NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution – Affiliated to Anna University Chennai)

K.R.NAGAR, KOVILPATTI – 628 503

www.nec.edu.in

REGULATIONS – 2011

DEPARTMENT OF

ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM AND SYLLABI OF

B.E.- ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS 2011

CURRICULUM AND SYLLABI FOR FULL TIME

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.	BEG101	Technical English – I	3	1	0	4
2.	BMA101	Mathematics – I	3	1	0	4
3.	BPH101	Engineering Physics – I	3	0	0	3
4.	BCY101	Engineering Chemistry – I	3	0	0	3
5.	BCS101	Fundamentals of Computing and Programming	3	0	0	3
6.	BME101	Engineering Graphics	2	3	0	4
PRACTICAL						
7.	BCS131	Computer Practice Laboratory – I	0	0	3	2
8.	BPC131	Physics and Chemistry Laboratory –I	0	0	3	2
9.	BME131	Engineering Practices Laboratory	0	0	3	2
Total Number of Credits :						**27**

SEMESTER – II

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BEG201	Technical English – II*	3	0	0	3
2.	BMA201	Mathematics – II*	3	1	0	4
3.	BPH201	Engineering Physics – II *	3	0	0	3
4.	BCY201	Engineering Chemistry – II *	3	0	0	3
5. a.	BME201	Engineering Mechanics (For Mechanical & Civil branches)	3	1	0	4
b.	BEE201	Circuit Theory (For EEE & EIE branches)	3	1	0	4
c.	BEC201	Electric Circuits and Electron Devices (For CSE, IT & ECE branches)	3	1	0	4
6. a.	BEE202	Basic Electrical & Electronics Engineering (For Mechanical & Civil branches)	4	0	0	4
b.	BME202	Basic Civil & Mechanical Engineering (For CSE, IT, EEE, EIE & ECE branches)	4	0	0	4
PRACTICAL						
7.	BCS231	Computer Practice Laboratory – II*	0	1	2	2
8.	BPC231	Physics & Chemistry Laboratory – II*	0	0	3	2
9. a.	BME231	Computer Aided Drafting and Modeling Laboratory (For Mechanical & Civil branches)	0	1	2	2
b.	BEE231	Electrical Circuits Laboratory (For EEE & EIE branches)	0	0	3	2
c.	BEC231	Circuits and Devices Laboratory (For ECE, CSE & IT branches)	0	0	3	2
10.	BEG231	English Language Skill Laboratory* (Skill of Listening)	0	0	3	2
		Total Number of Credits :				**29**

- *** Common to all B.E. / B.Tech. Programmes**

SEMESTER – III

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BMA301	Transforms and Partial Differential Equations	3	1	0	4
2.	BCS303	Data Structures and Object Oriented Programming in C++	3	0	0	3
3.	BEC301	Digital Electronics	3	1	0	4
4.	BEC302	Signals and Systems	3	1	0	4
5.	BEC303	Electronic Circuits – I	3	1	0	4
6.	BEE306	Electrical Engineering	3	0	0	3
PRACTICAL						
7.	BEC331	Digital Electronics Laboratory	0	0	3	2
8.	BEC332	Electronic Circuits Laboratory	0	0	3	2
9.	BCS333	Data Structures and Object Oriented Programming Laboratory	0	0	3	2
10.	BEG331	Communication Skills and Technical Seminar – I	0	0	3	2
		TOTAL	**18**	**4**	**12**	**30**

SEMESTER – IV

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BEC401	Electronic Circuits – II	3	1	0	4
2.	BEC402	Communication Theory	3	1	0	4
3.	BEC403	Electromagnetic Fields	3	1	0	4
4.	BMA403	Probability and Random Processes	3	1	0	4
5.	BEC404	Linear Integrated Circuits	3	0	0	3
6.	BEC405	Control Systems Analysis and Design	3	1	0	4
PRACTICAL						
7.	BEC431	Electronic Circuits and simulation Laboratory	0	0	3	2
8.	BEC432	Linear Integrated Circuits Laboratory	0	0	3	2
9.	BEE434	Electrical Engineering and Control System Laboratory	0	0	3	2
10.	BEG431	Communication Skills and Technical Seminar –II	0	0	3	2
		TOTAL	**18**	**5**	**12**	**31**

SEMESTER – V

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1	BEC501	Digital Communication	3	0	0	3
2	BEC502	DSP for Communication Engineering	3	1	0	4
3	BEC503	Microprocessors and Microcontroller	3	0	0	3
4	BEC504	Transmission Lines and Waveguides	3	0	0	3
5	BEI505	Electronic Instrumentation and Measurements	3	0	0	3
6		Elective – I	3	0	0	3
PRACTICAL						
7	BEC531	Communication Engineering Laboratory	0	0	3	2
8	BEC532	Processors and Microcontroller Laboratory	0	0	3	2
		TOTAL	**18**	**1**	**6**	**23**

ELECTIVE – I

S.No	Course Code	Course Title	L	T	P	C
1	BEC001	Medical Electronics	3	0	0	3
2	BEC002	Nano Electronics	3	0	0	3
3	BEC003	Electromagnetic Interference and Compatibility	3	0	0	3
4	BEC004	Radar and Navigational Aids	3	0	0	3
5	BEC005	Open Source Based Embedded System Design	3	0	0	3
6	BCS035	Internet and Java Programming	3	0	0	3

SEMESTER – VI

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BGE501	Professional Ethics and Human values	3	0	0	3
2.	BEC601	Computer Architecture and Organization	3	0	0	3
3.	BEC602	Computer Communication Networks	3	0	0	3
4.	BEC603	Antenna and Wave Propagation	3	0	0	3
5.	BEC604	VLSI Design	3	1	0	4
6.		Elective – II	3	0	0	3
PRACTICAL						
7.	BEC631	Computer Communication Networks Laboratory	0	0	3	2
8.	BEC632	VLSI Design Laboratory	0	0	3	2
		TOTAL	**18**	**1**	**6**	**23**

ELECTIVE – II

S.No	Course Code	Course Title	L	T	P	C
1	BEC006	Speech Processing	3	0	0	3
2	BEC007	Fundamentals of Digital Image Processing	3	0	0	3
3	BEC008	Telecommunication Switching and Networks	3	0	0	3
4	BEC009	Advanced Microprocessors	3	0	0	3
5	BCS404	Operating Systems	3	0	0	3
6	BEI005	Micro Electro Mechanical Systems (MEMS)	3	0	0	3

SEMESTER – VII

S. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BCE301	Environmental Science and Engineering	3	0	0	3
2.	BEC701	Wireless Communication	3	0	0	3
3.	BEC702	Optical Communication and Networks	3	0	0	3
4.	BEC703	RF and Microwave Engineering	3	0	0	3
5.		Elective III	3	0	0	3
6.		Elective IV	3	0	0	3
PRACTICAL						
7.	BEC731	Electronic System Design Laboratory	0	0	3	2
8.	BEC732	Optical and Microwave Laboratory	0	0	3	2
9.	BEC733	Comprehension	0	0	3	1
		Total Number of Credits				**23**

SEMESTER – VIII

S. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BMG601	Principles of Management	3	0	0	3
2.	BEC801	Satellite Communication Systems	3	0	0	3
3.		Elective V	3	0	0	3
4.		Elective VI	3	0	0	3
PRACTICAL						
5.	BEC831	Project Work	0	0	18	12
		Total Number of Credits				**24**

SEVENTH SEMESTER ELECTIVES (ELECTIVE III & IV)

S. No	Course Code	Course Title	L	T	P	C
1	BEC010	VLSI Digital Signal Processing	3	0	0	3
2	BEC011	Advanced VLSI Design	3	0	0	3
3	BEC012	Fundamentals of Semiconductor Chip Testing	3	0	0	3
4	BEC013	Digital Signal Processors	3	0	0	3
5	BEC014	ARM Processor Architecture and Programming	3	0	0	3
6	BEC015	Multimedia Compression and Communication	3	0	0	3
7	BEC016	Information Theory and Coding Techniques	3	0	0	3
8	BIT008	Wireless Sensor Networks	3	0	0	3
9	BMG002	Entrepreneurship Development	3	0	0	3

EIGHTH SEMESTER ELECTIVES (ELECTIVE V & VI)

S. No	Course Code	Course Title	L	T	P	C
1	BEC017	Wavelets and its Applications	3	0	0	3
2	BEC018	Embedded and Real Time Systems	3	0	0	3
3	BEC019	Biosignal Processing	3	0	0	3
4	BEC020	Advanced Electronic System Design	3	0	0	3
5	BEC021	Global Navigation Satellite System	3	0	0	3
6	BEC022	Mobile Adhoc Networks	3	0	0	3
7	BCS009	High Speed Networks	3	0	0	3
8	BMG701	Total Quality Management	3	0	0	3

BEG101 TECHNICAL ENGLISH – I L T P C
3 1 0 4

UNIT I 12

General Vocabulary – Changing words from one form to another – Adjectives, Comparative adjectives – Active and Passive voice – Tenses – simple present, present continuous – Nouns – compound nouns – Skimming and scanning – Listening and transfer of information – bar chart, flowchart – Paragraph writing, description – Discussing as a group and making an oral report on the points discussed, Conversation techniques – convincing others.

Suggested activities:

1. Matching words & meanings - Using words in context – Making sentences.
2. Changing sentences from active to passive voice & vice versa.
3. Skimming, cloze exercises, exercises transferring information from text to graphic form – bar charts, flow charts.
4. Writing descriptions using descriptive words & phrases, and technical vocabulary.
5. Role play, conversation exercises, discussions, oral reporting exercises.

Any other related relevant classroom activity.

UNIT II 12

Vocabulary – prefixes & suffixes – simple past tense – Spelling and punctuation – 'wh' Question forms – Scanning, inference – Listening & note-taking – Paragraph writing – Comparison and contrast – Creative thinking and speaking.

Suggested Activities:

1. a. Vocabulary activities using prefixes and suffixes.
   b. Exercises using questions – asking & answering questions.
2. Scanning the text for specific information.
3. Listening and note-taking – Writing paragraphs using notes, giving suitable headings and subheadings for paragraphs. Using expressions of comparison and contrast.
4. Discussion activities and exploring creative ideas.

Any other related relevant classroom activity.

UNIT III 12

Tenses – simple past, simple future and past perfect – Reading in Context – Reading & note-making – single line – Definitions – sequencing of sentences – instruction writing – Persuasive speaking.

Suggested activities:

1. Providing appropriate context for the use of tenses
2. Listening and note-taking
3. (a) Writing sentence definitions and instructions
   (b) Identifying the discourse links and sequencing jumbled sentences.
4. Speaking exercises, discussions, role play exercises using explaining, convincing and persuasive Strategies.

Any other related relevant classroom activity.

UNIT IV 12

Modal verbs and Probability – Concord subject verb agreement (Correction of errors) – Cause and effect expressions – Extended Definition – Speaking about the future plans.

Suggested activities:

1. a. Making sentences using modal verbs to express probability
   b. Gap filling using relevant grammatical form of words.
2. Writing extended definitions
3. Speaking – role play activities, discussions, extempore speaking exercises speculating about the future.
   Any other related relevant classroom activity

UNIT V **12**

'If' conditionals – Gerunds – Intensive reading – Speaking – Presentation of problems & solutions – Itinerary – planning for an industrial visit – Formal Letter writing – Letter to the editor, invitation letter, accepting, declining letter and permission letter.

Suggested activities:

1. a) Sentence completion exercises using 'If' conditionals.
   b) Gap filling exercises using gerunds and present participle forms
2. Reading comprehension exercises.
3. Role play, discussion, debating and speaking activities for stating, discussing problems and suggesting solutions.
4. Writing letters to officials and to the editor in formal/official contexts.
   Any other related relevant classroom activity.

TOTAL: 60 PERIODS

AREAS TO BE COVERED UNDER DIFFERENT HEADINGS:

A) Language focus

1. Suffixes and Prefixes
2. Transformation of words from one form to another (Derivatives from root words)
3. Matching words & meanings (synonyms)
4. Compound nouns
5. Degrees of comparison
6. Active and passive voice-impersonal passive
7. Tenses: simple present, simple past, simple future, present continuous, past continuous, Present Perfect.
8. Modal verbs
9. 'Wh' Question forms
10. Conditional clause
11. Gerunds and infinitives
12. Expressing Cause and effect
13. Concord
14. Punctuation
15. Writing definitions

B) Reading

1. Reading in context
2. Skimming and scanning
3. Scanning the text for specific information
4. Reading and note-making
5. Intensive reading for making inferences
6. Reading comprehension

C) Listening:

1. Listening and transfer of information
2. Listening & note taking

D) Writing:

1. Transformation of information from graphical data to written form and from written form to graphical Form.
2. Paragraph writing – Description
3. Paragraph Writing – comparison and contrast.
4. Note-making
5. Writing Instructions
6. Jumbled sentences
7. Letter writing – Formal letters (Invitation, Accepting, Declining, Permission Letters) Letters to the editor

E) Speaking:

1. Discussing as a group and making oral reports,
2. Role play-Conversation techniques – convincing others
3. Creative thinking and speaking, Exploring creative ideas
4. Persuasive strategies
5. Speaking about the future plans
6. Extempore speech – Speaking exercises speculating about the future
7. Presentation of problems and solutions
8. Debates

TEXT BOOK:

1. Department of Humanities & Social Sciences, Anna University, 'English for Engineers and Technologists' Combined Edition (Volumes 1 & 2), Chennai: Orient Longman Pvt. Ltd., 2006. Themes 1– 4 (Resources, Energy, Computer, Transport)

REFERENCES:

1. Meenakshi Raman and Sangeeta Sharma, 'Technical Communication English skills for Engineers', Oxford University Press, 2008.
2. Andrea, J. Rutherford, 'Basic Communication Skills for Technology', 2nd Edition, Pearson Education, 2007.

***Extensive Reading*:**

A.P.J.Abdul Kalam with Arun Tiwari, 'Wings of Fire' An Autobiography, University Press (India) Pvt. Ltd.,1999, 30th Impression 2007.

BMA101 MATHEMATICS – I L T P C
3 1 0 4

UNIT I MATRICES 12

Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY 12

Equation of a sphere – Plane section of a sphere – Tangent Plane – Equation of a cone – Right circular cone – Equation of a cylinder – Right circular cylinder.

UNIT III DIFFERENTIAL CALCULUS 12

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Differentiation of implicit functions – Jacobians – Taylor's expansion – Maxima and Minima – Method of Lagrangian multipliers.

UNIT V 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 co-ordinates – Area as double integral – Volume as triple integral.

TOTAL: 60 PERIODS

TEXT BOOK:

1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", 3rd Edition, Laxmi Publications (P) Ltd., (2008).

REFERENCES:

1. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, (2007).
2. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2007).
3. Glyn James, "Advanced Engineering Mathematics", 7th Edition, Wiley India, (2007).
4. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., (2007).

BPH101 ENGINEERING PHYSICS – I L T P C
3 0 0 3

UNIT I ULTRASONICS 9

Introduction – 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 II LASERS 9

Introduction – Principle of Spontaneous emission and stimulated emission, Population inversion, pumping, Einsteins A and B coeffcients – derivation. Types of lasers – He-Ne, CO_2, Nd-YAG, Semiconductor lasers (homojunction & heterojunction) Qualitative Industrial Applications - Lasers in welding, heat treatment, cutting – Medical applications – Holography (construction & reconstruction).

UNIT III FIBER OPTICS & APPLICATIONS 9

Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Double crucible technique of fibre drawing – Splicing, Loss in optical fibre – attenuation, dispersion, bending – Fibre optical communication system (Block diagram) – Light sources – Detectors – Fibre optic sensors – temperature & displacement – Endoscope.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jean's Law from Planck's theory – Compton effect – Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box – Electron microscope – Scanning electron microscope – Transmission electron microscope.

