer: Issues in designing- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

UNIT V QUALITY OF SERVICE AND ENERGY MANAGEMENT SCHEMES **9**

Introduction-Issues and Challenges in Providing QoS in Adhoc Wireless Networks-Classifications of QoS Solutions. MAC Layer Solutions-Network Layer Solutions-QoS Frameworks-Need for Energy Management-Classification of Energy Management Schemes-Battery, Transmission Power, System Power Management Schemes.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. C.Siva Ram Murthy and B.S.Manoj, “Adhoc Wireless Networks Architectures and protocols”, Pearson Education, 2nd Edition, 2007.
2. Charles E. Perkins, “Adhoc Networking”, Addison - Wesley, 1st Edition, 2001.

REFERENCES

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, “Mobile Adhoc Networking”, Wiley India Edition, 2010.
2. Mohammad Ilyas, “The handbook of adhoc wireless networks”, CRC press, 2002.
3. Fekri M. Abduljalil and Shrikant K. Bodhe, “A survey of integrating IP mobility protocols and Mobile Adhoc networks”, IEEE communication Survey and tutorials, v9.no.1, 2007.
4. Jonathan Loo, Jaime Lloret Mauri, “Mobile Adhoc Networks: Current status and Future Trends”, CRC Press, 1st Edition, 2011.

13ECEB WIRELESS SENSOR NETWORKS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Describe the basic concepts and architecture of Wireless Sensor Networks.
CO 2: Develop the protocol stack for WSN.
CO 3: Design the simple Sensor Node for a specific application.

UNIT I INTRODUCTION 9

Challenges for Wireless Sensor Networks, Enabling Technologies for WSN, Single node architecture – Energy consumption of sensor nodes - Network architecture – Sensor network scenarios - Optimization Goals and Figures of Merit - Design principles for WSN.

UNIT II PHYSICAL LAYER 9

Introduction, wireless channel and communication fundamentals – frequency allocation, modulation and demodulation, wave propagation effects and noise, channels models, spread spectrum communication, packet transmission and synchronization, quality of wireless channels and measures for improvement, Physical layer and transceiver design consideration in wireless sensor networks: Energy usage profile, choice of modulation schemes, Antenna Considerations.

UNIT III DATALINK LAYER 9

MAC protocols – fundamentals of wireless MAC protocols, Low duty cycle protocols: STEM, S-MAC - wakeup concepts, contention-based protocols: CSMA, PAMAS - Schedule-based protocols: SMACS - IEEE 802.15.4 low rate WPAN.

UNIT IV NETWORK LAYER 9

Geographic routing, Hierarchical Routing – LEACH, PEGASIS, Location Based Routing – GAF, GEAR, Data aggregation – Various aggregation techniques.

UNIT V INFRASTRUCTURE ESTABLISHMENT AND CASE STUDY 9

Topology Control - Localization and Positioning - Target detection tracking, Medicine and Health Care, Environmental disaster monitoring.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Holger Karl, Andreas willig, "Protocol and Architecture for Wireless Sensor Networks", John Wiley Publication, 2006.
2. K.Akkaya and M.Younis, "A Survey of routing protocols in wireless sensor networks", Elsevier Adhoc Network Journal, Vol.3, no.3, pp. 325-349, 2005.

REFERENCES

1. Kazem Sohraby, Daniel Minoli and Taieb Znati, "Wireless Sensor Networks Technology- Protocols and Applications", John Wiley & Sons, 2007.
2. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks: an information processing approach", Elsevier Publication, 2004.
3. C.S.Raghavendra Krishna, M.Sivalingam and Tarib znati, "Wireless Sensor Networks", Springer Publication, 2004.

4. C. Siva Ram Murthy and B. S. Manoj, “Adhoc Wireless Networks Architectures and Protocols”, Prentice Hall, PTR, 2004
5. Philip Levis, “Tiny OS Programming”, 2006 – www.tinyos.net.
6. Jamal N. Al-karaki, Ahmed E. Kamal, “Routing Techniques in Wireless sensor networks: A survey”, IEEE wireless communication, December 2004, 6 – 28.

13ECEC	HIGH SPEED NETWORKS (Common to ECE, CSE and IT)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Develop an in-depth understanding, in terms of architecture, protocols and applications, of major high-speed networking technologies.

CO 2: Apply queuing analysis to control the effect of the congestion in high speed networks.

CO 3: Compare the various approaches of the Integrated and Differentiated Services.

CO 4: Discuss the protocols which provide QoS support for Real Time Applications.

UNIT I HIGH SPEED NETWORKS 9

Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection – ATM Cell – ATM Service Categories – AAL. High Speed LANs – Fast Ethernet – Gigabit Ethernet – Fibre Channel – Wireless LAN's applications, requirements – Architecture of IEEE 802.11.

UNIT II QUEUING ANALYSIS AND CONGESTION CONTROL 9

Single Server Queues – Multiserver Queues – Queues with Priorities – Networks of Queues –Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III ATM CONGESTION CONTROL 9

Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work – Traffic Control – ABR traffic Management – ABR rate control – RM cell formats – ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline – FQ – PS – BRFQ – GPS – WFQ – Random Early Detection – Differentiated Services.

UNIT V PROTOCOLS FOR QOS SUPPORT 9

RSVP – Goals and Characteristics, Data Flow, RSVP operations – Protocol Mechanisms – Multiprotocol Label Switching – Operations – Protocol details – RTP – Protocol Architecture – Data Transfer Protocol – RTCP.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. William Stallings, "High-speed Networks and Internet", Pearson Education, 2nd Edition, 2002.
2. Jean Warland, Pravin Varaiya, "High-performance Communication Networks", Jean Harcourt Asia Private Limited, 2nd Edition, 2000.

REFERENCES

1. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
2. Abhijit S. Pandya, Ercan Sen, "ATM Technology for Broadband Telecommunications Networks", CRC Press, 2004

13ECED PRINCIPLES OF NETWORK SECURITY

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Describe the need for security and the various security techniques.
CO 2: Explain the various symmetric and asymmetric key algorithms.
CO 3: Apply suitable authentication functions to ensure authentication.
CO 4: Elaborate different types of security services used in various applications.
CO 5: Provide solutions for security at the system level.

UNIT I INTRODUCTION 9

OSI Security Architecture - Security Goals - Types of Attacks - Passive attack, active attack - Security services – Overview of Cryptography - Classical Encryption techniques – Substitutional Ciphers, Transposition Ciphers - Steganography

UNIT II SYMMETRIC AND ASYMMETRIC KEY ALGORITHMS 9

Block Ciphers - Data Encryption Standard - Block Cipher Design Principles and Modes of Operation – Advanced Encryption Standard – Triple DES, Stream Cipher-RC4. Public Key Cryptography and RSA – Diffie-Hellman key Exchange.

UNIT III AUTHENTICATION AND HASH FUNCTION 9

Authentication requirements – Authentication functions – Message Authentication Codes - Hash functions- SHA-1-Digital signatures: Digital signature standards - Entity Authentication: Biometrics, Key management Techniques.

UNIT IV NETWORK SECURITY 9

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

UNIT V SYSTEM LEVEL SECURITY 9

Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems**.**

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. William Stallings, “Cryptography And Network Security – Principles and Practices”, Pearson Education, 3rd Edition, 2003.
2. Behrouz A. Foruzan, “Cryptography and Network Security”, Tata McGraw-Hill, 2007.

REFERENCES

1. Bruce Schneier, “Applied Cryptography”, John Wiley & Sons Inc, 2nd Edition, 2001.
2. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Pearson Education, 3rd Edition, 2003.
3. Wade Trappe and Lawrence C. Washington, “Introduction to Cryptography with coding theory”, Pearson Education, 2nd Edition, 2007.
4. Wenbo Mao, “Modern Cryptography Theory and Practice”, Pearson Education, 3rd reprint, 2008.
5. Thomas Calabrese, “Information Security Intelligence: Cryptographic Principles and Applications”, Thomson Delmar Learning, 2006.
6. Atul Kahate, “Cryptography and Network Security”, Tata McGraw-Hill, 8th reprint, 2006.