UNIT V 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 – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Polymorphism and allotropy – Crystal defects – point, line and surface defects – Burger vector.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R. K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi (2003)
2. M.N.Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics' S.Chand and company, Ltd., New Delhi, 2005.

REFERENCES:

1. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics', 6th Edition, Thomson Brooks/Cole, Indian reprint (2007)
2. Rajendran, V and Marikani A, 'Engineering Physics' Tata Mc Graw Hill Publications Ltd, III Edition, New Delhi (2004).
3. Palanisamy, P.K., 'Engineering Physics' Scitech publications, Chennai (2007).
4. Jayakumar. S, 'Engineering Physics', R.K. Publishers, Coimbatore (2003).
5. Chitra Shadrach and Sivakumar Vadivelu, 'Engineering Physics', Pearson Education, New Delhi (2007).

BCY101 ENGINEERING CHEMISTRY – I L T P C
3 0 0 3

UNIT I WATER TECHNOLOGY 9

Characteristics – alkalinity – types of alkalinity and determination – hardness – types and estimation by EDTA method (problems), Domestic water treatment – disinfection methods (Chlorination, ozonation. UV treatment) – Boiler feed water – requirements – disadvantages of using hard water in boilers – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning – demineralization process – desalination and reverse osmosis.

UNIT II POLYMERS AND COMPOSITES 9

Polymers – definition – polymerization – types – addition and condensation polymerization – free radical polymerization mechanism ,Plastics – classification – preparation, properties and uses of PVC, Teflon, polycarbonate, polyurethane, nylon-6,6, PET, Rubber – vulcanization of rubber, synthetic rubbers – butyl rubber, SBR, Composites – definition, types polymer matrix composites – FRP only.

UNIT III SURFACE CHEMISTRY 9

Adsorption – types – adsorption of gases on solids – adsorption isotherms – Frendlich and Langmuir isotherms – adsorption of solutes from solution – role of adsorbents in catalysis, ion-exchange adsorption and pollution abatement.

UNIT IV NON-CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear energy – fission and fusion reactions and light water nuclear reactor for power generation (block diagram only) – breeder reactor – solar energy conversion – solar cells – wind energy – fuel cells – hydrogen-oxygen fuel cell – batteries – alkaline batteries – lead-acid, nickel-cadmium and lithium batteries.

UNIT V ENGINEERING MATERIALS 9

Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of alumina, magnesite and zirconia bricks, Abrasives – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide. Lubricants – mechanism of lubrication, liquid lubricants – properties – viscosity index, flash and fire points, cloud and pour points, oilyness – solid lubricants – graphite and molybdenum sulphide. Nanomaterials – introduction to nanochemistry – carbon nanotubes and their Applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C.Jain and Monica Jain, “Engineering Chemistry” Dhanpat Rai Pub.Co., New Delhi (2002).
2. S.S. Dara “A text book of engineering chemistry” S.Chand & Co. Ltd., New Delhi (2006).

REFERENCES:

1. B.K.Sharma “Engineering chemistry” Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar “Engineering Chemistry” Tate McGraw-Hill Pub.Co.Ltd., New Delhi (2008).

BCS101 FUNDAMENTALS OF COMPUTING AND PROGRAMMING L T P C
3 0 0 3

UNIT I INTRODUCTION TO COMPUTERS 9

Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations – Classification of Computers – Basic Computer Organization – Number Systems.

UNIT II COMPUTER SOFTWARE 9

Computer Software – Types of Software – Software Development Steps – Internet Evolution – Basic Internet Terminology – Getting connected to Internet – Applications.

UNIT III PROBLEM SOLVING AND OFFICE AUTOMATION 9

Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudocode –Application Software Packages – Introduction to Office Packages (not detailed commands for examination).

UNIT IV INTRODUCTION TO "C" 9

Overview of **"C"** – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making –Branching and Looping.

UNIT V FUNCTIONS AND POINTERS 9

Handling of Character Strings – User-defined functions – Definitions – Declarations – Call by reference – Call by value – Structures and Unions – Pointers – Arrays – The Preprocessor – Developing a **"C"** Program : Some Guidelines.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ashok.N.Kamthane, "Computer Programming", Pearson Education (India) (2008).
2. Behrouz A.Forouzan and Richard.F.Gilberg, "A Structured Programming Approach Using C", Second Edition, Brooks-Cole Thomson Learning Publications (2007).

REFERENCES:

1. Pradip Dey and Manas Ghoush, "Programming in C", Oxford University Press (2007).
2. Byron Gottfried, "Programming with C", 2nd Edition, (Indian Adapted Edition), TMH publications (2006). (Unit II, III, IV, and V).
3. Stephen G.Kochan, "Programming in C", Third Edition, Pearson Education India (2005).
4. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
5. E.Balagurusamy,"Computing fundamentals and C Programming", Tata McGRaw-Hill Publishing Company Limited (2008).
6. S.Thamarai Selvi and R.Murugan, "C for All", Anuradha Publishers (2008).

BME101 ENGINEERING GRAPHICS L T P C
2 3 0 4

UNIT I PLANE CURVES AND FREE HAND SKETCHING 12

CURVES USED IN ENGINEERING PRACTICES:

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

FREE HAND SKETCHING:

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 12

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

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, cylinders and cones – 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, truncated prisms, pyramids, cylinders and cones, Combination of any two simple solids. Perspective projection of prisms, pyramids and cylinders by visual ray method and vanishing point method.

TOTAL: 60 PERIODS

TEXT BOOK:

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

REFERENCES:

1. K.V.Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).
2. M.S. Kumar, "Engineering Graphics", D.D. Publications (2007).
3. K. Venugopal & V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited (2008).
4. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2005).
5. K. R. Gopalakrishnana, "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).

BCS131 COMPUTER PRACTICE LABORATORY – I L T P C
0 0 3 2

LIST OF EXERCISES
I. MS Office

a) WORD PROCESSING

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - Flow Chart.

b) SPREAD SHEET

1. Chart - Line, XY, Bar and Pie.
2. Formula - formula editor.
3. Spread sheet - inclusion of object, picture and graphics, protecting the document and sheet.
4. Sorting and Import / Export features.

II SIMPLE C PROGRAMMING

1. Data types, Expression evaluation, Conditional statements.
2. Arrays.
3. Structures and Unions.
4. Functions.

TOTAL: 45 PERIODS

For programming exercises Flow chart and pseudocode are essential.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 60 STUDENTS

HARDWARE

- LAN System with 66 nodes (OR) Standalone PCs – 66 Nos.
- Printers – 3 Nos.

SOFTWARE

- OS – Windows / UNIX Clone
- Application Package – Office suite
- Compiler – **"C"**

BPC131 PHYSICS AND CHEMISTRY LABORATORY – I **L T P C**
0 0 3 2

PHYSICS LABORATORY – I

LIST OF EXPERIMENTS

1. (a) Particle size determination using Diode Laser.
   (b) Determination of Laser parameters – Wavelength and angle of divergence.
   (c) Determination of acceptance angle in an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Determination of wavelength of mercury spectrum – spectrometer grating.
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of Hysteresis loss in a ferromagnetic material.

B. CHEMISTRY LABORATORY – I

LIST OF EXPERIMENTS

1. Estimation of hardness of Water by EDTA method.
2. Estimation of Copper in brass by EDTA method.
3. Determination of DO in water (Winkler's method)
4. Estimation of Chloride in Water sample (Argentometric)
5. Estimation of alkalinity of Water sample
6. Determination of molecular weight and degree of polymerization using viscometry.

BME131 ENGINEERING PRACTICES LABORATORY L T P C
0 0 3 2

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE

BUILDINGS:

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

PLUMBING WORKS:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

CARPENTRY USING POWER TOOLS ONLY:

(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise:
Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE

WELDING:

(a) Preparation of arc welding of butt joints, lap joints and tee joints.
(b) Gas welding practice.

BASIC MACHINING:

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

SHEET METAL WORK:

(a) Forming & Bending:
(b) Model making – Trays, funnels, etc.
(c) Different type of joints.

MACHINE ASSEMBLY PRACTICE:

(a) Study of centrifugal pump.
(b) Study of air conditioner.

DEMONSTRATION ON:

(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE

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.

IV ELECTRONICS ENGINEERING PRACTICE

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

TOTAL: 45 PERIODS

REFERENCES:

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

BEG201 TECHNICAL ENGLISH – II **L T P C**

(Common to all branches) **3 0 0 3**

AIM

To encourage students to actively involve in participative learning of English and to help them acquire communication skills.

OBJECTIVES

1. To help the students to develop listening skills for academic and professional purposes.
2. To help the students to acquire the ability of effective speaking in English in real-life situations.
3. To inculcate reading habit and to develop effective reading skills.
4. To help the students to improve their active and passive vocabulary.
5. To familiarize the students with different rhetorical functions of scientific English.
6. To enable the students to write letters and reports effectively in formal and business situations.

UNIT I **10**

Technical Vocabulary – meanings in context, sequencing words, Articles – Prepositions, intensive reading and predicting content, Reading and interpretation, extended definitions, process description.

Suggested activities

1. Exercises on word formation using the prefix 'self' – Gap filling with preposition Exercises – Using sequence words
2. Reading comprehension exercise with questions based on inference – Reading heading and predicting the content – reading advertisements and interpretation
3. Writing extended definitions – Writing description of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future

UNIT II **10**

Phrases / structure indicating cause/purpose – Adverbs – Skimming – Non-verbal communication – Listening – correlating verbal and non-verbal communication – speaking in group discussion – Formal Letter writing – Writing analytical paragraphs.

Suggested Activities

1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) – Reading comprehension exercises with texts including graphic communication – Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categories data in tables.
3. Writing formal letters – quotations, placing orders, clarification, and complaint, Letter seeking permission for industrial visits, writing analytical paragraphs on different debatable issues.

UNIT III **10**

Cause and effect expressions – Different grammatical forms of the same word – speaking – stress and intonation, Group Discussions – reading – critical reading – listening – writing – using connectives, report writing – types, structure, data collection, content, form, recommendations.

Suggested Activities

1. Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word.
2. Speaking exercises involving the use of stress and intonation – Group discussions – analysis of problems and offering solutions.
3. Reading comprehension exercises with critical questions, multiple choice questions.
4. Sequencing of jumbled sentences using connectives – Writing different types of reports like industrial accident report and survey report – writing recommendations.

UNIT IV **10**

Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application – content, format (CV/Bio-data) – instructions, imperative forms – preparing checklists, Yes/No question form – Email communication

Suggested Activities

1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation of content.
3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
4. Speaking – Role Play – group discussions – Activities giving oral instructions.
5. Writing descriptions, expanding hints – writing argumentative paragraphs – Writing formal letters – writing letter of application with CV/Bio-data – Writing general and safety instructions – Preparing checklists – Writing e-mail messages

UNIT V **5**

Speaking – Discussion of problems and solutions – Creative and critical thinking – writing an essay, Writing a proposal.

Suggested Activities

1. Case Studies on problems and solutions
2. Brain storming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements

TOTAL 45 periods

AREAS TO BE COVERED UNDER DIFFERENT HEADINGS

A. Language Focus

1. Technical vocabulary
2. Sequencing words
3. Articles
4. Prepositions
5. Word formation using prefixes
6. Phrases / Structure indicating purpose
7. Adverbs
8. Cause and effect expressions
9. Tense forms
10. Different grammatical forms of the same word
11. Numerical adjectives
12. Extended definitions

B. Reading

1. Intensive reading and predicting content
2. Reading and interpretation
3. Skimming
4. Critical reading
5. Reading comprehension exercises

C. Listening

1. Correlating verbal and non-verbal communication
2. Listening comprehension

D. Speaking

1. Group Discussions
2. Stress and intonation
3. Role plays and giving oral instructions
4. Discussion of problems and solutions

E. Writing

1. Process description
2. Formal letter writing
3. Writing analytical paragraphs
4. Report Writing
5. Descriptive writing
6. Argumentative paragraphs
7. Letter of application
8. Instructions
9. Recommendations
10. Checklists preparation
11. Email Communication
12. Writing critical essays
13. Writing proposals

TEXT BOOK:

1. **'**English for Engineers and Technologists' Combined Edition (Volumes 1 & 2), Department of Humanities & Social Sciences, Anna University, Chennai: Orient Longman Pvt. Ltd., 2006. Themes 5 – 8 (Technology, Communication, Environment, Industry)

REFERENCES:

1. Mark Abbot son, "Technical English for professionals" (2009).
2. P.K. Dutt, G. Rajeevan and C.L.N Prakash, 'A Course in Communication Skills', Cambridge University Press, India 2007.
3. Krishna Mohan and Meera Banerjee, 'Developing Communication Skills', Macmillan India Ltd., (Reprinted 1994 – 2007).
4. Edgar Thorpe, Showick Thorpe, 'Objective English', Second Edition, Pearson Education, 2007.
5. Rodney Huddleston and Geoffrey Pullum, 'A students introduction to English Grammar', Cambridge University Press, 2007.
6. Jack C.Richards, Jonathan Hull and Susan Protor, 'English for International Communication', Third Edition, Cambridge University Press, 2004.

Extensive Reading:

1. Robin Sharma**, '**The Monk Who Sold His Ferrari', Jaico Publishing House, 2007

***Note**:*

The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

BMA201 MATHEMATICS – II L T P C
(*Common to all branches)* 3 1 0 4

UNIT I 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 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 parallelpipeds.

UNIT III ANALYTIC FUNCTIONS 12

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

UNIT IV COMPLEX INTEGRATION 12

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

UNIT V LAPLACE TRANSFORM 12

Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions. Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL: 60 PERIODS

TEXT BOOK:

1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", 3rd Edition, Laxmi Publications (P) Ltd., (2008).
2. Grewal.B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications', Delhi (2007).

REFERENCES:

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi (2007).
2. Glyn James, "Advanced Engineering Mathematics", 3rd Edition, Pearson Education (2007).
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 7th Edition, Wiley India (2007).
4. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., (2007).

BPH201 ENGINEERING PHYSICS – II **L T P C**
(Common to all branches) **3 0 0 3**

UNIT I CONDUCTING MATERIALS 9

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

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect – Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 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 – applications – magnetic recording and readout – storage of magnetic data – tapes, floppy and magnetic disc drives. Superconductivity – Properties – Types of super conductors – BCS theory of superconductivity (Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – Internal field – Claussius-Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferro electricity and applications.

UNIT V MODERN ENGINEERING MATERIALS 9

Metallic glasses: preparation, properties and applications. Shape Memory Alloys (SMA): Characteristics, properties of Ni-Ti alloy, application, advantages and disadvantages of SMA. Nanomaterials: synthesis – plasma arcing – chemical vapour deposition – sol-gels – electrodeposition – ball milling – properties of nanoparticles and applications. Carbon nanotubes: fabrication – arc method – pulsed laser deposition – chemical vapour deposition – structure – properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Charles Kittel ‘Introduction to Solid State Physics’, John Wiley & sons 7th Edition, Singapore (2007)
2. Charles P. Poole and Frank J.Ownen, ‘Introduction to Nanotechnology’, Wiley India (2007) (for Unit V)

REFERENCES:

1. G.Senthil Kumar, 'Engineering Physics – II' VRB Publishers Pvt Ltd., Chennai (2010)
2. B.N.Sankar and S.O.Pillai, 'Engineering Physics', New Age International Publishers (2008) New Delhi.
3. Jayakumar .S. 'Materials Science', R.K. Publishers, Coimbatore (2008).
4. Palanisamy.P.K, 'Materials Science', Scitech publications (India) Pvt.Ltd., Chennai, 2nd Edition (2007).
5. M. Arumugam, 'Materials Science' Anuradha Publications, Kumbakonam (2006).
6. Rajendran.V and Marikani.A, 'Materials Science' Tata McGraw Hill publications, New Delhi (2004).