13ECFA TOTAL QUALITY MANAGEMENT **L T P C**
(Common to Mechanical, Civil, ECE & IT) **3 0 0 3**

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Recognize the need for total quality management and areas of application of this management concept.

CO 2: Predict the need for customer expectations and employee involvement.

CO 3: Estimate six-sigma and perform benchmarking.

CO 4: Devise methods to use Quality Function Deployment (QFD), failure Mode Effect Analysis (FMEA) and Taguchi's loss functions.

CO 5: Describe ISO 9000 and Environmental Management System (EMS) standards.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM –- Contributions of Deming, Juran and Crosby – Cost of Quality, Analysis Techniques for Quality Costs -Barriers to TQM.

UNITII TQM PRINCIPLES 9

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kanban, Kaizen, POKA-YOKE, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, - Business Excellence Model-Rajiv Gandhi National Quality Award.

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality – New management tools – Deviation and Standard Deviation; Phases and Defective Units of Six Sigma; Its Importance; Overview of Master Black and Green Belt– Bench marking– Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II 9

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.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000 - ISO 9000-2000 Quality System –Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 - ISO/TS 16949 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, 3 Edition, Indian Reprint (2010).

2. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6 Edition, South-Western (Thomson Learning), 2005.

REFERENCES

1. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Limited, Oxford, 3rd Edition, 2003.
2. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Private Limited, 2006.
3. Janakiraman B and Gopal R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Private Limited, 2006.
4. Ramachandran, S. "Total Quality Management", Air Walk Publications, 2nd Edition 2008.

FEW HYPERLINKS FOR REFERENCES

- http://nptel.ac.in/courses/110101010/16
- http://www.iso.org/iso/qmp_2012.pdf
- http://en.wikipedia.org/wiki/ISO_9000

13ECFB	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
	(Common to ECE & Mechanical)	3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO1: describe the concept of entrepreneurship and need for becoming an entrepreneur.
CO2: discuss about competencies and motivation acquired for an entrepreneur.
CO3: demonstrate their plan to start a small enterprise.
CO4: analyze the financial and accounting details needed for starting and running a small enterprise.
CO5: summarize the various supports available to start a small enterprise.

UNIT I ENTREPRENEURSHIP 9

Concept of Entrepreneurship – Characteristics of successful Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur - Types of Entrepreneur – Distinction between an Entrepreneur and Intrapreneur – Role of Entrepreneurship in Economic development – Factors affecting entrepreneurship growth – Knowledge and skills of an Entrepreneur.

UNIT II ENTREPRENEURIAL MOTIVATION AND COMPETENCIES 9

Meaning of Entrepreneurial Motivation – Motivational Cycle – Theories of Entrepreneurial Motivation – Entrepreneurial motivation factors – Achievement Motivation – Entrepreneurial Motivational behaviour – case studies.

Meaning of Entrepreneurial Competency – Major Entrepreneurial Competencies – Development Entrepreneurial Competencies – Case studies. Entrepreneurship Development Programmes – Need – Objectives – Phases – Evaluation.

UNIT III BUSINESS 9

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business Opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING 9

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, management ofworking Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM –Taxation – Income Tax, Excise Duty – Sales Tax.

UNITV SUPPORT TO ENTREPRENEURS 9

Sickness in small Business – Concept, Magnitude, causes and consequences, Corrective Measures– Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. S.S.Khanka "Entrepreneurial Development" S.Chand and Co. Ltd., New Delhi, 2014.
2. Hisrich R D and Peters M P, "Entrepreneurship", 5th Edition, Tata McGraw-Hill, 2002.

REFERENCES:

1. Rabindra N. Kanungo, "Entrepreneurship and innovation", Sage Publications, New Delhi, 2010.
2. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers Entrepreneurship Development Institute of India, Ahmadabad, 1986.

13ECGA PRINCIPLES OF OPERATING SYSTEMS L T P C
3 0 0 3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Identify the functions of Operating Systems.
CO 2: Discuss the concepts of process management.
CO 3: Predict and analyze deadlocks.
CO 4: Describe the importance of storage management.
CO 5: Understand the basics of file systems and I/O systems.

UNIT I PROCESSES 9

Introduction to operating systems – operating system structures – system calls – system programs – system structure - Processes: Process concept – Process scheduling – Cooperating processes – Interprocess communication – Communication in client-server systems.

UNIT II THREADS, PROCESS SCHEDULING AND SYNCHRONIZATION 9

Threads: Multi-threading models – Threading issues - CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple processor scheduling – Real time scheduling. Process Synchronization: The critical-section problem – Semaphores – Classic problems of synchronization.

UNIT III DEADLOCK 9

Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

UNIT IV STORAGE MANAGEMENT 9

Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging - Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames.

UNIT V FILE SYSTEMS AND I/O SYSTEMS 9

File System Interface: File concept – Access methods – Directory structure – File system mounting – Protection - File-System Implementation: Directory implementation –Allocation methods – Free space management – efficiency and performance - I/O Systems – kernel I/O subsystem – streams – performance. Mass Storage Structure: Disk scheduling – Disk management.

L:45 TOTAL: 45 PERIODS

TEXT BOOK

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne "Operating System Principles", 6th Edition, John Wiley & Sons (Asia) India Pvt. Ltd., 2009.

REFERENCES

1. Andrew S. Tanenbaum, "Modern Operating Systems", 2nd Edition, Pearson Education, 2004.
2. Gary Nutt, "Operating Systems", 3rd Edition, Pearson Education, 2004.
3. Harvey M. Deitel, "Operating Systems", 3rd Edition, Pearson Education, 2004.
4. Dhananjay M.DhamDhere, "Operating Systems A Concept – Based Approach", 3rd Edition, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2003.

13ECGB SOFT COMPUTING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Acquire knowledge of soft computing theories and fundamentals.

CO 2: Apply the Soft computing approaches to solve real-world problems.

CO 3: Discriminate the principles of Artificial Neural Networks, Fuzzy sets, Fuzzy logic and Genetic algorithms.

CO 4: Illustrate the use of ANN, Fuzzy sets to solve hard real-world problems.

UNIT I INTRODUCTION 9

Evolution of computing - Soft computing constituents - From conventional AI to computational intelligence - Neural networks - Scope and evolution - Models of neural networks - Feed forward networks - Supervised learning neural networks – Associative degrade networks - Unsupervised learning networks - Special networks.

UNIT II FUZZY SETS AND FUZZY LOGIC 9

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations - Membership Functions – Defuzzification.

UNIT III FUZZY MEASURES AND REASONING 9

Fuzzy arithmetic and measures - Fuzzy rule base – Fuzzy Approximate reasoning - Categorical, qualitative, syllogistic, dispositional - Fuzzy inference systems - Fuzzy decision making - Fuzzy logic control systems: Architecture, model and application.

UNIT IV MACHINE LEARNING AND GENETIC ALGORITHM 9

Machine Learning Techniques - Machine Learning Using Neural Nets - Genetic Algorithms - Simple and general GA - Classification of Genetic algorithm - Messy, adaptive, hybrid, parallel - Holland classifier system.

UNIT V APLLICATIONS WITH CASE STUDY 9

Character recognition – Fabric defect identification – Knowledge base Evaluation – Earthquake damage Evaluation – Balancing inverted pendulum – Air conditioner controller – Electrical Load balancing.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. S.N.Sivanandam and S.N.Deepa, “Principles of Soft Computing”, Wiley India Ltd., 1st Edition, 2007.
2. S.Rajasekaran, G.A.Vijayalakshmi, “Neural Networks, Fuzzy Logic And Genetic Algorithm: Synthesis And Applications”, 6th Edition, PHI, 2006.

REFERENCES

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun and Eiji Mizutani, "Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence", Prentice-Hall of India, 2003.
2. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Education, 2003.
3. Amit Konar, "Artificial Intelligence and Soft Computing: Behavioral and Cognitive Modeling of the Human Brain – Volume I", 1st Edition, CRC Press, 2000.
4. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson Education, 2009.

13ECGC INTERNET AND WEB TECHNOLOGY L T P C
(In Collaboration with InfoSys) **3 0 0 3**
(Common to CSE, ECE and IT)

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Understand the complexity of the real world objects
CO 2: Learn the best practices for designing Web forms and Usability Reviews
CO 3: Understand the Principles behind the design and construction of Web applications
CO 4: Develop and Deploy an Enterprise Application

UNIT I REVIEW OF OBJECT ORIENTED CONCEPTS 7

Objected oriented concepts – object oriented programming (review only) — advanced concept in OOP – relationship – inheritance – abstract classes – polymorphism – Object Oriented design methodology – approach – best practices. UML class diagrams – interface – common base class.

UNIT II INTERNETWORKING 9

Internetworking – Working with TCP/IP – IP address – sub netting – DNS – VPN – proxy servers – firewalls – Client/Server concepts - World Wide Web – components of web application – MIME types, browsers and web servers – types of web content – URL – HTML – HTTP protocol – Web applications – performance – Application servers – Web security. User Experience Design – Basic UX terminology – UXD in SDLC – Rapid prototyping in Requirements.

UNIT III CLIENT BASED TECHNOLOGIES 9

Client Tier using HTML – Basic HTML tags – Look and feel using CSS – Client side scripting using Java Script and Validations - Document Object Model (DOM).

UNIT IV WEB DATABASE PROGRAMMING 10

Business tier using POJO (Plain Old Java Objects) – Introduction to Frameworks – Introduction to POJO – Multithreaded Programming – Java I/O – Java Database Connectivity (JDBC).

UNIT V SERVER BASED TECHNOLOGIES 10

Presentation tier using JSP – Role of Java EE in Enterprise applications – Basics of Servlets - To introduce server side programming with JSP - Standard Tag Library.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Douglas E Comer, Internet Book, "The: Everything You Need to Know About Computer Networking and How the Internet Works", 4th Edition, Prentice Hall, 2007
2. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Prentice Hall, 2007

REFERENCES

1. http://www.ietf.org/
2. http://www.w3.org/
3. http://www.vpnc.org/vpn-standards.html

4. http://java.sun.com/docs/books/tutorial/
5. Michael Nash, Java Frameworks and Components, Cambridge University Press, 2002.
6. Ted Wugofski, XML Black Book 2nd Edition, Certification Insider Press
7. Developing Web Applications with JavaServer Faces found online at http://java.sun.com/developer/technicalArticles/GUI/JavaServerFaces/
8. Short introduction to log4j found online at http://logging.apache.org/log4j/1.2/manual.html
9. JUnit Cookbook by Kent Beck, Erich Gamma at http://junit.sourceforge.net/
10. http://java.sun.com/
11. http://www.junit.org/
12. Marty Hall and Larry Brown, Core Servlets and JavaServer Pages Vol.1: Core Technologies 2nd Edition, Sun Microsystems.
13. Bryan Basham, Kathy Sierra, and Bert Bates, Head First Servlets and JSP, SPD O'Reilly, 2005.
14. Herbert Schildt, "Java: The Complete Reference", McGraw-Hill Professional, 2006.
15. The Complete reference - JSP
16. Servlet Tutorial can be found online at http://java.sun.com/docs/books/tutorial
17. http://java.sun.com/javaee/javaserverfaces/reference/docs/index.html
18. JSF Tutorial can be found online at http://java.sun.com/j2ee/1.4/docs/tutorial/doc/JSFIntro.html

13ECGD	SOCIAL COMPUTING	L	T	P	C
	(Common to IT, ECE and CSE)	3	0	0	3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Describe the key concepts of analysis and design of social computing systems.

CO 2: Discuss the range of social computing applications.

CO 3: Apply the knowledge of social interaction technologies like blogs,wikis,podcasts,etc.,

CO 4: Show Proficiency in the general social network research process from data collection to mining.

UNIT I FUNDAMENTAL CONCEPTS AND THEORIES 9

Social Influence and Human Interaction with Technology- flow of information - Boundary roles and Innovation - Innovation and Information networks - Innovation Success Factors. Social Networking. Social Networks in Information Systems- SNA- Representations- visualization. Social Software.

UNIT II DESIGN METHODOLOGIES 9

Distributed Learning Environments - building a conceptual Framework - technical and Conceptual challenges. A Methodology for Integrating the Social Web Environment. Software Architectural Design.

UNIT III DEVELOPMENT 9

Information Systems Development – Framework .Social Networks Applied to E-Gov- Introduction - Stages and Services - Social Networks of Citizens – Ontology - Development of Adaptive Systems -DemonD: A Social Search Engine- Actor Network Theory in Information Retrieval Activity.

UNIT IV TOOLS AND TECHNOLOGIES 9

ERP-Systems- Modern Socio-Technical Systems Design - The design order Principle - The minimal Critical Specification Principle- The Task Completeness Principle - Evaluating the Effectiveness of Social Visualization Within Virtual Communities .The Hybrid Course

UNIT V SOCIAL COMPUTING AND COMMUNITY DETECTION 9

Basic Concepts - social computing task. Nodes, ties and Influence- Importance of Nodes -Strengths of Ties- Influence Modeling. Node-Centric Community Detection - Group-Centric Community Detection .Social Media Mining-Classification with Network Data.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Subhasish Dasgupta George, “Social Computing:Concepts, Methodologies, Tools, and Applications”, Washington University, USA,2010.
2. Lei Tang, Huan Liu, “Community Detection and Mining in Social Media”, Morgan & Claypool Publishers, 2010.

REFERENCES

1. Soumen Chakrabarti, “Mining the Web - Discovering Knowledge from Hypertext Data”, Morgan Kaufmann, 2003.
2. Bing Liu, “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data”, Springer Berlin Heidelberg; 1st Edition, 2007.

13ECGE MOBILE COMPUTING L T P C
(Common to IT, ECE and EEE) 3 0 0 3

COURSE OUTCOMES

Upon Completion of this course, the students will be able to

CO1: explain the basic concepts of mobile computing.
CO2: describe the various schemes in MAC protocols.
CO3: explain the functionalities of Mobile IP protocols
CO4: discuss on routing and security issues in Ad hoc and Sensor networks.
CO5: explain the architecture and components of Mobile Operating Systems.

UNIT I INTRODUCTION 9

Mobile Computing – Applications – Characteristics – Structure of Cellular Mobile Communication – GSM – services – Architecture – GPRS – services – Architecture services – UMTS .

UNIT II MAC PROTOCOLS 9

Properties – Wireless MAC – Taxonomy – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes – 802.11 MAC standards.

UNIT III MOBILE INTERNET PROTOCOL 9

Mobile IP – Terminologies of Mobile IP – Packet Delivery – Features of Mobile IP – Key Mechanism – Route optimization DHCP – Significance of DHCP .

UNIT IV MOBILE ADHOC NETWORKS &WIRELESS SENSOR NETWORKS 9

MANET : Characteristics – Routing Protocols- VANET –Security issues in MANET – Attacks on Adhoc Networks – Sensor Networks: Characteristics - Routing Protocols.

UNIT V MOBILE APPLICATION DEVELOPMENT AND OPERATING SYSTEMS 9

Responsibilities of OS in Mobile device – Mobile O/S-Windows Mobile-Palm OS-Symbian OS-Android and Blackberry OS-Mobile Devices as Web clients-WAP-Android Software Development Kit-M-Commerce-B2C and B2B applications-Security Issues.

L: 45 ; TOTAL: 45 PERIODS

TEXT BOOKS

1. Jochen H. Schller, “Mobile Communications”, Pearson Education, Second Edition, New Delhi, 2007.
2. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi ,2012.

REFERENCES

1. Rappaport T.S., “Wireless Communications; Principles and Practice “, Prentice Hall, NJ, 1996.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. C.K.Toh, “AdHoc Mobile Wireless Networks”, Pearson Education, First Edition, 2002. Android Developers: http://developer.android.com/index.html

13ECGF	ANALYTIC COMPUTING (Common to IT, ECE and CSE)	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon Successful completion of this course, Students will be able to

CO 1: Apply statistical analysis methods in Big Data Platform.
CO 2: An ability to analyze a problems appropriate to mining data streams.
CO 3: Apply the knowledge of clustering techniques in data mining.
CO 4: Explain about social networking data analytics.
CO 5: Use Visualization techniques for Distributed file systems

UNIT I INTRODUCTION TO BIG DATA 9

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting - Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT II MINING DATA STREAMS 9

Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window - Realtime Analytics Platform(RTAP) applications - real time sentiment analysis, stock market predictions.