BCY201 ENGINEERING CHEMISTRY – II L T P C
(*Common to all branches)* 3 0 0 3

AIM

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES

1. The student should be conversant with the principles of electrochemistry, electrochemical cells, emf and applications of emf measurements.
2. Principles of corrosion control.
3 . Chemistry of Fuels and combustion.
4. Industrial importance of Phase rule and alloys.
5. Analytical techniques and their importance.

UNIT I ELECTROCHEMISTRY 9

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode – calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometric titrations (redox Fe^{2+} vs dichromate and precipitation – Ag+ vs Cl^- titration) and conductometric titrations – acid-base (HCI vs NaOH) titrations.

UNIT II CORROSION AND CORROSION CONTROL 9

Chemical corrosion – Pilling-Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed current cathodic methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

UNIT III FUELS AND COMBUSTION 9

Calorific value – classification – Coal – proximate and ultimate analysis – metallurgical coke – manufacture by Otto-Hoffmann by product oven method – Petroleum processing and fractions – cracking – catalytic cracking and methods. knocking – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes – Gaseous fuels- water gas, producer gas, CNG and LPG – Flue gas analysis – Orsat apparatus – theoretical air for combustion.

UNIT IV PHASE RULE AND ALLOYS 9

Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT V ANALYTICAL TECHNIQUES 9

Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (problem) (block diagram only) – estimation of iron by Colorimetry. flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry. atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub. Co., New Delhi, 15th Edition (2009).
2. S.S.Dara "A text book of Engineering Chemistry" S.Chand & Co.Ltd., New Delhi (2006)

REFERENCES:

1. A Text book of Physical Chemistry by A.S.Negi & S.C. Anand, New Age International Pvt. Ltd., New Delhi (2009)
2. B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd., New Delhi (2008)
3. Principles of Physical Chemistry, AR Puri, LR Sharma, M.S. Pathania, Vishal Publication, (2005)
4. B.K.Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001)

(a) BME201 ENGINEERING MECHANICS L T P C
(For Mechanical & Civil Branches) 3 1 0 4

OBJECTIVE

At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I BASICS & STATICS OF PARTICLES 12

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES 12

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples

UNIT III PROPERTIES OF SURFACES AND SOLIDS 12

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section by using standard formula – second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Mass moment of inertia – Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia.

UNIT IV DYNAMICS OF PARTICLES 12

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS 12

Frictional force – Laws of Coloumb friction – simple contact friction – Rolling resistance – Belt friction. Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL: 60 PERIODS

TEXT BOOK:

1. Beer, F.P and Johnson Jr. E.R. "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, 9th edition (2010)

REFERENCES:

1. Rajasekaran.S, Sankarasubramanian.G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., 3rd Edition (2010).
2. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 12th Edition (2010).
3. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., (2003).
5. Ashok Gupta, "Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)", Pearson Education Asia Pvt., Ltd., (2002).
6. Palanichamy.M.S., Nagam, S., "Engineering Mechanics – Statics & Dynamics", Tata McGraw-Hill (2001).

(b) BEE201 CIRCUIT THEORY (For EEE & EIE Branches)

L	T	P	C
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UNIT I BASIC CIRCUITS ANALYSIS 12

Ohm's Law – Kirchoffs laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits.

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 12

Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Norton Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 12

Series and parallel resonance – their frequency response – Quality factor and Bandwidth – Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 12

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. input (Sinusoidal).

UNIT V ANALYSING THREE PHASE CIRCUITS 12

Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4- wire circuits with star and delta connected loads, balanced & unbalanced loads – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, (2007).
2. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill publishers, 6th edition, New Delhi, (2002).

REFERENCES:

1. John Bird "Electrical Circuit Theory and Technology" Fourth Edition, Newnes Publications (2010)
3. Charles K.Alexander, Mathew N.O.Sadik, "Fundamentals of Electric circuits", 2nd Edition, McGraw Hill (2003).
4. Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi (2001).
5. Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd., New Delhi, (1996).
6. Chakrabati A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi (1999).

(c) BEC201 ELECTRIC CIRCUITS AND ELECTRON DEVICES L T P C
(For ECE, CSE and IT Branches) 3 1 0 4

UNIT I CIRCUIT ANALYSIS TECHNIQUES 12

Kirchoff's current and voltage laws – series and parallel connection of independent sources – R, L and C – Network Theorems – Thevenin, Superposition, Norton, Maximum power transfer and duality – Star-delta conversion.

UNIT II TRANSIENT & RESONANCE IN RLC CIRCUITS 12

Basic RL, RC and RLC circuits and their responses to pulse and sinusoidal inputs – frequency response – Parallel and series resonances – Q factor – single tuned and double tuned circuits.

UNIT III SEMICONDUCTOR DIODES 12

Review of intrinsic & 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.

UNIT IV TRANSISTORS 12

Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V SPECIAL SEMICONDUCTOR DEVICES (Qualitative Treatment only) 12

Tunnel diodes, PIN diode, varactor diode – SCR characteristics and two transistor equivalent model – UJT – Diac and Triac – Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – LED, LCD.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Joseph A. Edminister, Mahmood, Nahri, "Electric Circuits" – Shaum series, Tata McGraw Hill (2001)
2. Salivahanan, N. Suresh kumar and A.Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition (2008).
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition (2008).

REFERENCES:

1. William H. Hayt, J.V. Jack, E. Kemmebly and Steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill (2011.)
2. A.Sudhakar, Shyammohan S Palli, "Circuits and Networks-Analysis and Synthesis", Tata McGraw Hill, 4th edition (2010)
3. Robert T.Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, 7th Education (2008).
4. J.Millman & Halkins, Satyebranta Jit, "Electronic Devices & Circuits", Tata McGraw Hill, 2nd Edition (2008).
5. William H. Hayt, J.V. Jack, E. Kemmebly and steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 6th Edition (2002).

(a) BEE202 BASIC ELECTRICAL & ELECTRONICS ENGINEERING L T P C
(For Mechanical & Civil Branches) 4 0 0 4

UNIT I ELECTRICAL CIRCUITS & MEASURMENTS 12

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits. Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II ELECTRICAL MACHINES 12

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, Single Phase Induction Motor.

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 12

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier

UNIT IV DIGITAL ELECTRONICS 12

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (simple concepts)

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 12

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL: 60 PERIODS

TEXT BOOKS:

1. R.S. Sedha, "Applied Electronics" S. Chand & Co., 2006.
2. V.N. Mittle "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.

REFERENCES:

1. Gnanavadivel,C. Senthilkumar, A. Vijaykumar, S. Joseph Gladwin, "Basic Electrical and Electronics Engineering", Anuradha Publishers (2011).
2. Muthusubramanian.R, Salivahanan.S and Muraleedharan.K.A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition (2006).
3. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
4. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers (2003).
5. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum Outline Series, McGraw Hill (2002).
6. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd., (1994).

(b) BME202 BASIC CIVIL & MECHANICAL ENGINEERING L T P C
(For CSE, ECE, EEE, EIE & IT branches) 4 0 0 4

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.

TOTAL: 30 PERIODS

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: 30 PERIODS

REFERENCES:

1. Shanmugam.G and Palanichamy.M.S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi (1996).
2. Ramamrutham. S, “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P) Ltd. 1999.
3. Seetharaman S. “Basic Civil Engineering”, Anuradha Agencies (2005).
4. Venugopal K and Prahu Raja V, “Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam (2000).
5. Shantha Kumar S R J., “Basic Mechanical Engineering”, Hi-tech Publications, Mayiladuthurai (2000).

BCS231 COMPUTER PRACTICE LABORATORY – II **L T P C**
(Common to all branches) **0 1 2 2**

LIST OF EXPERIMENTS

1. UNIX COMMANDS

Study of Unix OS – Basic Shell Commands – Vi Editor.

2. SHELL PROGRAMMING

Simple Shell program – Conditional Statements – Testing and Loops.

3. C PROGRAMMING ON UNIX

Dynamic Storage Allocation – Pointers – Functions – File Handling.

TOTAL: 45 PERIODS

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware

- UNIX Clone Server – 1 No
- Nodes (thin client or PCs) – 33 Nos
- Printer – 3 Nos.

Software

- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

BPC231 PHYSICS AND CHEMISTRY LABORATORY – II **L T P C**

(Common to all branches) **0 0 3 2**

PHYSICS LABORATORY – II

LIST OF EXPERIMENTS

1. Determination of Young's modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
4. Determination of viscosity of liquid – Poiseuille's method.
5. Spectrometer dispersive power of a prism.
6. Determination of Young's modulus of the material – uniform bending.
7. Torsional pendulum – Determination of rigidity modulus.

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

CHEMISTRY LABORATORY – II

LIST OF EXPERIMENTS

1. Conductometric titration (Simple acid base)
2. Conductometric titration (Mixture of weak and strong acids)
3. Conductometric titration using $BaCl_2$ Vs Na_2SO_4
4. Potentiometric Titration (Fe^{2+} Vs $K_2Cr_2O_7$)
5. pH Titration (Acid & Base)
6. Determination of water of crystallization of a crystalline salt ($CuSO_4$)
7. Estimation of Ferric ion by spectrophotometry.

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

(a) BME231 COMPUTER AIDED DRAFTING AND MODELING LABORATORY L T P C
(For Mechanical & Civil Branches) 0 1 2 2

List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: **Plotting of drawings must be made for each exercise and attached to the records written by students.**

List of Equipments for a batch of 30 students:

1. Pentium IV computer or better hardware, with suitable graphics facility – 30 Nos.
2. Licensed software for Drafting and Modeling – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 Nos.

(b) BEE231 ELECTRICAL CIRCUITS LABORATORY **L T P C**

(For EEE & EIE branches) **0 0 3 2**

LIST OF EXPERIMENTS

- Verification of ohm's laws and kirchoff's laws.
- Verification of Thevenin's and Norton's Theorem
- Verification of superposition Theorem
- Verification of maximum power transfer theorem.
- Verification of reciprocity theorem
- Measurement of self inductance of a coil
- Verification of mesh and nodal analysis.
- Transient response of RL and RC circuits for DC input.
- Frequency response of series and parallel resonance circuits.
- Frequency response of single tuned circuits.

TOTAL: 45 PERIODS

(c) BEC231 CIRCUITS AND DEVICES LABORATORY **L T P C**
(For ECE, CSE & IT branches) **0 0 3 2**

- Verification of KVL and KCL
- Verification of Thevenin and Norton Theorems.
- Verification of superposition Theorem.
- Verification of Maximum power transfer and reciprocity theorems.
- Frequency response of series and parallel resonance circuits.
- Characteristics of PN and Zener diode
- Characteristics of CE configuration
- Characteristics of CB configuration
- Characteristics of UJT and SCR
- Characteristics of JFET and MOSFET
- Characteristics of Diac and Triac.
- Characteristics of Photodiode and Phototransistor.

TOTAL: 45 PERIODS

BEG231 ENGLISH LANGUAGE SKILL LABORATORY (Skill of Listening) L T P C
(Common to all branches) **0 0 3 2**

UNIT I (Micro Skills I) 4

Tasks (Type I): Lexical word identification

A. Identifying the homophones/words with silent letters/often mispronounced words
B. Identifying the missing words in native speech (Native accent)

Tasks (Type II): Decompressing structures

A. Expanding sound units into word clusters (Ex: verbs with multiple auxiliaries/contracted forms)
B. Identifying the constituent words in collocations/compound words/idiomatic phrases

UNIT II (Micro Skills II): Identifying tonal variations for meaning making 6

Tasks:

A. Punctuating the script after listening to it.
B. Marking word chunks/tone groups in transcript after listening to it.
C. Marking syllable stress in words.
D. Identifying tonal variations expressing rhetorical questions/ information seeking Questions / Exclamations / General statements.

UNIT III Content Comprehension and Making Inferences 12

Tasks:

A. Listening and filling in the chart
B. Multiple choice questions (Negative/factual)
C. True/False questions
D. Questions with multiple answers (choosing two/three correct answers)
E. Matching information
F. Filling the blanks (not more than three words)
G. Comprehending the text organization

UNIT IV Listening and act 8

Tasks:

A. Locating spots in a map following the given directions
B. Transferring data to graphs/diagrams/flow charts
C. Diagram/Picture completing tasks
D. Finding the answer through the process of elimination

TOTAL: 30 PERIODS

BMA301 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
(Common to all branches) 3 1 0 4

OBJECTIVES

The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I FOURIER SERIES (9L+3T)

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 (9L+3T)

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

UNIT III PARTIAL DIFFERENTIAL EQUATIONS (9L+3T)

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

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (9L+3T)

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 V Z - TRANSFORMS AND DIFFERENCE EQUATIONS (9L+3T)

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

Lectures: 45 Tutorials: 15 Total: 60 Periods

TEXT BOOK

1. Grewal, B.S, "*Higher Engineering Mathematics",* 40th Edition, Khanna publishers, Delhi, (2007)

REFERENCES

1. Bali.N.P and Manish Goyal, "*A Textbook of Engineering Mathematics"*, 7th Edition, Laxmi Publications(P) Ltd. (2007)
2. Ramana.B.V., "*Higher Engineering Mathematics",* Tata Mc-GrawHill Publishing Company limited, New Delhi (2007).
3. Glyn James, "*Advanced Modern Engineering Mathematics"*, 3rd Edition, Pearson Education (2007).
4. Erwin Kreyszig, "*Advanced Engineering Mathematics",* 8th edition, Wiley India (2007).

BCS303 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++

L	T	P	C
3	0	0	3

AIM

1. To provide an in-depth knowledge in problem solving techniques and data structures.

OBJECTIVES

1. To learn the systematic way of solving problems.
2. To understand the different methods of organizing large amounts of data.
3. To learn programs in C++.
4. To efficiently implement the different data structures.
5. To efficiently implement solutions for specific problems.

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 9

Introduction, Tokens, Expressions, contour Structures, Functions in 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 and polymorphism, File Handling Templates, Exception handling, Manipulating strings.

UNIT III DATA STRUCTURES & ALGORITHMS 9

Algorithm, Analysis, Lists, Stacks and queues, Priority queues, Binary Heap-Application, Heaps, hashing, hash tables without linked lists.

UNIT IV NONLINEAR DATA STRUCTURES 9

Trees-Binary trees, search tree ADT, AVL trees, Graph Algorithms, Topological sort, shortest path algorithm network flow problems, minimum spanning tree , Introduction to NP - completeness.

UNIT V SORTING AND SEARCHING 9

Sorting - Insertion sort, Shell sort, Heap sort, Merge sort, Quick sort, Indirect sorting, Bucket sort, Introduction to Algorithm Design Techniques -Greedy algorithm (Minimum Spanning Tree), Divide and Conquer (Merge Sort), Dynamic Programming (All pairs Shortest Path Problem).

TOTAL: 45

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 3rd Edition, Pearson Education Asia, 2007.
2. E.Balagurusamy, "Object Oriented Programming with C++", McGraw Hill Company Ltd., 2007.

REFERENCES

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in Java", 3rd Edition, Pearson Education Asia, 2011.
2. Bjarne Stroustrup , "Programming: Principles and Practice Using C++", Addison Wesley, 2008.
3. Michael T. Goodrich and Roberto Tamassia, "Data Structures and Algorithms in Java", Wiley Student Edition, 2010.

BEC301 DIGITAL ELECTRONICS

L	T	P	C
3	1	0	4

AIM

- To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

OBJECTIVES

- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions.
- To introduce the methods for simplifying Boolean expressions.
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits.
- To introduce the concept of memories and programmable logic devices.
- To illustrate the concept of synchronous and asynchronous sequential circuits

UNIT I MINIMIZATION TECHNIQUES AND LOGIC GATES 9

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.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR, Implementations of Logic Functions using gates, NAND-NOR implementations, Multi level gate implementations, Multi output gate implementations. TTL and CMOS Logic and their characteristics, Tristate gates.