UNIT III FREQUENT ITEMSETS AND CLUSTERING 9

Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT IV SOCIAL NETWORKING DATA ANALYTICS 9

An introduction tosocial networkdataAnalytics-Introduction,Online Social Networks: Research Issues,Research Topics in Social Networks. Data mining in social media-Data mining in a Nutshell, Social Media,Motivations for Data Mining in Social Media, Data Mining Methods for Social Media,visualizing social networks,A Taxonomy of Visualizations,The Convergence of Visualization, Interaction and Analytics.

UNIT V FRAMEWORKS AND VISUALIZATION 9

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications:

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.

REFERENCES

1. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analytics”, John Wiley & sons, 2012.
2. Glenn J. Myatt, “Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O’Reilly, 2011.
3. Jiawei Han, MichelineKamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008.
4. Charu C. Aggarwal, “Social Network Data Analytics”, Springer, 2011.

13ECGH BUSINESS INTELLIGENCE AND ITS APPLICATIONS L T P C
(Common to CSE and ECE) **3 0 0 3**

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to,

CO 1: Develop a foundation in Business Intelligence (BI) for Business Analysis.
CO 2: Understand the different aspects of the BI environment, and key success factors.
CO 3: Understand Technology enabling process in an organization.
CO 4: Identify and analyze the new Techniques in BI.
CO 5: Be able to apply the techniques in the context of a business problem.

UNIT I INTRODUCTION TO BUSINESS INTELLIGENCE 9

Business intelligence and its impact - Factors driving Business Intelligence – Business Intelligence and Related Technologies – Case Study - Obstacles to Business Intelligence.

UNIT II BUSINESS INTELLIGENCE CAPABILITIES 9

Introduction – Core Capabilities of BI - – Synergistic Business Intelligence Capability - Information Integration – Factors Necessitating Information Integration Capability – Technology Enabling Information Integration Capability - Presentation.

UNIT III TECHNOLOGY ENABLING BUSINESS INTELLIGENCE 9

Technology enabling Organizational Memory – Information Integration – Enabling Insights and Decision – Enabling Presentation - OLAP Cube, Data Slice and Dice - BI in Practice - Performance Dashboards - Balanced Scorecards - IT Governance - Case Study.

UNIT IV BUSINESS INTELLIGENCE IMPLEMENTATION: INTEGRATION AND EMERGING TRENDS 9

Implementing BI – Overview – BI and Integration Implementation – Connecting BI System to Database and other Enterprise Systems – On-Demand BI – Issues of Legality, Privacy, and Ethics – Emerging Topics in BI – The Rise of Collaborative Decision Making.

UNIT V MANAGEMENT AND FUTURE OF BUSINESS INTELLIGENCE 9

Development of BI - Business Intelligence System - Reporting system - Data Warehouse - Data Mart - Knowledge Management Systems - Discussion and Case Study – The Future of Business Intelligence.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Rajiv Sabherwal, Irma Becerra-Fernandez “Business Intelligence Practices, Technologies, and Management”, Wiley, 2011.
2. Efraim Turban, Ramesh Sharda, Jay E.Aronson, David King, “Business Intelligence: A Managerial Approach”, Pearson Education, 2011.

REFERENCES

1. Rajiv Sabherwal,“ e-Study Guide for Business Intelligence”, 2014. [Kindle Edition]
2. Swain Scheps, “Business Intelligence for Dummies”, Wiley, 2008.

13ECGJ ARTIFICIAL INTELLIGENCE AND ROBOTICS L T P C
(Common to CSE and ECE) **3 0 0 3**

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

CO 1: Demonstrate the Understanding of the problem solving techniques involved in artificial intelligence.
CO 2: Understand the Logical reasoning realization of artificial intelligence.
CO 3: Summarize the importance of planning and learning with respect to artificial intelligence and robotics.
CO 4: Understand the terminologies used in Robotic Systems and understand the robotics programming.

UNIT I PROBLEM SOLVING 9

Introduction - Agents - Problem formulation - uninformed search strategies - heuristics - informed search strategies.

UNIT II LOGICAL REASONING 9

Logical agents - propositional logic - inferences - first-order logic - inferences in first order logic - forward chaining - backward chaining.

UNIT III PLANNING 9

Planning with state-space search - partial-order planning - planning graphs - planning and acting in the real world.

UNIT IV LEARNING 9

Learning from observation - Inductive learning - Decision trees - Explanation based Learning - Statistical learning methods.

UNIT V ROBOTICS 9

Introduction to Robotics - Robot Components - Robotic programming: Architecture - Planning - Languages - OS - Sample robots.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. S. Russel, P. Norvig, "Artificial Intelligence - A Modern Approach", 3rd Edition, Prentice Hall, 2010.
2. Mataric Maja J, "The Robotics Primer", 1st Edition, Massachusetts Institute of Technology Press, 2007.
3. Scott Preston, "Robotics Programming 101", Copy right material, 2011.

REFERENCES

1. David Poole, Alan Mackworth and Randy Goebel, "Computational Intelligence: A logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", 4th Edition, Pearson Education, 2002.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.

13TD01 INDIAN BUSINESS LAWS L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: explain the elements of a valid contract.

CO 2: discuss main provisions relating to Sale of Goods Act and Negotiable Instruments Act.

CO 3: explain provisions relating to incorporation and functioning of company and partnership firm.

CO 4: understand the fundamentals of Consumer Protection Act and Foreign Exchange Management Act.

CO 5: understand the basic knowledge of Information Technology Act and RTI Act.

UNIT I THE INDIAN CONTRACT ACT, 1872

Definition of a Contract and its essentials - Formation of a valid Contract - Offer and Acceptance, Consideration - Capacity to Contract - Free consent - Legality of object - Discharge of a Contract by performance - Impossibility and Frustration - Breach, Damages for breach of a contract - Quasi contracts - Special Contracts - Contract of Indemnity and Guarantee - Contract of Bailment and Pledge - Contract of Agency.

UNIT II THE SALE OF GOODS ACT, 1930

Definition of a Contract of Sale - Conditions and Warranties - Passing of Property - Right of Unpaid Seller against the Goods - Remedies for Breach - The Negotiable Instrument Act, 1881 Definition and characteristics - Kinds of negotiable instruments - Promissory Note - Bill of Exchange and Cheques - Holder and Holder in due course - Negotiation, Presentment, Discharge from Liability - Noting and Protest – Presumption - Crossing of Cheques - Bouncing of Cheques.

UNIT III THE COMPANIES ACT, 1956

Nature and Definition of a Company - Registration and Incorporation - Memorandum of Association - Articles of Association – Prospectus - Kinds of Companies - Directors: Their powers and duties – Meetings - Winding up - The Indian Partnership Act, 1932 - Definition of Partnership and its essentials - Rights and Duties of Partners: Types of Partners - Minor as a partner - Doctrine of Implied Authority - Registration of Firms - Dissolution of firms - Limited Liability Partnership Act, 2000.

UNIT IV THE CONSUMER PROTECTION ACT, 1986

Aims and Objects of the Act - Redressal Machinery and Procedure for complaints under the Act – Remedies – Appeals - Enforcement of orders and Penalties - Foreign Exchange Management Act 2000 - Definition and Main Provisions.

UNIT V THE INFORMATION TECHNOLOGY ACT

Definition, Digital Signature - Electronic Governance – Attribution - Acknowledgment and Dispatch of Electronic Records - Sense Electronic Records and Sense Digital Signatures - Regulation of Certifying Authorities Digital Signature Certificates - Duties of Subscribers - Penalties and Offences - The Right to Information Act, 2005 - Right to know - Salient Features of the Act - Obligation of Public Authority - Designation of Public Information Officer - Request for obtaining information - Duties of a PIO - Exemption from Disclosure of Information - Partial Disclosure of Information - Information Commissions - Powers of Information Commissions - Appellate Authorities – Penalties - Jurisdiction of Courts.

TEXT BOOKS

1. Kuchhal M.C, "Business and Industrial Laws", 3rd Edition, JBA Publishers, New Delhi, 2013.
2. Gulshan S.S, "Merchantile Law", 3rd Edition, JBA Publishers, New Delhi, 2007.

REFERENCES

1. Mulla D.F, "The Sale of Goods Act and the Indian Partnership Act", 10th Edition, LexisNexis Ltd., India, 2012.
2. Dabas J, "Negotiable Instruments Act", 2nd Edition, JBA Publishers, New Delhi, 2013.
3. Avtar S, "The Principles of Mercantile Law", 9th Edition, Eastern Book Company, India, 2011.

13TD02 LEADERSHIP AND PERSONALITY DEVELOPMENT L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: identify the various leadership skills.
CO 2: understand group dynamics and factors influencing the team performance.
CO 3: describe the personality dimensions based on personality theories.
CO 4: explain personality determinants and personality types.
CO 5: apply effective training program for personality development.

UNIT I INTRODUCTION

Leadership – Meaning, Concepts and Myths about Leadership, Components of Leadership- Leader, Followers and Situations - Leadership Skills – Basic Leadership Skills - Building Technical Competency - Advanced Leadership Skills - Team Building for Work Teams - Building High Performance Teams.

UNIT II TEAMS AND LEADERSHIP

Assessing Leadership & Measuring Its Effects - Group- Nature, Size, Roles, Norms, Cohesion, and Stages of Group Development - Teams and their Leadership – Effective Team Characteristics and Team Building - Ginnetts Team Effectiveness Leadership Model.

UNIT III PERSONALITY

Personality - Meaning, Concept, Personality Patterns, Symbols of Self, Moulding the Personality Pattern, Persistence & Change - Personality & Personal Effectiveness - Psychometric Theories – Cattele and Big Five - Psychodynamic Theories - Carl Jung and MBTI - Transactional Analysi - Johari – Window - Personal Effectiveness.

UNIT IV PERSONALITY DETERMINANTS

Personality Determinants – Heredity and Environment – Types of personality.

UNIT V PERSONALITY TRAINING

Concept, Role, Need, Importance and types of personality Training - Understanding Process of Learning - Developing an Integrated Approach of Learning in Training Programme - Training Needs Assessment.

TEXT BOOKS

1. Yukl G, “Leadership in Organisations”, 8th Edition, Pearson Education Ltd., England, 2013.
2. Lall M, Sharma S, “Personal Growth Training & Development”, Kindle Edition, USA, 2009.

REFERENCES

1. Janakiraman B, “Training and Development”, Wiley Dream tech, Biztantra, 2005.
2. Pareek U, “Understanding Organizational Behaviour”, 2nd Edition, Oxford University Press, USA, 2007.

13TD03 INTERNATIONAL BUSINESS MANAGEMENT L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: understand the global business environment.

CO 2: explain the impact of economic, legal, cultural, geographical and political factors on international business.

CO 3: discuss the issues and problems of Multinational Enterprises.

CO 4: discuss the role of various international financial institutions.

CO 5: discuss about important aspects of WTO and GATT agreement.

UNIT I INTERNATIONAL BUSINESS ENVIRONMENT

International Business Environment - Globalization - Forces, Meaning, Dimensions and Stages in Globalization - Trading Environment of International Trade - Tariff and Non-tariff Barriers - Trade Blocks.

UNIT II RISK ANALYSIS AND PRACTICES

Country Risk Analysis - Political, Social and Economic - Cultural and Ethical practices - Responsibilities of International Business - Economic crisis in foreign countries.

UNIT III MULTINATIONAL ENTERPRISES

Managing Multinational Enterprises - Problems and Potential - Multinational Service Organizations - Indian companies becoming multinationals - Potential, Need and Problems.

UNIT IV INTERNATIONAL FINANCIAL MANAGEMENT

Introduction to International Financial Management - Balance of Trade and Balance of Payment - International Monetary Fund, Asian Development Bank and World Bank - Financial Markets and Instruments - Introduction to Export and Import Finance - Methods of Payment in International Trade.

UNIT V INTERNATAIONAL AGREEMENT

General Agreement on Trade and Tariffs, (GATT) - World Trade Organization - Seattle and Doha Round of Talks - Dispute Settlement Mechanism under WTO - Problems of Patent Laws - International Convention on Competitiveness - Global Sourcing and its Impact on Indian Industry - Globalization and Internal Reform Process.

TEXT BOOKS

1. Bhalla V.K, Shivaramu S, "International Business Environment", 9th Edition, Anmol Publications Pvt. Ltd., Delhi, 2005.
2. Apte P.G, "International Financial Management", 5th Edition, Tata McGraw Hill, India, 2008.
3. Cherulinam F, "International Business", 5th Edition, Prentice Hall of India, New Delhi, 2010.

REFERENCES

1. Rao, Rangachari, "International Business", Himalaya Publishing House, New Delhi, 2010.
2. Hill C, "International Business", 10th Edition, Tata McGraw Hill Education, New Delhi, 2014.
3. Daniels J.D, "International Business Environment", 15th Edition, Prentice Hall of India, New Delhi, 2014.

13TD04 BASICS OF MARKETING L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: describe the basic concepts of marketing.
CO 2: discuss the significance of consumer behavior and market segmentation.
CO 3: discuss brand, trade mark, after- sales service and product life cycle concepts.
CO 4: formulate strategies for pricing and channels of distribution.
CO 5: analyze and selection of best promotional technique.

UNIT I INTRODUCTION

Nature and Scope of Marketing - Importance of Marketing – Concepts: Traditional and Modern - Selling Vs. Marketing - Marketing Mix - Marketing Environment.

UNIT II CONSUMER BEHAVIOR AND MARKET SEGMENTATION

Nature, Scope and Significance of Consumer Behavior - Market Segmentation - Concept and Importance - Bases for Market Segmentation.

UNIT III PRODUCT PLANNING

Concept of Product - Consumer and Industrial Goods - Product Planning and Development - Packaging - Role and Functions - Brand Name and Trade Mark - After- Sales Service - Product Life Cycle Concept.

UNIT IV PRICING AND PHYSICAL DISTRIBUTION

Price - Importance of Price in the Marketing Mix - Factors Affecting Price of a Product/Service - Discounts and Rebates - Distribution Channels - Concept and Role - Types of Distribution Channels - Factors Affecting Choice of a Distribution Channel - Retailer and Wholesaler - Distributions Channels and Physical Distribution.

UNIT V PROMOTION

Definition - Methods of Promotion - Optimum Promotion Mix - Advertising Media - Their Relative Merits and Limitations - Characteristics of an Effective Advertisement - Personal Selling - Selling as a Career - Classification of a Successful Sales Person - Functions of Salesman.

TEXT BOOKS

1. Etzel M.J, Walker B.J, Stanton W.J, “Fundamentals of Marketing”, 13th Edition, McGraw Hill, New York, 2004.
2. Tanner J, Raymond M, “Principles of Marketing”, University of Minnesota Libraries Publishing, New York, 2015.

REFERENCES

1. Rajan Nair N, Varma M.M, “Marketing Management”, 2nd Edition, S.Chand & Sons, New Delhi, 2005.
2. Ramaswamy V.S, Namakumari S, “Marketing Management", 3rd Edition, Macmillan India Limited, London, 2002.

13TD05 RETAILING AND DISTRIBUTION MANAGEMENT L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: explain the concepts of retailing and distribution management.
CO 2: analyze and solve retailers' problems to make decisions in retail organizations.
CO 3: plan and formulate strategy for retail management process.
CO 4: discuss about various distribution technology and stores management.
CO 5: analyze the issues and challenges in Logistic Management

UNIT I INTRODUCTION

Meaning and Nature of Distribution and Retail Industry - Future of Retailing and Distribution in India - Distribution Channels – Concept, Role and Types - Factors Affecting Choice of Distribution Channel.

UNIT II TYPES OF RETAILING

Stores Classified by Owners - Stores Classified by Merchandising Categories - Wheel Of Retailing - Traditional Retail Formats Vs. Modern Retail Formats in India - Store and Non-Store Based Formats - Cash and Carry Business - Retailing Models – Franchiser Franchisee, Directly Owned - Wheel of Retailing and Retailing Life Cycle – Issues in Retailing.