UNIT II COMBINATIONAL CIRCUITS 9

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 9

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, serial adder/subtractor, Asynchronous Ripple or serial counter, Asynchronous Up/Down counter, Synchronous counters, Synchronous Up/Down counters, Programmable counters, 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 MEMORY DEVICES 9

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

UNITV SYNCHRONOUS AND AYNCHRONOUS SEQUENTIAL CIRCUITS 9

Synchronous Sequential Circuits: General Model, Classification, Design, Use of Algorithmic State Machine, Analysis of Synchronous Sequential Circuits

Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits, incompletely specified State Machines, Problems in Asynchronous Circuits, Design of Hazard Free Switching circuits. Design of Combinational and Sequential circuits using VERILOG.

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS

1. M. Morris Mano, "Digital Design", 3rd Edition, Prentice Hall of India Pvt. Ltd., Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", 3rd Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 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.

BEC302 SIGNALS AND SYSTEMS

L	T	P	C
3	1	0	4

AIM

- To study and analyze the characteristics of continuous, discrete signals and systems.

OBJECTIVES

- To study the properties and representation of discrete and continuous signals.
- To study the sampling process and analysis of discrete systems using z transforms.
- To study the analysis and synthesis of discrete time systems.

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9

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

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UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 9

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

UNIT III LINEAR TIME INVARIANT -CONTINUOUS TIME SYSTEMS 9

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

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 9

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

UNIT V LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS 9

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

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS:

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

REFERENCES:

- Hwei P. Hsu, “Signals and Systems- Schaum's Outline Series”, Tata McGraw Hill, (Indian Reprint), 2nd Edition, 2010.
- John Alan Stuller, “An Introduction to Signals and Systems”, Cengage Learning India Pvt. Ltd., 2008.
- Ramesh Babu.P, “Signals and Systems”, Scitech Publications, 2008.
- B.P Lathi, “Linear Systems and Signals”, 2nd Edition Oxford University, 2008.

BEC303 ELECTRONIC CIRCUITS – I

L	T	P	C
3	1	0	4

AIM

- The aim of this course is to familiarize the student with the analysis and design of basic Transistor, Amplifier circuits and power supplies.

OBJECTIVES

On completion of this course the student will understand

- The methods of biasing transistors.
- Design of simple amplifier circuits.
- Midband analysis of amplifier circuits using small - signal equivalent circuits to determine gain input impedance and output impedance.
- Method of calculating cutoff frequencies and to determine bandwidth.
- Design of power amplifiers.
- Analysis and design of power supplies.

UNITI TRANSISTOR BIASING AND STABILITY ANALYSIS 9

BJT, Need for biasing, Stability factor, fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to h_{FE} variation within manufacturer's tolerance, Stability factors, Different types of biasing circuits, Method of stabilizing the Q point, Advantage of Self bias (voltage divider bias) over other types of biasing, Bias compensation, Diode, Thermistor and Sensistor compensations, Biasing the FET and MOSFET.

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 9

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

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS 9

General shape of frequency response of amplifiers, Definition of cutoff frequencies and bandwidth, Low frequency analysis of amplifiers to obtain lower cutoff frequency Hybrid -∏ 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 IV LARGE SIGNAL AMPLIFIERS 9

Classification of amplifiers, Class A large signal amplifiers, and second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier, efficiency of Class A amplifiers. 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 V RECTIFIERS AND POWER SUPPLIES 9

Classification of power supplies, Rectifiers, Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for V_{dc} and ripple voltage with C, L, LC and CLC filters, Voltage multipliers, Voltage regulators, Zener diode regulator, principles of obtaining a regulated power supply, regulator with

current limiting, Over voltage protection, Switched mode power supply (SMPS), Power control using SCR.

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS

1. Millman J and Halkias .C, "Integrated Electronics", TMH, 2007.
2. S.Salivahanan, N. Suresh Kumar and A. Vallavaraj, "Electronic Devices and Circuits", 2nd Edition, TMH, 2007.

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. J. Millman, C.C.Halkias, "Electronic Devices Circuits", 2nd Edition, 1998, TMH.
4. David A. Bell , "Fundamentals of Electronic Devices and Circuits", Oxford University Press, 2009.

BEE306 ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

AIM

- To expose the students to the concepts of various types of electrical machines and transmission and distribution of electrical power.

OBJECTIVES

To impart knowledge on

- Constructional details, principle of operation, performance, starters and testing of D.C. machines.
- Constructional details, principle of operation and performance of transformers.
- Constructional details, principle of operation and performance of induction motors.
- Constructional details and principle of operation of alternators and special machines.
- Power System transmission and distribution.

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

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, "Basic Electrical Engineering", Tata McGraw Hill Publishing Company Ltd, Second Edition, 2007 (Reprint).
2. C.L. Wadhwa, "Electrical Power Systems", New Age International, Fourth Edition, 2007.

REFERENCES

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

BEC331 DIGITAL ELECTRONICS LABORATORY

L	T	P	C
0	0	3	2

- Design and implementation of Adder and Subtractor using logic gates.
- Design and implementation of code converters using logic gates
  - BCD to excess-3 code and vice versa
  - Binary to gray and vice-versa.
- Design and implementation of 4 bit binary Adder/ subtractor and BCD adder using IC 7483.
- Design and implementation of 2 bit Magnitude Comparator using logic gates and 8 bit Magnitude Comparator using IC 7485.
- Design and implementation of 16 bit odd/even parity checker generator using IC74180.
- Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154.
- Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147.
- Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters.
- Design and implementation of 3-bit synchronous up/down counter
- Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.
- Design of experiments 1, 6, 8 and 10 using Verilog Hardware Description Language

TOTAL: 45

BEC332 ELECTRONIC CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

E.No.1 Fixed Bias amplifier circuit using BJT
- i. Waveforms at input and output without bias.
- ii. Determination of bias resistance to locate Q-point at center of load line.
- iii. Plot the frequency response & Determination of Gain Bandwidth Product

E.No.2 Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias).
- i. Measurement input and output impedances
- ii. Plot the frequency response & Determination of Gain Bandwidth Product

E.No.3 Design and construct BJT Common Collector Amplifier using voltage divider bias (self-bias).
- i. Measurement of input and output impedances.
- ii. Plot the frequency response & Determination of Gain Bandwidth Product

E.No.4 Design and construct BJT Common Base Amplifier using voltage divider bias (self-bias).
- i. Measurement of input and output impedances .
- ii. Plot the frequency response & Determination of Gain Bandwidth Product

E.No.5 Darlington Amplifier using BJT
- i. Measurement of input and output impedances.
- ii. Comparison with calculated values.
- iii. Plot the frequency response & Determination of Gain Bandwidth Product

E.No.6 Source follower with Bootstrapped gate resistance
- i. Measurement of gain, input resistance and output resistance with and without Bootstrapping.
- ii. Comparison with calculated values.

E.No.7 Differential amplifier using BJT
- i. Measurement of CMRR.

E.No.8 Class A Power Amplifier
- i. Observation of output waveform.
- ii. Measurement of maximum power output.
- iii. Determination of efficiency.
- iv. Comparison with calculated values.

E.No.9 Class B Complementary symmetry power amplifier
- i. Observation of the output waveform with crossover Distortion.
- ii. Modification of the circuit to avoid crossover distortion.
- iii. Measurement of maximum power output.
- iv. Determination of efficiency.
- v. Comparison with calculated values.

E.No.10 Half wave rectifier without and with filter.
- i. Measurement of DC and ripple (ac) voltages at the output under different loading conditions but without Filter.
- ii. Measurement of DC and ripple (ac) voltages at the output under different loading conditions but with Filter
- iii. Calculation of ripple factor under different loading conditions with and without filter.
- iv. Comment on calculated ripple factor values.

E.No.11 Full wave rectifier without and with filter

i. Measurement of DC and ripple (ac) voltages at the output under different loading conditions but without Filter.
ii. Measurement of DC and ripple (ac) voltages at the output under different loading conditions but with Filter
iii. Calculation of ripple factor under different loading conditions with and without filter. Comment on calculated ripple factor values.

E.No.12 Power Supply circuit - Full wave rectifier with simple capacitor filter and Zener Voltage Regulator

i. Measurement of DC output voltage under different loading conditions.
ii. Plot the Load regulation characteristics and calculate the Load regulation.

TOTAL: 45

BCS333 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LABORATORY

L	T	P	C
0	0	3	2

1. Basic Programs for C++ Concepts
2. Array implementation of List Abstract Data Type (ADT)
3. Linked list implementation of List ADT
4. Cursor implementation of List ADT
5. Stack ADT - Array and linked list implementations

The next two exercises are to be done by implementing the following source files
   (a) Program source files for Stack Application 1
   (b) Array implementation of Stack ADT
   (c) Linked list implementation of Stack ADT
   (d) Program source files for Stack Application 2

An appropriate header file for the Stack ADT should be #included in (a) - (d)

6. Implement any Stack Application using array implementation of Stack ADT (by implementing files (a) and (b) given above) and then using linked list implementation of Stack ADT (by using files (a) and implementing file (c))
7. Queue ADT – Array and linked list implementations
8. Search Tree ADT - Binary Search Tree
9. Heap Sort
10. Quick Sort

TOTAL: 45

BEG331 COMMUNICATION SKILLS AND TECHNICAL SEMINAR – I **L T P C**
(Common to all branches) **0 0 3 2**

(To be conducted as a Practical Paper by the Depts of English for 3 hrs per week)

OBJECTIVES:

1. To improve the learners' oral fluency in English
2. To help the learners acquire the readiness to speak in English
3. To develop the sub-skills required for paper presentations and group discussions
4. To help the learners improve their vocabulary related to specific fields of technology
5. To facilitate the development of the learners' proficiency in meaningful interaction
6. To provide them linguistic support for managing vital sub-functions of Communication

COURSE CONTENT:

A) Phonetic practice (7 hrs)

1. English phonemes with special emphasis on the diphthongs
2. Stress patterns for words that end with specific suffixes.

('ion' , 'ic' 'ical' 'ious','ate' , 'ise/-ize', 'fy', 'logy', 'ity')

B) Speech practice (8 hrs)

1. Speaking on the themes by developing the hints provided.

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. Climate change
10. Ecological threats
11. Water resources
12. Nuclear technology
13. Scientific farming
14. Thermal power plants
15. Natural calamities
16. Robotics
17. Artificial intelligence
18. Role of Fibre Optics
19. Exploration of Mars
20. Gas turbines

C) Group Quiz on technical aspects related to the themes (4hrs)

D) Language Functions (8 hrs)

- comparing and contrast
- reporting the conversation of others.
- talking about future plans and intentions
- giving reasons
- expressing preferences
- quantifying
- expressing certainty and uncertainty
- expressing opinions and impressions
- making suggestions

- expressing assumptions
- evaluating options
- hypothesing/deducing
- defending a point of view

E) Seminar presentation on the themes allotted (18 hrs)

PROCEDURE:

A) Phonetic practice

All the speech sounds should be taught .The learners should be given drills in the pronunciation of at least 30 words for each sound. While practicing stress patterns, they should be encouraged to identify as many words as possible for each suffix endings.

B) Speech practice

Every student should be allowed to choose one theme to specialize in. (However not more than 4 students in a section can choose the same theme).The teacher has to prepare at least 4 hints development tasks on each theme and should provide chance to each learner to speak on those hints related to his/ her theme (5 minutes).The hints may be supplied to the students in advance. When a student speaks, the class should be encouraged to ask questions as well as note down the words related to the different fields.

C) Group Quiz on technical phrases related to the themes.

The class should be divided into groups that specialize on a particular theme. Each group should conduct a quiz (question & answer session) which will be answered by the other groups.

D) 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.

E) Seminar presentation on the themes allotted

Each student should collect materials from books, journals and newspapers for his/her theme and prepare a short seminar paper. The presentation should be for 10 minutes. It should be followed 'open house' during which others should come forward to question, clarify, supplement or evaluate.

RECORD LAY OUT:

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

2. First page containing learner details and the topic of specialization.
3. Twenty words for each phoneme
4. Twenty words with stress marks for each suffix ending
5. Vocabulary list (technical words and compound words) related to the 20 themes identified for this semester.
6. Three news paper items, two journal items and three internet sources related to the special theme selected by the student.(To be pasted on the pages)
7. The Quiz questions of the group with expected answers.
8. The seminar paper presented by the learner with details about the open house.
9. Notes of observation. (Details about any three seminar paper presentations by others)
10. The record should be duly signed by the course teacher and submitted to the External Examiner for verification during the semester practicals.

P = 45 Total = 45

BEC401 ELECTRONIC CIRCUITS – II

L	T	P	C
3	1	0	4

AIM

1. The aim of this course is to familiarize the student with the analysis and design of feedback amplifiers, oscillators, tuned amplifiers, wave shaping circuits, multivibrators and blocking oscillators.

OBJECTIVES

On completion of this course the student will understand

2. The advantages and method of analysis of feedback amplifiers.
3. Analysis and design of LC and RC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time base generators.

UNIT I FEEDBACK AMPLIERS 9

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, Nyquist criterion for stability of feedback amplifiers.

UNIT II OSCILLATORS 9

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 III TUNED AMPLIFIERS 9

Coil losses, unloaded and loaded Q of tank circuits, 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 IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

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

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS 9

UJT Sawtooth waveform generator, Pulse transformers, equivalent circuit, response, applications, Blocking oscillator, Free running blocking oscillator, Astable Blocking Oscillators with base timing, Push-pull Astable blocking oscillator with emitter timing, Frequency control using core saturation, Triggered blocking oscillator, Monostable blocking oscillator with base timing, Monostable blocking oscillator with emitter timing,Time base circuits, Voltage-Time base circuit, Current-Time base circuit, Linearization through adjustment of driving waveform.

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS

1. Millman and Halkias. C., “Integrated Electronics”, Tata McGraw-Hill 1991, (I, II).
2. Schilling and Belove, “Electronic Circuits”, TMH, 3rd Edition, 2002 (Unit - III)
3. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, “Electronic Devices and Circuits”, 2nd Edition, TMH, 2007.

REFERENCES

- Chenming Hu , "Modern Semiconductor Devices for Integrated Circuits", Prentice Hall, 2009.
- Jimmie J.Cathey, "Schaum's Outline of Electronic Devices and Circuits", McGraw-Hill, 2nd Edition, 2002.
- David A. Bell, "Solid State Pulse Circuits", Prentice Hall of India, 1992.
- Sedra / Smith, "Micro Electronic Circuits", Oxford University Press, 2004.
- Millman J. and Taub H., "Pulse Digital and Switching waveform", McGraw-Hill, 1992.

BEC402 COMMUNICATION THEORY

L	T	P	C
3	1	0	4

AIM

1. To study the various analog communication fundamentals viz., Amplitude modulation and demodulation, angle modulation and demodulation. To study Noise performance of various receivers and information theory with source coding theorem.

OBJECTIVES

2. To provide various Amplitude modulation and demodulation systems.
3. To provide various Angle modulation and demodulation systems.
4. To provide some depth analysis in noise performance of various receiver.
5. To study some basic information theory with some channel coding theorem.

UNIT I AMPLITUDE MODULATION SYSTEMS 10

Review of spectral characteristics of Periodic and Non-periodic signals; Generation and Demodulation of AM, DSBSC, SSB and VSB Signals; Comparison of Amplitude Modulation Systems; Frequency Translation; FDM; Non - Linear Distortion.

UNIT II ANGLE MODULATION SYSTEMS 8

Phase and Frequency Modulation; Single tone, Narrow Band and Wideband FM, Transmission Bandwidth, Generation and Demodulation of FM Signal.

UNIT III NOISE THEORY 8

Review of Probability, Random Variables and Random Process; Gaussian Process, Noise - Shot noise, Thermal noise and white noise; Narrow band noise, Noise temperature; Noise Figure.