UNIT III MANAGEMENT OF RETAILING OPERATIONS

Meaning - Functions of Retail Management - Strategic Retail Management Process - Retail Planning - Importance and Process - Developing Retailing Strategies.

UNIT IV TECHNOLOGY IN DISTRIBUTION

Bar-Coding – RFID – Electronic Payment Systems - Store Administration - Floor Space Management – Managing Store Inventories and Display Action Plans - Pricing Strategies and Location Strategies.

UNIT V LOGISTICS OF RETAIL MANAGEMENT

Components and Functions; Distribution Related Issues and Challenges - Gaining Competitive Advantage through Logistics Management.

TEXT BOOKS

1. Agrawal D. K., “Distribution & Logistics Management: A Strategic Marketing Approach”, Macmillan Publishers India Limited, New Delhi, 2007.
2. Berman B, Evans J.R, “Retail Management – A Strategic approach”, 12th Edition, Pearson Education Ltd., England, 2013.
3. Cox R, Brittan P, “Retailing an introduction, Financial Times Management”, 5th Edition, Pearson Education Limited, England, 2004.

REFERENCES

1. Rushton A, Croucher P, Baker P, “The Handbook of Logistics & Distribution Management”, Kogan Page Limited, London, 2006.
2. Coughlan A.T, Anderson E, Stern L.W, El-Ansary A.I, “Marketing Channels", 7th Edition, Prentice Hall, New Jersey, 2006.
3. Sinha P. K, Uniyal D.P, “Managing Retailing”, Oxford University Press, India, 2007.

13TD06 **INTERNATIONAL ECONOMICS** **L T P C**
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: discuss the impact of globalization.

CO 2: identify and analyze different theoretical models of international economics in light of 'real world' situations.

CO 3: examine the consequences of trade policies.

CO 4: explain the importance of international financial markets.

CO 5: discuss the important aspects of international banking.

UNIT I INTRODUCTION

Background of International Business Economics - Globalization and International Business – The Emergence of Global Institutions – Drivers of Globalizations - The Globalization Debate.

UNIT II THE INTERNATIONAL TRADE THEORY

The Law of Comparative Advantage – The Demand and Supply, Offer Curves - The Terms of Trade – Factor Endowments and the Heckscher – Ohlin Theory – Implications of Trade Theories - Economics of Scale - Imperfect Competition.

UNIT III INTERNATIONAL TRADE POLICY

Trade Restrictions - Tariffs, Non –Tariff Trade Barriers - Tariff Vs. Quota - The New Protectionism – Economic Integration - Custom Unions and Free Trade Areas - Major Regional Trade Agreements - Foreign Exchange Market – Types of Foreign Exchange Transactions – Reading Foreign Exchange Quotations – Forward and Futures Market – Foreign - Currency Options – Exchange Rate Determination – Arbitrage – Speculation and Exchange - Market Stability.

UNIT IV WORLD FINANCIAL ENVIRONMENT

Global Foreign Exchange Markets – Economic Theories of Exchange - Rate Determination - International Regime for FDI and MNC - Consequences of Economic Globalization.

UNIT V INTERNATIONAL BANKING

Reserves, Debt and Risk - Nature of International Reserves – Demand for International Reserves – Supply of International Reserves – Gold Exchange Standard – Special Drawing Rights – International Lending Risk – The Problem of International Debt – Financial Crisis and The International Monetary Fund – Eurocurrency Market.

TEXT BOOKS

1. Krugman P.R, Obstfeld M, "International Economics Theory and Policy", 8th Edition, Prentice Hall, Boston, 2008.
2. Carbaugh R.J, "International Economics", 15th Edition, South Western College publication, USA, 2014.

REFERENCES

1. Daniels J, Radebaugh L, Sullivan D, Salwan P, "International Business", 12th Edition, Pearson Education, New Delhi, 2010.
2. Suranovic S, "International Economics: Theory and Policy", Flat World Knowledge, USA, 2010.

13TD07 INDIAN ECONOMY L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: discuss the current economic development in India
CO 2: describe the key indicators of estimation of national income
CO 3: explain elementary concepts of economic planning and development in India
CO 4: discuss the concept of public finance and preparation of budget
CO 5: discuss the influence of infrastructure growth on economic development

UNIT I ECONOMIC DEVELOPMENT

Meaning - Measurement of Economic Development - Characteristic of underdeveloped and developed economies - Causes for Indian economic underdevelopment - Major issues in development - Strategies for economic development Import substitution and Export oriented strategies - Determinants of economic development.

UNIT II NATIONAL INCOME

The National Income and its estimates in India - Limitations of National income estimation - Trends in National income of India: Growth and Structure - Inter-state variations in National income - Income distribution - Measurement of poverty in India.

UNIT III ECONOMIC PLANNING

Planning and economic development in India - Planning models in India (Elementary concepts) - Capital formation - Growth of Public and Private sector in India – Industrial policies an assessment - Capital formation and domestic saving.

UNIT IV INDIAN PUBLIC FINANCE

Budgetary policies of the central government - Composition and trends in public revenue and expenditure - Expenditure control and government consumption expenditure - concepts of Budgetary deficits and implications - state budget.

UNIT V INFRASTRUCTURE AND ECONOMIC DEVELOPMENT

Power and energy - Transport system in India's economic development - Communication system in India - Urban infrastructure - Science and technology - Private investment in infrastructure - Outlook and prospects.

TEXT BOOKS

1. Dutt R, Sundaram K.P.M, "Indian Economy", S.Chand and Co., New Delhi, 2006.
2. Agarwal A.N, Agarwal M.K, "Indian Economy: Problems of Development and Planning", 41st Edition, New Age International Ltd., New Delhi, 2016.

REFERENCES

1. Arvind P, "India: The Emerging Giant", Oxford University Press, USA, 2008.
2. Government of India, Economic Survey, (2010 -11 to 2014 -15).

13TD08 RURAL ECONOMICS L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: discuss the role and importance of agriculture in economic development of India.
CO 2: describe the impact of agricultural forming in rural employment, wage policy, technological change and green revolution.
CO 3: analyze the relationship between rural and urban society.
CO 4: recognize the formation and system of rural social institutions.
CO 5: compare the social changes in the rural society after modernization and globalization.

UNIT I INTRODUCTION

Nature and Scope of Rural Economy - Importance of Agriculture in Economic Development of India - Nature of Land Problems - Evolution of Policy – Land Tenure System - Land Reform Measures.

UNIT II AGRICULTURE AND FARMING

Agricultural Holdings - Fragmentation and Sub-Division of Holdings, Cooperative Farming-Rural Labour Problems - Nature of Rural Unemployment - Employment and Wage Policy - Sources of Technological Change and Green Revolution.

UNIT III RURAL SOCIETY

Rural Society Structure and Change - Village and its Social Organization - Indian Village and its Types - Rural-Urban Continuum and Rural-Urban Relationships.

UNIT IV RURAL SOCIAL INSTITUTIONS

Rural Social Institutions - Family, Property, Caste, Class, Agrarian Structure - Indebtedness and Poverty - Jajmani System - Religion, Village, Panchayat Raj and Community Development Programmes – Problems.

UNIT V SOCIAL CHANGES

Social Change in Rural India-Impact of Westernization - Secularization, Urbanisation, Industrialisation, Migration, Transportation, Modernization of Indian Rural Society - Post Modernization and Globalization and Indian Villages.

TEXT BOOKS

1. Carver T.N, “The Principles of Rural Economics”, Ginn and company, USA, 1911.
2. Desai A.R, “Rural Sociology in India”, 5th Edition, Popular Prakashan Ltd., Mumbai, 2011.

REFERENCES

1. Dube S.C., “India’s changing villages”, Psychology Press, UK, 2003.
2. Datt R, Sundharam K.P.M, Datt G, Mahajan A,“Indian Economy”, 72nd Edition, S.Chand & Co., New Delhi, 2016.
3. Chaudhari, C.M., “Rural Economics”, Sublime Publication, Jaipur, 2009.