UNIT IV PERFORMANCE OF CW MODULATION SYSTEMS 10

Super heterodyne Radio receiver and its characteristic, SNR, Noise in DSBSC systems using coherent detection, Noise in AM system using envelope detection and its FM system, FM threshold effect, Pre-emphasis and De-emphasis in FM, Comparison of performances.

UNIT V INFORMATION THEORY 9

Discrete Messages and Information Content, Concept of Amount of Information, Average information, Entropy, Information rate, Source coding to increase average information per bit, Shannon-Fanon coding, Huffman coding, Lempel-Ziv (LZ) coding, Shannon's Theorem, Channel Capacity, Bandwidth- S/N trade-off, Mutual information and channel capacity, rate distortion theory, Lossy Source coding.

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS

1. Dennis Roddy & John Coolen , "Electronic Communication", 4th Edition., Prentice Hall of India, 1995.
2. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", 3rd Edition, Tata McGraw Hill, 2008.

REFERENCES

1. Simon Haykin , "Communication Systems", Wiley Publications, 5th Edition, 2009.
2. B.P.Lathi and Zhi Ding, "Modern Digital and Analog Communication Systems", Oxford University Press, 2009.
3. A. Bruce Carlson, "Communication Systems", McGraw-Hill, 2009.

BEC403 ELECTROMAGNETIC FIELDS

L	T	P	C
3	1	0	4

AIM

1. To familiarize the student to the concepts, calculations and pertaining to electric, magnetic and electromagnetic fields so that an in depth understanding of antennas, electronic devices, and waveguides are possible.

OBJECTIVES

1. To analyze field potentials due to static changes.
2. To evaluate static magnetic fields.
3. To understand how materials affect electric and magnetic fields.
4. To understand the relation between the fields under time varying situations.
5. To understand principles of propagation of uniform plane waves.

UNIT I STATIC ELECTRIC FIELDS 9

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 infinite uniformly charged line, Potential due to electrical dipole, Electric Flux Density, Gauss Law, Proof of Gauss Law, Applications.

UNIT II STATIC MAGNETIC FIELD 9

The Biot-Savart Law in vector form , Magnetic Field intensity due to a finite and infinite wire carrying a current I, Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I, Ampere's circuital law and simple applications. Magnetic flux density, The Lorentz force equation for a moving charge and applications, Force on a wire carrying a current I placed in a magnetic field, Torque on a loop carrying a current I, Magnetic moment, Magnetic Vector Potential.

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS 9

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, continuity equation for current. Definition of Inductance, Inductance of loops and solenoids,Definition of mutual inductance, simple examples. Energy density in magnetic fields, Nature of magnetic materials, magnetization and permeability, magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

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 in integral form, Equation expressed in point form. Maxwell's four equations in integral form and differential form. Poynting Vector and the flow of power, Power flow in a co-axial cable, Instantaneous Average and Complex Poynting Vector.

UNIT V ELECTRO MAGNETIC WAVES 9

Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect, Linear, Elliptical and circular polarization, Reflection of Plane Wave from a conductor, normal incidence, Reflection of Plane Waves by a perfect dielectric, normal and oblique incidence, Dependence on Polarization, Brewster angle.

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS

- W H.Hayt & J A Buck, "Engineering Electromagnetics", TATA McGraw-Hill, 7th Edition, 2007 (Unit I, II, III).
- E.C. Jordan & K.G. Balmain, "Electromagnetic Waves and Radiating Systems", Pearson Education, 4th Edition (Unit IV, V)

REFERENCES

- Matthew N. O. Sadiku, "Elements of Electromagnetics", Oxford University Press, USA, 3rd Edition, 2010.
- Jian-Ming Jin, "Theory and Computation of Electromagnetic Fields", Wiley-IEEE Press, 2010.
- James C. Lin, "Electromagnetic Fields in Biological Systems", CRC Press Inc, 2011.
- David k. Cheng, "Field and Wave Electromagnetics", Pearson Education, 2009.

BMA403 PROBABILITY AND RANDOM PROCESSES L T P C
3 1 0 4

AIM

1. This course aims at providing the necessary basic concepts in random processes. Knowledge of fundamentals and applications of random phenomena will greatly help in the understanding of topics such as signals & systems, pattern recognition, voice and image processing and filtering theory.

OBJECTIVES

At the end of the course, the students would

1. Have a fundamental knowledge of the basic probability concepts.
2. Have a well-founded knowledge of standard distributions which can describe real life phenomena.
3. Acquire skills in handling situations involving more than one random variable and functions of random variables.
4. Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
5. Be able to analyze the response of random inputs to linear time invariant systems.

UNIT I RANDOM VARIABLES (9L+3T)

Discrete and continuous random variables – Moments - Moment generating functions and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and normal distributions – Function of random variable.

UNIT II TWO DIMENSIONAL RANDOM VARIABLE (9L+3T)

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Regression – Transformation of random variables - Central limit theorem (for 2-D random variables)

UNIT III CLASSIFICATION OF RANDOM PROCESSES (9L+3T)

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 (9L+3T)

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 (9L+3T)

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

Lectures: 45 Tutorials: 15 Total: 60 Periods

TEXT BOOKS

1. Oliver C. Ibe, “Fundamentals of Applied probability and Random processes”, Elsevier, First Indian Reprint, 2007 (For units 1 and 2).
2. Peebles Jr. P.Z., “Probability Random Variables and Random Signal Principles”, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002 (For units 3, 4 and 5).

REFERENCES

1. Miller,S.L and Childers, S.L, “Probability and Random Processes with applications to Signal Processing and Communications”, Elsevier Inc., 1st Indian Reprint 2007.
2. H. Stark and J.W. Woods, “Probability and Random Processes with Applications to Signal Processing”, Pearson Education (Asia), 3rd Edition, 2002.

3. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw-Hill edition, New Delhi, 2004.
4. Leon-Garcia.A, "Probability and Random Processes for Electrical Engineering", Pearson Education Asia, 2nd Edition, 2007.
5. Yates and D.J. Goodman, "Probability and Stochastic Processes", John Wiley and Sons, 2nd Edition, 2005.

BEC404 LINEAR INTEGRATED CIRCUITS

L	T	P	C
3	0	0	3

AIM:

1. To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

OBJECTIVES

1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non-linear applications of operational amplifiers.
3. To introduce the theory and applications of analog multipliers and PLL.
4. To teach the theory of ADC and DAC.
5. To introduce the concepts of waveform generation and introduce some special function 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 and internal circuit diagrams of IC 741, 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.

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 , A/D Converter using Voltage-to-Time Conversion , Over-sampling A/D Converters.

UNITV WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs 9

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, IC L8038 function generator, Timer IC 555, IC Voltage regulators, Three terminal fixed and adjustable voltage regulators, IC 723 general purpose regulator, Monolithic switching regulator, Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto - couplers and fibre optic IC.

TOTAL: 45

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 Pvt. Ltd., 2000.

REFERENCES:

1. Johan H. Huijsing , "Operational Amplifiers: Theory and Design", Kluwer Academic Publishers, 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, 2008.

BEC405 CONTROL SYSTEMS ANALYSIS AND DESIGN

L	T	P	C
3	1	0	4

OBJECTIVES

1. To understand the open loop and closed loop (feedback) systems.
2. To understand time domain and frequency domain analysis of control systems required for stability analysis.
3. To understand the compensation technique that can be used to stabilize control systems

UNIT I CONTROL SYSTEM MODELING 9

Basic Elements of Control System, Open loop and Closed loop systems, Differential equation, Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems, Block diagram reduction Techniques, Signal flow graph

UNIT II TIME RESPONSE ANALYSIS 9

Time response analysis, First Order Systems, Impulse and Step Response analysis of second order systems, Steady state errors, P, PI, PD and PID Compensation, Analysis using MATLAB

UNITIII FREQUENCY RESPONSE ANALYSIS 9

Frequency Response, Bode Plot, Polar Plot, Nyquist Plot, Frequency Domain specifications from the plots, Constant M and N Circles, Nichol's Chart, Use of Nichol's Chart in Control System Analysis. Series, Parallel, series-parallel Compensators, Lead, Lag, and Lead Lag Compensators, Analysis using MATLAB.

UNIT IV STABILITY ANALYSIS 9

Stability, Routh-Hurwitz Criterion, Root Locus Technique- Construction of Root Locus, Stability, Dominant Poles, Application of Root Locus Diagram , Nyquist Stability Criterion, Relative Stability, Analysis using MATLAB

UNITV STATE VARIABLE ANALYSIS & DIGITAL CONTROL SYSTEMS 9

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. Sampled Data control systems, Sampling Theorem, Sample & Hold, Open loop & Closed loop sampled data systems.

Lectures: 45 Tutorials: 15 Total: 60

TEXTBOOK

1. J.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.

BEC431 ELECTRONICS CIRCUITS AND SIMULATION LABORATORY

L	T	P	C
0	0	3	2

Design of following circuits

1. Series and Shunt feedback amplifiers: Frequency response, Input and output impedance calculation
2. RC Phase shift oscillator, Wien Bridge Oscillator
3. Hartley Oscillator, Colpitts Oscillator
4. Tuned Class C Amplifier
5. Integrators, Differentiators, Clippers and Clampers
6. Astable, Monostable and Bistable multivibrators

SIMULATION USING PSPICE:

- Differential amplifier
- Active filters : Butterworth 2^{nd} order LPF, HPF (Magnitude & Phase Response)
- Astable, Monostable and Bistable multivibrator - Transistor bias
- D/A and A/D converters (Successive approximation)
- Analog multiplier
- CMOS Inverter, NAND and NOR

TOTAL: 45

BEC432 LINEAR INTEGRATED CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

Design and testing of

1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier
4. Active lowpass, Highpass and bandpass filters.
5. Astable & Monostable multivibrators and Schmitt Trigger using op-amp.
6. Phase shift and Wien bridge oscillators using op-amp.
7. Astable and monostable multivibrators using NE 555 Timer.
8. PLL characteristics and its use as Frequency Multiplier.
9. DC power supply using LM317 and LM723.
10. Study of SMPS.
11. Simulation of Experiments 3, 4, 5, 6 and 7 using PSpice netlists.

Note: Op-Amps uA741, LM 301, LM311, LM 324 & AD 633 may be used

TOTAL: 45

BEE434 ELECTRICAL ENGINEERING AND CONTROL SYSTEM LABORATORY

L T P C
0 0 3 2

AIM

To expose the students to the basic operations of electrical machines and help them to develop experimental skills.

1. To study the concepts, performance characteristics, time and frequency response of linear systems.
2. To study the effects of controllers.

EXPERIMENTS

a. Open circuit and load characteristics of separately excited and self excited D.C. generator.
b. Load test on D.C. shunt motor.
c. Swinburne's test and speed control of D.C. shunt motor.
d. Load test on single phase transformer and open circuit and short circuit test on single phase transformer
e. Regulation of three phase alternator by EMF and MMF methods.
f. Load test on three phase induction motor.
g. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
h. Study of D.C. motor and induction motor starters.
i. Digital simulation of linear systems.
j. Stability Analysis of Linear system using Matlab.
k. Study the effect of P, PI, PID controllers using Matlab.
l. Design of Lead and Lag compensator.
m. Transfer Function of separately excited D.C.Generator.
n. Transfer Function of armature and Field Controller D.C.Motor.

TOTAL: 45

BEG431 COMMUNICATION SKILLS AND TECHNICAL SEMINAR – II L T P C
(Common to all branches) **0 0 3 2**

(To be conducted as a Practical Paper by the Depts of English for 3 hrs per week)

OBJECTIVES:

- To improve the learners' oral fluency in English
- To help the learners acquire the readiness to speak in English
- To develop the sub-skills required for paper presentations and group discussions
- To help the learners improve their vocabulary related to specific fields of technology
- To facilitate the development of the learners' proficiency in meaningful interaction
- To provide them linguistic support for managing vital sub-functions of communication.

COURSE CONTENT:

A) Phonetic practice (7 hrs)

All the English phonemes with special emphasis on the following

1. /ae/ and /ei/
2. /e/ and /i/
3. First syllable and second syllable stress
4. Three different ways of pronouncing 'ed' past tense endings eg. *'played', 'walked', 'wanted'*
5. Correct pronunciation of commonly used words (A list of 1000 words will be suggested by the university)
6. Silent letters

B) Speech practice (8 hrs)

Speaking on the themes by developing the hints provided.
The themes are:

1. Indian space missions
2. Converting agricultural wastes for useful purposes
3. Developments in transportation
4. Technology and agriculture
5. Impact of global warming
6. Desalination of water
7. Technology for national security
8. Industrial development and ecological issues
9. Applications of nano technology
10. Hazards of e-waste

C) Preparation of power point frames on the given topic (2 hrs)

(Only pictures, graphs, equations should be given through power point and not the text of the presentation as such)

D) Language Functions (14 hrs)

- Reporting the conversation of others
- Using the third conditional
- Expressing agreement and disagreement
- Numerical expressions
- Describing manner and frequency
- Evaluating different standpoints
- Developing an argument
- Describing daily routines, events, and weather

D) Seminar presentation on the themes allotted using power point frames (14 hrs)

PROCEDURE:

A) Phonetic practice

The learners should be given drills in the pronunciation of at least 30 words for each sound. While practicing stress patterns, they should be encouraged to identify as many words as possible for each pattern.

B) Speech practice

Every student should be allowed to choose one theme to specialize in. (However not more than 7 students in a section can choose the same theme).The teacher has to prepare at least 4 hints development tasks on each theme and should provide chance to each learner to speak on those hints related to his/ her theme (5 minutes).The hints may be supplied to the students in advance. When a student speaks, the class should be encouraged to ask questions as well as note down the words related to the different fields.

C) 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.

D) Seminar presentation on the themes allotted

Each student should collect materials from books, journals and newspapers for his/her theme and prepare a short seminar paper. The presentation should be for 10 minutes using power point frames. It should be followed by an 'open house' during which others should come forward to question, clarify, supplement or evaluate.

RECORD LAY OUT:

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

1. First page containing learner details and the topic of specialization.
2. Twenty words for each phoneme /ae/, /ei/, /i/ and /e/
3. Fifty words with first syllable stress and fifty for second syllable stress (The learner will be required to pronounce some of these words during the practical exam)
4. Vocabulary list (technical words and compound words) related to the 10 themes identified for this semester.
5. Three newspaper items, two journal items and three internet sources related to the special theme selected by the student.(To be pasted on the pages)
6. The seminar paper presented by the learner with a soft copy of the power point frames.
7. Notes of observation. (Details about any two seminar paper presentations by others)
8. The record should be duly signed by the course teacher and submitted to the External Examiner for verification during the semester practicals.

P = 45 Total = 45

BEC501 DIGITAL COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES

- To study signal space representation of signals and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- To understand base band and band pass signal transmission and reception techniques.
- To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.

UNIT I DIGITAL COMMUNICATION SYSTEM 9

Digital Communication Systems – Functional description, Channel classification, Performance Measure; Geometric representation of Signals, Gram Schmidt Orthogonalization Procedure, Bandwidth , Mathematical Models of Communication Channel, Conversion of the Continuous AWGN channel into a vector channel.

UNIT II BASEBAND FORMATTING TECHNIQUES 9

Sampling – sampling theorem, Aliasing, Impulse sampling, Natural Sampling, Sampler Implementation; 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, Subband Encoding, Linear Predictive coding.

UNIT III CHANNEL CODING TECHNIQUES AND LINE CODES 9

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 9

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

UNIT V BANDPASS SIGNAL TRANSMISSION AND RECEPTION 9

Memory less modulation methods - Representation and Spectral characteristics, Binary ASK, Binary PSK, Binary FSK,QAM, QPSK; Band pass receiving filter, Error performance – Coherent and Non-coherent detection systems.

TOTAL: 45 PERIODS

TEXT BOOKS

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

REFERENCES

1. Simon Haykin, “Digital Communications”, John Wiley, 5th Edition, 2006.
2. John.G. 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.

BEC502 DSP FOR COMMUNICATION ENGINEERING

L	T	P	C
3	1	0	4

OBJECTIVES

- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the applications of digital signal processing.

UNIT I DISCRETE FOURIER TRANSFORM 9

DTFT and its properties, DFT and its properties, Relation between DTFT and DFT, FFT 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 9

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 9

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

UNIT IV FINITE WORD LENGTH EFFECTS 9

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 DIGITAL SIGNAL PROCESSORS 9

Introduction – Evolution of DSP Processors-TMS320C50-Architecture – Instruction set– Addressing modes –simple programming

TUTORIAL: 15 PERIODS TOTAL: 60 PERIODS

TEXT BOOKS

1. John G Proakis and Manolakis, “Digital Signal Processing Principles, Algorithms and Applications”, Pearson Education, 4th Edition, 2007.
2. B. Venkataramani, M. Bhaskar, “Digital Signal Processors, Architecture, Programming and Applications”, Tata McGraw Hill, New Delhi, 2008(Reprint).

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.

BEC503 MICROPROCESSORS AND MICROCONTROLLER

L	T	P	C
3	0	0	3

OBJECTIVES

- To introduce the architecture and programming of 8085 microprocessor.
- To introduce the interfacing of peripheral devices with 8085 microprocessor.
- To introduce the architecture, programming and interfacing of 8051 micro controller.

UNIT I INTRODUCTION **9**

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 **9**

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.

UNIT III 8051 MICROCONTROLLER **9**

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

UNIT IV 8051 PROGRAMMING **9**

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

UNIT V SYSTEM DESIGN USING 8051 **9**

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

TOTAL: 45 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.

BEC504 TRANSMISSION LINES AND WAVEGUIDES

L	T	P	C
3	0	0	3

OBJECTIVES

- To become familiar with propagation of signals through lines
- To Understand signal propagation at Radio frequencies
- To Understand radio propagation in guided systems
- To become familiar with resonators

UNIT I LUMPED FILTERS 9

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 9

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 9

Parameters of open wire line and Coaxial cable at RF - Line constants for dissipation - voltages and currents on the dissipationless 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 9

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 9

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

TOTAL: 45 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.

BEI505 ELECTRONIC INSTRUMENTATION AND MEASUREMENTS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To study the principles and concepts of electronic measurements.
- To acquire the knowledge about signal generators and signal analyzers in measurements
- To understand the relevance of digital instruments in measurements.
- To learn the needs for data acquisition systems and measurement techniques in optical domain.

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.

UNIT II BASIC ELECTRONIC MEASUREMENTS 9

Electronic multimeters - Cathode ray oscilloscope - Block schematic - Applications-Special oscilloscopes - Q meters - Vector meters - RF voltage and power measurements.

UNIT III SIGNAL GENERATORS AND ANALYZERS 9

Function generators - RF Signal generators - Sweep generators - Frequency synthesizer -Wave analyzer - Harmonic distortion analyzer - Spectrum analyzer.

UNIT IV DIGITAL INSTRUMENTS 9

Digital voltmeter – Multimeters - Frequency counters - Measurement of frequency and time interval - Extension of frequency range - Measurement errors - Recording and Display devices

UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS 9

Elements of a digital data acquisition system-Interfacing of transducers Multiplexing computer controlled instrumentation- IEEE 488 bus-Localization of cable faults-Fiber optic measurements for power and system loss-Optical time domains reflectometer.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Albert D.Helfrick and William D.Cooper “Modern Electronic Instrumentation and Measurement Techniques”, Prentice Hall of India, 2003.
2. J.B.Gupta, “A course in Electronics and Electrical Measurements and Instrumentation”, S.K.Kataria & Sons, New Delhi, 2007.

REFERENCES

1. Joseph J.Carr, “Elements of Electronics Instrumentation and Measurement”, Pearson Education, 2003.
2. Alan. S. Morris, “Principles of Measurements and Instrumentation”, 2nd Edition, Prentice Hall of India, 2003.
3. Ernest O. Doebelin, “Measurement Systems - Application and Design”, Tata McGraw Hill 2004.

BEC531 COMMUNICATION ENGINEERING LABORATORY

L	T	P	C
0	0	3	2

List of Experiments

1. Study of AM modulator & determination of percentage of modulation
2. Study of FM modulator & to determine the modulation index and bandwidth for various values of amplitude and frequency signals.
3. Study and verification of Frequency Division Multiplexing and Time Division Multiplexing.
4. Study of Pulse Modulation- PAM/PWM/PPM using discrete components / simulation using LABVIEW.
5. Study of Digital Modulation schemes – ASK, PSK, QPSK, and FSK using discrete components /simulation using LABVIEW.
6. Study and simulation of Line codes and Error control coding techniques using LABVIEW.
7. Verification of Sampling Theorem and effects of aliasing using MATLAB.
8. Study and verification of Linear and Circular Convolution using MATLAB.
9. Designing of FIR Filters using MATLAB.
10. Designing of IIR Filters using MATLAB.
11. Calculation of FFT of a signal using MATLAB.
12. Study of Finite Word Length effects using MATLAB.

BEC532 PROCESSORS AND MICROCONTROLLER LABORATORY

L	T	P	C
0	0	3	2

List of Experiments

1. Study of various addressing modes using TMS320C50 processor.
2. Implementation of linear &circular convolution using TMS320C64XX/67XX processor.
3. Implementation of FIR Filter using TMS320C64XX/67XX processor.
4. Wave form generation using TMS320C64XX/67XX processor.
5. Calculation of FFT using TMS320C64XX/67XX processor.
6. Programs for arithmetic & logical operations using 8085 Microprocessor.
7. Programs for Sorting & Searching using 8085 Microprocessor.
8. Parallel communication between two kits using 8255 interfacing card.
9. Waveform generation using 8255 interfacing card.
10. Programs for arithmetic& logic operations using 8086 Microprocessor.
11. Interfacing ADC and DAC using 8051 Microcontroller.
12. Programming arithmetic, logical & Bit manipulations operations using 8051Microcontroller.
13. Serial communication between Microcontroller & PC using UART Interface.

BGE501 PROFESSIONAL ETHICS AND HUMAN VALUES

(Common to 5th Sem - EEE, EIE, CIVIL & IT 6th Sem - CSE & ECE)	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

OBJECTIVES:

- To create awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others

UNIT I HUMAN VALUES 10

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 issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

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 8

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 for ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE),India.

TOTAL: 45 PERIODS

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.

REFERENCES

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)
2. 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).
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

BEC601	COMPUTER ARCHITECTURE AND ORGANIZATION	L	T	P	C
		3	0	0	3

OBJECTIVES

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms and implementation of fixed-point and floating-point addition, subtraction, multiplication and division.
- To study in detail the different types of control and the concept of pipelining.
- To study the hierarchical memory system including cache memories and virtual memory.
- To study the different ways to communicate with I/O devices and standard I/O interfaces.

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 (PCI, SCSI and USB).

TOTAL: 45 PERIODS

TEXTBOOKS

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

REFERENCES

1. Morris Mano, "Computer System Architecture" (Low price edition), Prentice-Hall of India, 2005.
2. Parhami, "Computer Architecture", Oxford Press, 2006.
3. P.Pal Chaudhuri, "Computer organization and design", 2nd Edition, Prentice Hall of India, 2007.
4. G.Kane & J.Heinrich, "MIPS RISC Architecture", Englewood cliffs, New Jersey, Prentice Hall, 2nd Edition, 1992.

BEC602	COMPUTER COMMUNICATION NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the functions of different layers.
- To introduce IEEE standard employed in computer networking.
- To get familiarized with different protocols and network components.

UNIT I INTRODUCTION TO COMPUTER COMMUNICATION NETWORKS AND PHYSICAL LAYER 9

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 10

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 9

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 7

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 10

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

TOTAL: 45 PERIODS

TEXT BOOKS

1. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill, 5th Edition, 2012.
2. Andrew S. Tannenbaum, “Computer Networks”, Pearson Education, 5th Edition, 2010.

REFERENCES

1. Wayne Tomasi, “Introduction to Data Communication and Networking”, 1st Edition, Pearson Education, 2005.
2. James.F.Kurouse & W.Rouse, “Computer Networking: A Top down Approach featuring the internet”, 2nd Edition, Pearson Education, 2002.
3. C.Sivaram Murthy, B.S.Manoj, “Ad hoc Wireless Networks – Architecture and Protocols”, 1st Edition, Pearson Education, 2004.
4. William Stallings, “Data and Computer Communication”, 9th Edition, Pearson Education, 2010.

BEC603 ANTENNA AND WAVE PROPAGATION

L	T	P	C
3	0	0	3

OBJECTIVES

- To study radiation from a current element.
- To study antenna arrays
- To study aperture antennas
- To learn special antennas such as frequency independent and broad band antennas.
- To study radio wave propagation.

UNIT I PHYSICAL CONCEPT OF RADIATION 9

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

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

UNIT II THEORY OF ARRAY ANTENNA 9

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

UNIT III APERTURE ANTENNAS 9

Aperture Antennas: Magnetic Current and its fields, Uniqueness theorem, Field equivalence principle, Duality principle, Method of Images, Pattern properties, Slot antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat reflector, Corner Reflector, Common curved reflector shapes, Lens Antenna.

UNIT IV SPECIAL ANTENNAS AND ANTENNA MEASUREMENTS 9

Special Antennas: Long wire, V and Rhombic Antenna, Turnstile Antenna, Helical Antenna- Axial mode helix, Normal mode helix, Biconical Antenna, Spiral Antenna, Microstrip Patch Antennas, Base station antennas, Wireless antennas.

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

UNIT V RADIO WAVE PROPAGATION 9

Calculation of Great Circle Distance between any two points on earth, Ground Wave Propagation, Free-space Propagation, Ground Reflection, Surface waves, Diffraction, Wave propagation in complex Environments, Tropospheric Propagation, Tropospheric Scatter. Ionospheric propagation: Structure of ionosphere, Sky waves, skip distance, Virtual height, Critical frequency, MUF, Electrical properties of ionosphere, Effects of earth's magnetic fields, Faraday rotation, Whistlers.

TOTAL: 45 PERIODS

TEXTBOOKS

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, 2006.
4. Constantine A. Balanis, "Antenna Theory Analysis and Design", John Wiley, 2nd Edition, 2007.

BEC604	VLSI DESIGN	L	T	P	C
		3	1	0	4

OBJECTIVES

- To learn the CMOS process technology.
- To learn techniques of chip design using programmable devices.
- To learn the concepts of designing VLSI subsystems.
- To learn the concepts of modeling a digital system using Hardware Description Language.

UNIT I CMOS TECHNOLOGY 9

A brief History, MOS transistor, Ideal I-V characteristics, C-V characteristics, Non ideal I-V effects, DC transfer characteristics,- CMOS technologies, Layout design Rules, CMOS process enhancements, Technology related CAD issues, Manufacturing issues.

UNIT II CLASSIFICATION OF ICs AND CIRCUIT CHARACTERIZATION 9

SSI, MSI, LSI, VLSI definitions, ASIC classification, Full Custom ASICs, Standard Cell based ASICs, Gate Array based ASICs, Channelled, channelless and structured GA, 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 9

Circuit families, Low power logic design, comparison of circuit families, sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology, sequencing dynamic circuits.

UNIT IV CMOS TESTING 9

Need for testing, Testers, Text fixtures and test programs, Logic verification, Silicon debug principles, Manufacturing test, Design for testability, Built in Self test, JTAG Boundary scan.

UNIT V SPECIFICATION USING VERILOG HDL 9

Basic concepts, identifiers, gate primitives, gate delays, operators, timing controls, procedural assignments conditional statements, Data flow and RTL, structural gate level switch level modeling, Design hierarchies, Behavioral and RTL modeling, Test benches, 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.

TUTORIAL: 15 PERIODS LECTURE: 45 PERIODS TOTAL: 60 PERIODS

TEXT BOOKS

1. Weste and Harris, "CMOS VLSI DESIGN", 4th Edition, Addison-Wesley, 2010.
2. Uyemura J.P, "Introduction to VLSI circuits and systems", Wiley, 2002.
3. J.Bhasker, "Verilog HDL Primer", BS publication, 3rd Edition, 2005.

REFERENCES

1. D.A Pucknell & K.Eshraghian, "Basic VLSI Design", 3rd Edition, PHI, 2003.
2. Wayne Wolf, "Modern VLSI design", Pearson Education, 3rd Edition, 2007.
3. M.J.S.Smith, "Application specific integrated circuits", Pearson Education, 1997.

4. Ciletti, "Advanced Digital Design with the Verilog HDL", Prentice Hall of India 2nd Edition, 2010.

BEC631 COMPUTER COMMUNICATION NETWORKS LABORATORY

L	T	P	C
0	0	3	2

List of Experiments

1. PC to PC Communication / Parallel Communication using 8 bit parallel cable / Serial communication using RS 232C.
2. Analysis of logical link control layer protocols - Stop & wait, Sliding window.
3. Token Ring & Token Bus Protocols.
4. Ethernet LAN protocol / to create scenario and study the performance of CSMA/CD, CSMA/CA protocol ethereal simulation.
5. Switches/Routers.
6. Implementation of distance vector routing algorithm.
7. Implementation of Link state routing algorithm.
8. Implementation of Data encryption/decryption.
9. Cryptography (Network Security).
10. NS-2 based Simulation.

BEC632	VLSI DESIGN LABORATORY	L	T	P	C
		0	0	3	2

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. Synthesis, P&R and Post P&R simulation for all the blocks/codes developed in Expt. No. 1 and No. 2 given above. Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignment to be taught in this experiment.

4. Generation of configuration/fuse files for all the blocks/codes developed as part of Expt.1 and Expt. 2. FPGA devices must be configured and hardware tested for the blocks/codes developed as part of Expt. 1 and Expt. 2. The correctness of the inputs and outputs for each of the blocks must be demonstrated at least on oscilloscopes (logic analyzer preferred).

5. Schematic Entry and SPICE simulation of MOS differential amplifier. Determination of gain, bandwidth, output impedance and CMRR.

6. Layout of a simple CMOS inverter, parasitic extraction and simulation.

7. Design of a 10 bit digital controlled oscillator and carry look ahead adder using standard cell approach, simulation followed by study of synthesis reports.

8. Automatic layout generation followed by post layout extraction and simulation of the circuit studied in Expt. No.7.

BEC001 MEDICAL ELECTRONICS

L	T	P	C
3	0	0	3

OBJECTIVES

- To study the methods of recording various biopotentials
- To study the methods of measuring biochemical and various physiological information
- To understand the working of units which will help to restore normal functioning
- To understand the use of radiation for diagnostic and therapy

UNIT I ELECTRO-PHYSIOLOGY AND BIOPOTENTIAL RECORDING 9

The origin of Biopotentials, biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG – lead systems and recording methods, typical waveforms and signal characteristics, electrical safety, micro shock, macro shock.

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENTS 9

pH, pO_2, pCO_2-measurement, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES AND BIO-TELEMETRY 9

Cardiac pacemakers, Fibrillation and Defibrillators, Dialyser, Heart-Lung machine, Biotelemetry, Radiopill. Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, Components of a Biotelemetry System, Implantable units, Applications of Telemetry in Patient care.

UNIT IV RADIOLOGICAL EQUIPMENTS 9

Ionizing Radiation, Diagnostic X-ray equipments, Use of Radio isotope in diagnosis, Radiation Therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, surgical diathermy, MRI, CT, PET, Ultrasonography

TOTAL: 45 PERIODS

TEXT BOOKS

1. John G.Webster, "Medical Instrumentation Application and Design", John Wiley and Sons, (Asia) Pvt.Ltd., 4th Edition, 2009.
2. Lesile Cromwell, "Biomedical instrumentation and measurement", Prentice Hall of India, New Delhi, 2007.