13TD09 INTERNATIONAL TRADE L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: discuss the importance of international trade in developing countries.
CO 2: describe the impact of Trade agreements in international Business environment.
CO 3: explain the role of foreign exchange and their impact on trade and investment flows.
CO 4: discuss the benefits of Multinational Corporation in Internal Trade
CO 5: analyze the key role of globalisation in Indian economy.

UNIT I INTRODUCTION

International Marketing - Trends in International Trade - Reasons - Global Sourcing and Production Sharing - International Orientations - Internationalization Stages and Orientations - Growing Economic Power of Developing Countries – International Business Decision.

UNIT II INTERNATIONAL BUSINESS ENVIRONMENT

Trading Environment - Commodity Agreements – State Trading - Trading Blocks and Growing Intra-Regional Trade - Regional Groupings – SAARC, BRICS, ECM, ASEAN - Trade Liberalization - The Uruguay Round-Evaluation – UNCTAD – GATT – WTO.

UNIT III INTERNATIONAL FINANCIAL ENVIRONMENT

International Money and Capital Markets - Foreign Investment Flows – Pattern, Structure and Effects - Movements in Foreign Exchange and Interest Rates and their Impact on Trade and Investment Flows - Exchange Rate Mechanism and Arrangement.

UNIT IV MULTINATIONAL CORPORATIONS

Definition - Organizational Structures - Dominance of MNC's - Recent Trends - Code of Conduct - Multinationals in India - Issue in Investment, Technology Transfer, Pricing and Regulations - International Collaborations and Strategic Alliances.

UNIT V INDIA IN THE GLOBAL SETTING

India an Emerging Market - India in the Global Trade - Liberalization and Integration with Global Economy - Factors Favouring and Resisting Globalization - Trade Policy and Regulation in India - Trade Strategies - Export-Import Policy - Regulation and Promotion of Foreign Trade in India.

TEXT BOOKS

1. Daniels J.D, Radebaugh L.H, Sullivan D.P, "International Business: Environment and Operations", 12th Edition, Prentice Hall, USA, 2009.
2. Ricky W.G, Michael W.P, "International Business: A Managerial Perspective", Prentice Hall, USA, 2009.

REFERENCES

1. Bhattacharya B, Varshney R.L, "International Marketing Management", 25th Revised Edition, S. Chand & Sons, New Delhi, 2015.
2. Verma M.L, "International Trade", Common wealth Publisher, New Delhi, 2010.

13TD10 GLOBAL CHALLENGES AND ISSUES L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: understand the various global issues.
CO 2: demonstrate a reasonable understanding of environmental debates and issues.
CO 3: explain the developmental issues relating to food, health and energy.
CO 4: demonstrate the economical issues in international trade.
CO 5: describe the civilization issues relating to human rights and social justice.

UNIT I SECURITY ISSUES

Nuclear Issues - Global and South Asian Context - Small Weapons Proliferation and Internal Arms Race - Chemical and Biological Weapons – Terrorism - Causes, Consequences And Trends - Cyber Terrorism – Counter Terrorism.

UNIT II ENVIRONMENTAL ISSUES

Global Warming and Climate Change - Threats to Bio-Sphere and Space - Pollutions, De-Forestation, Solid, Chemical and Nuclear Wastes and their Management - Preserving the Green Cover and Wild Life.

UNIT III DEVELOPMENTAL ISSUES

Food Security - Poverty and Hunger - Energy Security - Supply and Demand - Traditional and Alternative Sources of Energy – ITER - Health Security – Health for all - Development Vs. Environment - Sustainable Development.

UNIT IV ECONOMIC ISSUES ON INTERNATIONAL TRADE

International Trade - GATT, WTO - Regional Associations - ECM, ASEAN, OPEC, BRICS - Financial Crisis - ASEAN, Mexico and Greece - Global Issues in Trade and Commerce.

UNIT V CIVILIZATION ISSUES

Human Rights - Issues Relating to Freedom of Speech and Expression - Right to Self Determination - Preservation of Cultures and Cultural Diversities - Rights of Women and Children - Dividends of Globalization and Social Justice – Good Governance.

TEXT BOOKS

1. Payne R, "Global Issues", 4th Edition, Pearson Education Ltd., New York, 2013.
2. Owens P, Baylis J, Smith S, "The Globalization of World Politics", 3rd Edition, Oxford University Press, USA, 2013.

REFERENCE

1. Chirco J.A, "Globalization: Prospects and Problems", Sage Publications, New Delhi, 2013.

13TD11 INDIAN CULTURE AND HERITAGE L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO1: describe Indian culture, civilization and its features.

CO2: demonstrate stone age, Indian races and their contribution in pre-historic culture.

CO3: explain historical development of Indian culture.

CO4: explain the significance, conditions and development of Vedic culture.

CO5: analyze the advent of Islam and European culture.

UNIT I INTRODUCTION

Introduction to Culture - Meaning and Scope - Culture and Civilization - General Characteristics Features of Indian Culture - Geographical Impact on Indian Culture.

UNIT II PRE-HISTORIC CULTURE

Dravidian Culture - Old Stone Age - New Stone Age - Metal Age - Indian Races and their Contribution to Indian Culture.

UNIT III HISTORICAL DEVELOPMENT OF INDIAN CULTURE

Indus Valley Culture - City Planning - Social and Religious Conditions - Vedic and Later Vedic Cultures - Dharmasastras and Caste Systems - Comparison of Indus and Vedic Culture - Importance of Indus Valley and Vedic Cultures.

UNIT IV CULTURE IN SANGAM AGE AND POST SANGAM AGE

Sangam Literature - Society - Political and Economical Conditions - Trade - Religion and Fine Arts.

UNIT V ADVENT OF ISLAM AND EUROPEAN CULTURE

Impact on Indian Culture and Heritage – Reform Movements - Brahma Samaj, Ariya Samaj, Self Respect Movement – Post Colonial Development.

TEXT BOOKS

1. Luniya B.N, “Evolution of Indian Culture”, Lakshmi Narain Agarwal Publishers, Agra, 1986.
2. Jeyapalan N, “History of Indian culture”, Atlantic publishers, New Delhi, 2001.
3. Sharma H.C, “Indian Culture and Heritage”, Neha Publishers & Distributors, New Delhi, 2012.

REFERENCES

1. John G.A, “Dictionary of Indian Philosophy (Sanskrit-English)”, University of Madras, Madras, 1998.
2. Misra R.S, “Studies in philosophy and Religion”, Bharathiya Vidya Prakasans, Varanasi, 1991.
3. Misra S.K, “Culture and Rationality”, Sage publications India pvt. Ltd., New Delhi, 1988.
4. Suda J.P, “Religious in India”, Sterling Publishers Pvt. Ltd., New Delhi, 1978.

13TD12 INDIAN HISTORY L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO1: illustrate the basics of Indian cultural heritage.
CO2: describe interaction between Ancient Indian cultural heritage and Islamic culture.
CO3: demonstrate Innovation by rulers of medieval period in the area of Administration, and their contact with the Europeans.
CO4: analyse modern Indian movements, Economic history and Impact of the British rule on India.
CO5: demonstrate the concepts of Indian National Movement and the history of freedom struggle in India.

UNIT I ANCIENTY INDIAN CULTURE

Ancient Indian Cultural Heritage - Social, Political, Legal and in the Area of Religion and Philosophy.

UNIT II LAW RELATING TO CULTURE

Law Givers and Dispute Resolution Systems in Ancient India (Administration of Justice in Ancient India - Pre-Islamic Period) - Law Relating to Culture - The Advent of Islam - Interaction between Ancient Indian Cultural Heritage and Islamic Culture - The Emergence of Synthetic Indian Culture.

UNIT III ADMINISTRATION IN ANCIENT INDIA

Innovation by Rulers of Medieval Period in the Area of General and Revenue Administration - District Administration - Court Systems - Indian Contact with the Europeans.

UNIT IV SOCIO-ECONOMIC HISTORY

Socio-Religious Reform Movements in Modern India and its Legal Culture - Economic History of India During British Period - Impact of the British Rule on India – Education.

UNIT V EUROPEAN CULTURE IMPACT

Impact of European Culture and Liberal Thought on India – The Indian National Movement - The History of Freedom Struggle in India upto 1947.