REFERENCES

1. Khandpur, R.S. "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 2nd Edition, 2003.
2. Joseph.J, Carr and John M.Brown, "Introduction to Biomedical Equipment Technology", Pearson Education Inc., 2004.
3. A.P.F. Turner, I. Karube & G.S. Wilson, "Biosensors: Fundamentals & Applications", Oxford University Press, Oxford, 1st Edition, 1995.

BEC002	NANO ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To learn the logic devices involved in nano electronics
- To study quantum transport devices
- To study carbon nanotubes and molecular electronics

UNIT I INTRODUCTION TO NANOTECHNOLOGY 9

Background to nanotechnology: Types of nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size - surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope - scanning tunnelling microscope – nanomanipulator – nanotweezers – atom manipulation - nanodots – self assembly – dip pen nanolithography. Nanomaterials: preparation - plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling - applications of nanomaterials.

UNIT II FUNDAMENTALS OF NANO ELECTRONICS 9

Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing – DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing capability of biological neurons – performance estimation for the human brain. Ultimate computation:- power dissipation limit – dissipation in reversible computation – the ultimate computer.

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES 9

Silicon MOSFETS – Novel materials and alternate concepts:- fundamentals of MOSFET Devices-scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts.

Quantum transport devices based on resonant tunneling:- Electron tunneling – resonant tunneling diodes - resonant tunneling devices; Single electron devices for logic applications :- Single electron devices – applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES 9

Carbon Nanotube: Fullerenes - types of nanotubes - formation of nanotubes - assemblies – purification of carbon nanotubes – electronic properties – synthesis of carbon nanotubes - carbon nanotube interconnects - carbon nanotube FETs - Nanotube for memory applications - prospects of an all carbon nanotube nanoelectronics.

UNIT V MOLECULAR ELECTRONICS 9

Electrodes & contacts – functions – molecular electronic devices – first test systems - simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices.

TOTAL: 45 PERIODS

TEXTBOOKS

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse, "Nanotechnology: Basic Science and Emerging Technologies", Chapman & Hall / CRC, 1st Edition, 2002.
2. T. Pradeep, "NANO: The Essentials - Understanding Nanoscience and Nanotechnology", TMH, 1st Edition, 2008.

REFERENCES

1. Rainer Waser, "Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices", Wiley-VCH, 3rd Edition, 2012.
2. K.Goser, P.Glosekotter & J.Dienstuhl, "Nanoelectronic and Nanosystems – From Transistors to Molecular Quantum Devices" Springer, 2005.

BEC003 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

L	T	P	C
3	0	0	3

OBJECTIVES

- To understand EMI Sources, EMI problems and their solution methods in PCB level / Subsystem and system level design.
- To measure the emission immunity level from different systems to couple with the prescribed EMC standards

UNIT I BASIC CONCEPTS 7

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 10

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 7

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

UNIT V EMI TEST METHODS AND INSTRUMENTATION 12

EMI test sites - Open area site, TEM cell, Shielded chamber, Shielded Anechoic chamber, EMI test receivers, Spectrum Analyzer, Transient EMI Test wave Simulators, EMI coupling Networks - Line impedance Stabilization Networks, Feed through capacitors, Antennas and factors, Current probes and calibration factor; MIL-STD test methods, Civilian STD Test methods.

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.

BEC004 RADAR AND NAVIGATIONAL AIDS

L	T	P	C
3	0	0	3

OBJECTIVES

- To derive and discuss the Range equation and the nature of detection.
- To apply Doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars.
- To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.
- To understand principles of navigation, in addition to approach and landing aids as related to navigation.
- To understand navigation of ships from shore to shore.

UNIT I INTRODUCTION TO RADAR 9

Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies – Applications of Radar – The Origins of Radar. The Radar Equation Introduction- Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency- Antenna Parameters- System losses – Other Radar Equation Considerations

UNIT II MTI AND PULSE DOPPLER RADAR 9

Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) - Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics -Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT).

UNIT III DETECTION OF SIGNALS IN NOISE 9

Detection of Signals in Noise –Introduction – Matched –Filter Receiver –Detection Criteria – Detectors – Automatic Detector - Integrators – Constant False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction -Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas - Phase Shifters - Frequency-Scan Arrays, Radar Transmitters- Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources - Other aspects of Radar Transmitter. Radar Receivers - The Radar Receiver - Receiver noise Figure - Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

UNIT IV NAVIGATION METHODS 9

Introduction - Four methods of Navigation. Radio Direction Finding - The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders - The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders Radio Ranges - The LF/MF Four course Radio Range - VHF Omni Directional Range (VOR) - VOR Receiving Equipment - Range and Accuracy of VOR - Recent Developments. Hyperbolic Systems of

Navigation (Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System - Decca Receivers - Range and Accuracy of Decca - The Omega System

UNIT V DME AND TACAN 9

DME and TACAN - Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment Aids to Approach and Landing - Instrument Landing System - Ground Controlled Approach System - Microwave Landing System(MLS) Doppler Navigation - The Doppler Effect - 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)

TOTAL: 45 PERIODS

TEXTBOOK

1. Merrill I. Skolnik, “Introduction to Radar Systems”, Tata McGraw-Hill, 3rd Edition, 2004

REFERENCES

1. Peyton Z. Peebles, “Radar Principles”, John Wiley and Sons, 2007(Reprint).
2. J.C Toomay, “Principles of Radar”, 3rd Edition, PHI, 2004.
3. Dr. AK Sen and Dr. AB Bhattacharya, “Radar Systems and Radio Aids to Navigation”, Khanna Publishers, 2010.

BEC005 OPEN SOURCE BASED EMBEDDED SYSTEM DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES

- To learn the concepts of embedded system design.
- To study the architecture of OMAP-3 and its peripherals.
- To study embedded system development using crane board.
- To introduce an android application development.
- To introduce 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.

TOTAL: 45 PERIODS

TEXT BOOKS

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

REFERENCES

1. Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, “Linux Device Drivers”, 3rd Edition, O’REILLY, 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.

BCS035 INTERNET AND JAVA PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVES

- To learn Internet and Internetworking
- To learn the concepts in WWW, HTML and XML.
- To learn Java Programming Fundamentals

UNIT I INTERNET AND INTERNETWORKING **9**

Basics of Internet Communication - Hardware elements associated with Internet – Internet Services - Internet Protocols - TCP/IP, TJDP, HTTP – other Protocols – Telnet – Gopher - Mail and its types - FTP - Remote access and transaction.

UNIT II HTML AND XML **9**

Introduction to HTML - Tags and documents - Link documents using anchor tags -Images and pictures - Tables - HTML forms- Frames - Framesets – Dynamic HTML –CGI - Introduction to XML – Well formed XML – CSS – XSL - Valid XML.

UNIT III WORLD WIDE WEB **9**

Internet connection concepts - Intranets - Connecting LANs to the Internet - E-Mail concepts - E-Mail security - Reasons to secure the messages - Web Browsers Netscape - Internet Explorer - HTTP Protocol - Website and Webpage design - Web indexes – Search Engines.

UNIT IV JAVA PROGRAMMING **9**

The Genesis of Java - An overview - Language fundamentals - The Java environment: Installing Java - Java program development - Java source file structure compilation executions - Basic language elements: Lexical tokens - Identifiers – Keywords – Literals - Comments - Primitive data types - Operators - Control statements - Class fundamentals - Declaring objects - Introducing methods – Constructors - Access Control - Modifiers.

UNIT V JAVA CLASSES - INTERFACE AND INHERITANCE **9**

Nested classes - Inner class & Anonymous classes - Abstract class & Interfaces -Defining methods - Argument passing mechanism - Method overloading – Recursion - Static members - Finalize() method. Use and benefits of inheritance in OOP - Types of inheritance in Java - Inheriting Data members and methods - Role of constructors in inheritance - Overriding super class methods - Use of "Super"- Polymorphism in inheritance - Implementing interfaces.

TOTAL:45

TEXT BOOKS

1. Deitel & Deitel "Internet and www - How to program", 4th Edition, Pearson Education 2008.
2. Deitel & Deitel "XML How to program", Pearson Education 2001.
3. Norton, Herbert Schildt, "Java 2 The Complete Reference", 5th Edition, Tata McGraw Hill, 2011.
4. Paul. Deitel, Harvey Deitel, "Java How To Program", 7th Edition, Prentice Hall Publications, 2011.

REFERENCES

1. Daniel C. Lynch' Marehall T. Rose. Internet systems Handbook'" Addison Wesley, 1993.
2. Paul Deitel, Harvey M. Deitel, "Java for Programmers", 1st Edition, Pearson, 2010.

BEC006 SPEECH PROCESSING

L	T	P	C
3	0	0	3

OBJECTIVES

- To introduce the models for speech production
- To develop time and frequency domain techniques for estimating speech parameters
- To introduce a predictive technique for speech compression
- To understand speech recognition, synthesis and speaker identification.

UNIT I MECHANICS OF SPEECH 9

Speech production: Mechanism of speech production, Acoustic phonetics - Digital models for speech signals - Representations of speech waveform: Sampling speech signals, basics of quantization, delta modulation, and Differential PCM - Auditory perception: psycho acoustics.

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING 9

Time domain parameters of Speech signal - Methods for extracting the parameters Energy, Average Magnitude, Zero crossing Rate - Silence Discrimination using ZCR and energy - Short Time Auto Correlation Function - Pitch period estimation using Auto Correlation Function.

UNIT III FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING 9

Short Time Fourier analysis: Fourier transform and linear filtering interpretations, Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase Vocoder, Channel Vocoder - Homomorphic speech analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic Vocoders.

UNIT IV LINEAR PREDICTIVE ANALYSIS OF SPEECH 9

Basic Principles of linear predictive analysis - Auto correlation method - Covariance method - Solution of LPC equations - Cholesky method - Durbin's Recursive algorithm, - Application of LPC parameters - Pitch detection using LPC parameters - Formant analysis - MELP - CELP.

UNIT V APPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING 9

Algorithms: Dynamic time warping, K-means clustering and Vector quantization, Gaussian mixture modeling, hidden Markov modeling - Automatic Speech Recognition: Feature Extraction for ASR, Deterministic sequence recognition, Statistical Sequence recognition, Language models - Speaker identification and verification - Voice response system - Speech synthesis: basics of articulatory, source-filter, and concatenative synthesis – VOIP.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Thomas F. Quatieri, “Discrete-Time Speech Signal Processing”, Prentice Hall Pearson Education, 2004.
2. L.R.Rabiner and R.W.Schaffer, “Digital Processing of Speech signals”, Prentice Hall, 1979.

REFERENCES

1. Ben Gold and Nelson Morgan, “Speech and Audio Signal Processing”, John Wiley and Sons Inc., Singapore, 2nd Edition, 2011.
2. L.R. Rabiner and B. H. Juang, “Fundamentals of Speech Recognition”, Prentice Hall, 2nd Edition, 2008.
3. J.R. Deller, J.H.L. Hansen and J.G. Proakis, “Discrete Time Processing of Speech

Signals", John Wiley, IEEE Press, 2000.

BEC007	FUNDAMENTALS OF DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image segmentation and representation techniques.
- To study the image compression procedures.

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

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

UNIT II IMAGE ENHANCEMENT 9

Histogram equalization and specification techniques, Spatial and frequency domain filtering, Spatial averaging, Directional Smoothing, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - Noise distributions, Median, Geometric mean, Harmonic mean, Contra harmonic mean filters, degradation model, Unconstrained restoration - Lagrange multiplier and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener 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, Transform coding, JPEG and MPEG Standard.

TOTAL: 45 PERIODS

TEXTBOOKS

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson, 2nd Edition, 2009.
2. Khalid Sayood, "Introduction to Data Compression", Morgan Kauffman Harcourt India, 2nd Edition, 2012.

REFERENCES

1. Kenneth R. Castleman, "Digital Image Processing", Pearson, 1st Edition, 2007.
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, 2nd Edition, 2008.

BEC008 TELECOMMUNICATION SWITCHING AND NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES

- To introduce digital multiplexing and digital hierarchy namely SONET / SDH.
- To introduce the concepts of space switching, time switching and combination switching, example of a switch namely No.4 ESS Toll switch.
- To introduce the need for network synchronization and study synchronization issues. To outline network control and management issues.
- To study the enhanced local loop systems in digital environment. To introduce ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
- To introduce statistical modeling of telephone traffic. To study blocking system characteristics and queuing system characteristics.

UNIT I EVOLUTION OF TELECOMMUNICATION SWITCHING AND CIRCUITS 6

Evolution of Public Switched Telecommunication Networks Strowger exchange, Crossbar exchange, Stored programme exchange Digital exchange – Basic Telecommunication equipments – Telephone handset, Hybrid circuit, Echo suppressors and cancellors, PCM coders, Modems and Relays.

UNIT II ELECTRONIC SWITCHING 9

Circuit Switching, Message switching, Centralized stored programme switching, Time switching, Spare switching, Combination switching – Digital switching system hardware configuration, Switching system software, Organization, Switching system call processing software, Hardware software integration.

UNIT III TELECOMMUNICATION SIGNALING AND TRAFFIC 9

Channel associated signaling, Common channel signaling, SS7 signaling protocol, SS7 protocol architecture, Concept of Telecommunication traffic, Grade of service, Modeling switching systems, Blocking models and Delay systems.

UNIT IV INTEGRATED DIGITAL NETWORKS 9

Subscriber loop characteristics, Local access wire line and wireless PCM / TDM carrier standards transmission line codes, Digital multiplexing techniques, Synchronous, Asynchronous, Plesiochronous multiplexing techniques, SONET / SDH, Integrated Digital Network (IDN) environment – Principles of Integrated Services Digital Network (ISDN) – Cellular Mobile Communication Principles.

UNIT V DATA NETWORKS 12

Data transmission in PSTN – Connection oriented and Connection less protocols – packet switching – ISO-OSI architecture-Satellite based data networks – Multiple access techniques – LAN, WAN – standards – TCP / IP – Internet – Principle of ATM networks.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Viswanathan. T, “Telecommunication Switching System and Networks”, Prentice Hall of India Ltd., 2004.
2. Behrouz Forouzan, “Introduction to Data Communication and Networking”, McGraw- Hill, 2012.

REFERENCES

1. L.S.Lawton, “Integrated Digital Networks”, Galgotia Publication Pvt., Ltd.,New Delhi, 1996.
2. Syed R. Ali, “Digital Switching Systems”, McGraw-Hill Inc., New York, 2002.

BEC009 ADVANCED MICROPROCESSORS

L	T	P	C
3	0	0	3

OBJECTIVES

- To study about the general microprocessor concept.
- To have knowledge about the background of ARM family specifically ARM Cortex – M3 Processor, Operating Modes, and Instruction set etc.
- To study about the memory systems and debugging strategy of Cortex Processor.

UNIT I MICROPROCESSOR ARCHITECTURE 9

Functional Block Diagram – Description – Instruction Set – Data Formats – Instruction Formats – Addressing Modes – Timing Diagrams – Memory Hierarchy – Cache – Virtual Memory and Paging – Segmentation – Pipelining – Instruction Level Parallelism – RISC vs CISC – RISC Properties and Evaluation – CISC Properties and Evaluation – On-Chip register File vs Cache Evaluation.

UNIT II 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 III INSTRUCTION SET 9

Cortex-M3 Instruction Set, Mnemonics, Syntax and their Description – Unsupported Instructions – Moving Data Instructions – Pseudo Instructions – Data Processing Instructions – Unconditional Branch Instructions – Decision and Conditional Branch Instructions – Combined Compare and Conditional Branch Instructions – Instruction Barrier and Memory Barrier Instructions – Saturation Operations – Useful Instructions – MSR and MRS Instructions – Multiply and Divide Instructions – SDIV and UDIV Instructions – REV, REVH and REVSH Instructions – Reverse Bit – SXTB, SXTH, UXTB and UXTH Instructions – UBFX and SBFX – LDRD and STRD – Table Branch Byte and Table Branch Halfword.