TEXT BOOKS

1. Sreenivasa M.H.V, “History of India Part I and II”, JBA Publishers, New Delhi, 2015.
2. Agarwal R.C, Bhatnagar M, “Constitutional Development and National Movement of India”, S. Chand Publishers, New Delhi, 2005.

REFERENCES

1. Altekar S, “State and Government in Ancient India”, Motilal Banarsidass Publishers, New Delhi, 2002.
2. Majumdur R.C, “History and Culture of the Indian People”, Vol. 2, The Age of Imperial Unity, Bharatiya Vidya Bhavan, New Delhi, 2001

13TD13 SUSTAINABLE DEVELOPMENT AND PRACTICES L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: recognize the sustainable development and the way to achieve the sustainable development.
CO 2: outline the concept, factors governing the sustainability and their linkages.
CO 3: explain the environmental impact assessment and environmental audit.
CO 4: describe the environmental planning and managing the resources.
CO 5: acquire the knowledge about the environmental problems and their solutions.

UNIT I SUSTAINABLE DEVELOPMENT

Need for Sustainability - Nine Ways to Achieve Sustainability - Economics as the Dismal Science - Population, Resources and Environment.

UNIT II CHALLENGES OF SUSTAINABLE DEVELOPMENT

Concept of Sustainability - Factors Governing Sustainable Development - Linkages among Sustainable Development, Determinants of Sustainable Development - Case Studies on Sustainable Development.

UNIT III ENVIRONMENT IMPACT ASSESSMENT AND AUDIT

Concepts-process-evaluation methodology-EIA and EMS integration-setting up of audit programme - typical audit process - carrying out the audit-benefits of environmental auditing-environmental audit programmes in India.

UNIT IV ENVIRONMENTAL PLANNING

Introduction - Perspective of Environmental Planning - land resource development planning - Planning and managing the natural resources - landscape ecological planning - information and decision of environmental planning - Land use policy in India.

UNIT V ENVIRONMENTAL EDUCATION

Knowledge about the environment - Knowledge about the environment and population growth - Knowledge about the solution and environmental problems - Environmental education (EE) – Strategies for EE – Models for future Environmental Education Systems.

TEXT BOOKS

1. Rogers P, Jalal K.F, Boyd J.A, "An introduction to sustainable development", Earthscan Publications Ltd., UK, 2006.
2. Santra S.C," Environmental Science", 3rd Edition, New Central Book Agency (P) Ltd., London, 2013.

REFERENCES

1. Stavins R.N. "Economics of the Environment: Selected Readings", 5th Edition, W.W. Norton and Company, New York, 2005.
2. Sachs J.D, "The Age of Sustainable Development", Columbia University Press, New York, 2015.

13TD14 WOMEN IN INDIAN SOCIETY L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO1: Demonstrate historical perspective about women in Indian society.
CO2: Explain social problems of women.
CO3: Understand the legislation for women protection in India.
CO4: Demonstrate the involvement of women literacy, career and politics.
CO5: Analyse the role of NGO's in women empowerment.

UNIT I INTRODUCTION

A Historical Perspective - Early Vedic, Colonial and Modern Periods - Position of Women in Contemporary India.

UNIT II SOCIAL ISSUES

Issues of Girl Child - Female Infanticide and Foeticide, Sex Ratio, Child Marriage, Dowry and Property Rights - Women's Health and Birth Control - Reproduction - Violence against Women - Domestic Violence - Female Headed Households - Women in the Unorganized Sector of Employment - Women's Work- Status and Problems - Problems of Dalit Women.

UNIT III PROTECTIVE LEGISLATION FOR WOMEN

Protective Legislation for Women in the Indian Constitution - Anti Dowry, SITA, PNDT, And Prevention Sexual Harassment At Workplace (Visaka Case) - Domestic Violence(Prevention) Act.

UNIT IV WOMEN AND EDUCATION

Formal and Non-Formal Literacy - Post Literacy - Vocational Training - Dual Career Modernization – Women and Politics - Political Status - Global Movements and Indian Movements.

UNIT V ROLE OF NGO'S IN WOMEN EMPOWERMENT

Gender Economy - All India Women's Conference (AIWC) – Women's India Association (WIA) - National Council of Women in India (NCWIE) - Indian Association of Women's Studies – Women Development Cells - Self Help Groups.

TEXT BOOKS

1. Majumdar M, "Social Status of Women in India", Wisdom Press, New Delhi, 2012.
2. Harish R, Harishankar V.B, "Re-Defining Feminisms", Rawat Publications, Jaipur, 2011.

REFERENCES

1. Rathod P.B, "An Introduction to Women's Studies", ABD Publishers, Jaipur, 2010.
2. Ray R, "Hand Book of Gender", Oxford University Press, New Delhi, 2012.

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13TD15 INDIAN CONSTITUTION L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO1: describe the basic understanding of the Indian Constitution.
CO2: understand the structure and functions of parliament.
CO3: demonstrate the organization and working of the Judiciary.
CO4: understand the structure and functions of state legislature.
CO5: understand the 73rd and 74th Constitutional Amendments.

UNIT I INDIAN CONSTITUTION

Salient Features - Preamble - Fundamental Rights – Directive Principles of State Policy - Fundamental Duties.

UNIT II PARLIAMENTARY SYSTEM

Powers and Functions of President and Prime Minister - Council of Ministers - The Legislature Structure and Functions of Lok Sabha and Rajya Sabha – Speaker.

UNIT III THE JUDICIARY

Organisation and Composition of Judiciary - Powers and Functions of the Supreme Court - Judicial Review – High Courts.

UNIT IV STATE GOVERNMENTS

Powers and Functions of Governor and Chief Minister – Council of Ministers - State Legislature.

UNIT V LOCAL GOVERNMENTS

73rd and 74th Constitutional Amendments – Federalism - Center – State Relations.

TEXT BOOKS

1. Basu D.D," Introduction to Indian Constitution", Prentice Hall of India, New Delhi, 2015.
2. Gupta D.C, "Indian Government and Politics", Vikas Publishing House, New Delhi, 2010.

REFERENCES

1. Pylee M.V, "Introduction to the Constitution of India", Vikas Publishing House, NewDelhi, 2011.
2. Kashyap S, "Our Constitution", National Book Trust, New Delhi, 2010.

13TD16 BIO MECHANICS IN SPORTS L T P C
0 0 0 3

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO1**:** discuss the basics of biomechanics in sports & movement technique accurately.
CO2**:** discuss the basics of linear kinematics and its applications in the field of sports.
CO3: demonstrate the linear kinematics in the field of sports.
CO4**:** discuss the basics of angular kinematics and its applications in the field of sports.
CO5: demonstrate the angular kinematics in the field of sports.

UNIT I INTRODUCTION

Meaning, Aim and Objectives, Importance of Biomechanics in Sports - Types of Motion Linear, Angular, Curvilinear and Circular Motion.

UNIT II LINEAR KINEMATICS

Speed, Velocity, Acceleration, Motion, Projectile Motion – Application of Linear Kinematics in The Field of Physical Education and Sports.

UNIT III ANGULAR KINEMATICS

Angular Speed - Angular Velocity - Angular Acceleration - Relationship between Linear and Angular Motion – Application of Angular Kinematics in the Field of Physical Education and Sports.

UNIT IV LINEAR KINETICS

Mass, Weight, Force, Pressure, Work, Power, Energy, Impulse, Momentum, Impact, Friction, Newton's Law of Motion - Law of Inertia and Types of Inertia.

UNIT V ANGULAR KINETICS

Levers, Equilibrium and Centre of Gravity – Friction and its Types, Centrifugal and Centripetal Force Bio Mechanical Principles Involved in Designing Sports Equipments.

TEXT BOOKS

1. Singh S.K, "Biomechanics in Sports", Neha Publishers & Distributors, New Delhi, 2009.
2. McGinnis P.M, "Biomechanics of Sports and Exercise", 2nd Edition, Human Kinetics Publishers, USA, 2004.

REFERENCES

1. Saxena A, "Biomechanics in Sports", Neha Publishers & Distributors, New Delhi, 2011.
2. Heyward V.H, Gibson A.L, "Advanced Fitness Assessment and Exercise Prescription", 7th Edition, Human Kinetics, USA, 2014.