UNIT IV MEMORY SYSTEMS 9

Memory System Features – Memory Access Attributes – Bit-Band Operations – Advantages – Exclusive Accesses – Endian Mode – Pipeline – Bus Interfaces – Other Interfaces – Types of Exceptions – Vector Tables – Fault Exceptions – Interrupt Control – Software Interrupts – Interrupt Latency – Faults related to Interrupts – Memory Protection Unit – Registers – Typical Setup – Other Features – SYSTICK Timer – Power Management – Multiprocessor Communication – Self-Reset Control.

UNIT V DEBUGGING ARCHITECTURE 9

Debugging Features – Coresight Overview – Debug Modes – Debugging Events – Accessing Register Content in Debug – Trace System – Trace Components – DWT, ITM, ETM and TPIU – Flash Patch and Breakpoint Unit – Advanced High-Performance Bus Access Port – ROM Table – Programming with Cortex-M3.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Daniel Tabak, "Advanced Microprocessors", McGraw Hill. Inc., 2nd Edition, 1996.
2. 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.
4. A.K.Ray, K.M.Bhurchandi, "Advanced Microprocessors and Peripherals", McGraw-Hill Education, 2nd Edition, 2009.

BCS404 OPERATING SYSTEMS

(Common to 4th Sem – CSE & IT 6th Sem - ECE)

L	T	P	C
3	0	0	3

OBJECTIVES

- To aware about OS services that assist system users
- To expose several aspects of OS design including: process scheduling, synchronization, deadlocks and File systems.
- To become familiar with the kinds of abstractions provided by general purpose OS.
- To learn the internal policies and mechanisms implemented in the kernel part of operating systems.
- To analyze the tradeoffs inherent in operating system design and performances.

UNIT I PROCESSES AND THREADS 9

Introduction to operating systems – review of computer organization – operating system structures – system calls – system programs – system structure – virtual machines. Processes: Process concept – Process scheduling – Operations on processes – Cooperating processes – Interprocess communication – Communication in client-server systems. Case study: IPC in Linux. Threads: Multi-threading models – Threading issues. Case Study: Pthreads library.

UNIT II PROCESS SCHEDULING AND SYNCHRONIZATION 10

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Case study: Process scheduling in Linux. Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – critical regions – Monitors. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

UNIT III 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 –Thrashing. Case Study: Memory management in Linux.

UNIT IV FILE 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 – recovery– log-structured file systems. Case studies: File system in Linux – File system in Windows XP.

UNIT V I/O SYSTEMS 8

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem –streams – performance. Mass-Storage Structure: Disk scheduling – Disk management –Swap-space management – RAID – disk attachment – stable storage – tertiary storage. Case study: I/O in Linux.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", 6th Edition, Wiley India Pvt Ltd, 2003.

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. Deital, "Operating Systems", 3rd Edition, Pearson Education, 2004.

BEI005	MICRO ELECTRO MECHANICAL SYSTEMS	L	T	P	C
	(Common to EIE & ECE)	3	0	0	3

OBJECTIVES:

- To integrate the knowledge of semiconductors and solid mechanics to fabricate MEMS devices.
- To understand the basics of Microfabrication techniques.
- To identify and understand the various sensors, actuators and different materials used for MEMS
- To study the applications of MEMS

UNIT I OVERVIEW OF MEMS 9

History of MEMS, MEMS and Microsystems, Review of Electrical and Mechanical concepts in MEMS, Intrinsic Characteristic of MEMS, Scaling laws in Miniaturization. Materials for MEMS and Microsystems.

UNIT II MICRO FABRICATIONS AND MICROMACHINING 9

Microsystem Design and Fabrication, Microsystem fabrication processes-Photolithography, Ion Implantation, Diffusion, Oxidation, Chemical and Physical Vapor deposition, Deposition by Epitaxy, Etching. Bulk Micro manufacturing, Basic surface micromachining processes, LIGA process.

UNIT III MICROSENSORS 9

Resonant sensor, Vibratory gyroscope, Capacitive and Piezo Resistive Pressure sensors, Piezo Resistive accelerometer, Acoustic devices and SQUIDs.

UNIT IV MICROACTUATORS 9

Thermal Actuators - Thermal Sensing and Actuation, Thermal expansion, Thermocouples, Magnetic Actuators – Micromagnetic components, Piezoelectric and resistive actuators.

UNIT V APPLICATIONS 9

MEMS applications in Automobile, Military, Medical, Consumer, Industry and Space domains

TOTAL: 45 PERIODS

TEXT BOOKS

1. Chang Liu, “Foundations of MEMS”, Pearson Education India limited, 2006.
2. Marc Madou, “Fundamentals of Microfabrication”, CRC Press 1997.
3. Julian W. Gardner, Vijay K. Varadan, Osama O.Awadelkarim, “Micro Sensors, MEMS and Smart Devices”, John Wiley & Son Ltd, 2002.

REFERENCES

1. Stephen D. Senturia, “Micro System Design”, Kluwer Academic Publishers, 2001.
2. Minhang Bao, “Analysis and Design Principles of MEMS Devices”, Elsevier, 2005.
3. Tai Ran Hsu, “MEMS and Microsystems Design and Manufacture”, TatA McGraw - Hill, 2002.

BCE301 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
(Common to 3rd Sem – Civil, CSE, IT, EEE and EIE 3 0 0 3
5th Sem – Mechanical, 7th Sem - ECE)

OBJECTIVE

- At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

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 – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) –Introduction to biodiversity definition: genetic, species and ecosystem diversity –biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – 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 of biodiversity. Field study of common plants, insects, birds. Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies – timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over – utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture 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, use of alternate energy sources. Case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – 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 IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of nongovernmental organization – environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – wasteland reclamation – consumerism and waste products – environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation – central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV /AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2008.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCES

1. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, BS Publications, 2004.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental Law", Prentice Hall of India (P) Ltd., New Delhi, 2007.
4. Rajagopalan R, "Environmental Studies from Crisis to Cure", Oxford University Press, 2005.

BEC701 WIRELESS COMMUNICATION L T P C
3 0 0 3

OBJECTIVES

- To characterize fading multi-path radio channels in terms of Doppler spectrum, coherence time, power delay profile and coherence bandwidth.
- To distinguish the difference large signal fading and small signal fading.
- To plan and analyze simple wireless networks in terms of coverage and capacity.

UNIT I INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS 9

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 9

Radio wave Propagation – Transmit and receive Signal Models – Free Space path loss – Ray Tracing – Empirical Path loss models – Simplified path loss model –Shadow fading – Combined path loss and Shadowing – Outage Probability under path loss & shadowing – Cell coverage area.

UNIT III MOBILE RADIO WAVE PROPAGATION - SMALL SCALE FADING AND MULTIPATH 9

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 DIVERSITY AND EQUALIZATION IN WIRELESS SYSTEM 9

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 9

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.

TOTAL: 45 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, 2nd Edition, 2009.
3. Schiller, “Mobile Communication”, Pearson Education, 2nd Edition, 2009.

REFERENCE

1. Andrea Goldsmith, “Wireless Communications”, Cambridge University Press, 1st Edition, 2005.

BEC702 OPTICAL COMMUNICATION AND NETWORKS L T P C
3 0 0 3

OBJECTIVES

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- To learn the fiber optical receivers such as PIN, APD diodes, receiver operation and configuration.
- To learn operational principles of WDM and Solitons.

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, Comparison of performance, 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, OTDR Attenuation measurement, 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.

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, 2007.

BEC703 RF AND MICROWAVE ENGINEERING L T P C
3 0 0 3

OBJECTIVES

To understand and gain complete knowledge about

- RF basic concepts.
- RF amplifier design.
- Microwave semiconductor devices
- Microwave passive components
- Microwave measurements
- MMIC technology

UNIT I TWO 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.

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.

BEC731	ELECTRONIC SYSTEM DESIGN LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES

- To design and develop a simple Electronic systems based on Microprocessor, Microcontroller, FPGA and discrete IC's

LIST OF EXPERIMENTS

1. Design of a 4-20mA transmitter for a bridge type transducer. Design the Instrumentation amplifier with the bridge type transducer (Thermistor or any resistance variation transducers) and convert the amplified voltage from the instrumentation amplifier to 4 – 20 mA current using op-amp. Plot the variation of the temperature Vs output current.
2. Design of process control timer. Design a sequential timer to switch on & off at least 3 relays in a particular sequence using timer IC.
3. Design of Wireless data modem using FSK modulator
4. PCB layout design using CAD. Drawing the schematic of simple electronic circuit and design of PCB layout using CAD
5. Microcontroller based systems design. Design of microcontroller based system for simple applications like security systems combination lock and advertisement display.
6. DSP based system design. Design a DSP based system for echo cancellation, using TMS/ADSP DSP kit.
7. Pseudo-random Sequence Generator
8. Design of a simple 4 bit processor on FPGA.
9. Design and implementation of Encoder and Decoder for Linear Block Code and Cyclic code.
10. Design and Implementation of FIR filter on FPGA.
11. Implementation of RS-232 serial communication protocol on FPGA.

TOTAL: 45 PERIODS

BEC732	OPTICAL AND MICROWAVE LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES

- To measure various parameters of microwave components and fiber optic cables.
- To study the characteristics of LED, Photodiode through fiber optic cable.

LIST OF EXPERIMENTS

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

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers.
2. Attenuation Measurement in Fibers.
3. Fiber optic analog communication links.
4. Fiber optic digital communication links.
5. LED & Photo Diode Characteristics.

Microwave experiments:

1. Study of Microwave components
2. VSWR Measurements – Determination of terminated impedance.
3. Determination of guide wavelength, frequency measurement.
4. Radiation Pattern of Horn antenna
5. Determination of S-Matrix for microwave tees
6. Performance measure of Directional coupler

TOTAL: 45 PERIODS

BEC733	COMPREHENSION	L	T	P	C
		0	0	3	1

OBJECTIVES

- To encourage the students to pursue their higher education.
- To prepare the students to undergo GATE like entrance exams.
- To evaluate the comprehensive knowledge being acquired by the student.

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

Group B

1. Digital Circuits and Microprocessor
2. Computer Networks
3. VLSI Design
4. Data Structures and OOPS
5. Communication Skills

- The staff-coordinator per group is responsible for scheduling the session plans, monitoring the activities and recording the continual assessments.
- The technical seminars and group discussions will be assisted by subject experts in the department.
- 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

TOTAL: 45 PERIODS

BMG601 PRINCIPLES OF MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

- To get the skills needed to successfully manage an organization.
- To understand concepts of strategic and tactical organizational planning.
- Implement employee motivational approaches and conflict management skills.
- To describe common performance appraisal processes.
- To understand group and team management, management development, and employee training.
- Describe concepts of controlling and control systems.

UNIT I FOUNDATIONS 9

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

UNIT II MANAGERS AND ENVIRONMENT 9

Social responsibility – Planning – Objectives – Setting Objectives – Process of Managing through Objectives – Strategies – Policies and Planning Premises – Forecasting – Decision-making.

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 MOTIVATION AND DIRECTIONS 9

Objectives– Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – 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.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Hellriegel, Slocum & Jackson, "Management – A Competency Based Approach", Thomson South Western, 10th Edition, 2007.
2. Harold Koontz, Heinz Weihrich and mark V Cannice, "Management – A global & Entrepreneurial Perspective", Tata Mcgraw Hill, 12th Edition, 2007.
3. Andrew J. Dubrin, "Essentials of Management", Thomson South western, 7th Edition, 2007.

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 & Sivakumar M. "Principles of Management", Lakshmi Publications, 1st Edition, 2011.
4. Ramachandran. S. "Principles of Management", Air Walk Publications, 1st Edition, 2007.

BEC801 SATELLITE COMMUNICATION SYSTEMS L T P C
3 0 0 3

OBJECTIVES

- Study of satellite orbits and launching.
- Study of earth segment and space segment components
- Study of satellite link design.

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 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 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 Systems, DBS, DTH, TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/N_0, EIRP, Antenna Gain.

UNIT V SATELLITE APPLICATIONS 9

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Digital audio broadcast (DAB) – Remote sensing satellites, Weather forecasting satellites.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Dennis Roddy, "Satellite Communication", McGraw Hill International, 4th Edition, 2006.
2. Anil K. Maini, Varsha Agrawal, "Satellite Communication", Wiley India, 2010.

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, 2003.
3. Tri T. Ha, "Digital Satellite Communication", McGraw Hill, 2nd Edition, 2009.

BEC010 VLSI DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3

OBJECTIVES

- To study the concepts of pipelining, parallel processing.
- To learn the methods for designing a rank order filter.
- To know the algorithms for IIR filter design.

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.

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.

BEC011 ADVANCED VLSI DESIGN L T P C
3 0 0 3

OBJECTIVES

- To learn the programmable ASIC logic cells, I/O cells.
- To know the ASIC interconnects and Design Software.
- To study the ASIC construction, design entry.

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.

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.

BEC012 FUNDAMENTALS OF SEMICONDUCTOR CHIP TESTING L T P C

3 0 0 3

OBJECTIVES

- To understand the methodology of IC manufacturing
- To familiarize the fundamentals of IC testing

UNIT I INTRODUCTION TO SEMICONDUCTOR IC TESTING 9

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 – JTAG Standard for testing at board level.

UNIT III AUTOMATIC TEST EQUIPMENT ARCHITECTURE 9

Architecture of a mixed signal ATE – DC Subsystem, Digital subsystem, Clock, DSP, VI Source, DC Matrix, Waveform generators. 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 – 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, guard banding, Gaussian statistics.

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.

BEC013 DIGITAL SIGNAL PROCESSORS L T P C

3 0 0 3

OBJECTIVES

- Understand the fundamentals of fixed and floating point architectures of various DSPs.
- Learn the design of DSP Processors and its internal architecture.
- Study 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

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.

BEC014 ARM PROCESSOR ARCHITECTURE AND PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVES

- To study the fundamental concepts and instruction set of ARM processor.
- To design ARM based serial Interfacing system.
- To learn about various families of ARM processor.

UNIT I ARM PROCESSOR FUNDAMENTALS 9

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

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

Profiling and Cycle Counting – Instruction Scheduling – Register Allocation – Conditional Execution – Looping Constructs – Bit manipulation – Efficient switches – Handling unaligned data- Simple ARM assembly program

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)

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.

BEC015 MULTIMEDIA COMPRESSION AND COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES

- To have a complete understanding of error–control coding.
- To understand encoding and decoding of digital data streams.
- To introduce methods for the generation of these codes and their decoding techniques.
- To have a detailed knowledge of compression and decompression techniques.
- To introduce the concepts of multimedia communication.

UNIT I MULTIMEDIA COMPONENTS **9**

Introduction, Multimedia skills, Multimedia components and their characteristics, Text, sound, images, graphics, animation, video, hardware.

UNIT II 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 III TEXT AND IMAGE COMPRESSION **9**

Compression principles, source encoders and destination encoders, lossless and lossy compression, entropy encoding, source encoding, text compression, static Huffman coding, dynamic coding, arithmetic coding, Lempel ziv-welch Compression, Image compression – JPEG Standard, JPEG 2000 Standard, EZW,SPIHT.

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, Streamed stored video and audio, 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.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Fred Halshall, “Multimedia communication - applications, networks, protocols and standards”, Pearson Education, 2007.
2. Khalid Sayood, “Introduction to Date Compression”, Morgan Kauffman, 4th Edition, 2012.
3. Kurose and W.Ross, “Computer Networking -a Top down approach”, Pearson education, 6th Edition, 2012.

REFERENCES

1. Zi Nian LEee, Mark S.Drew, “Fundamentals of Multimedia”, PHI Learning Pvt. Ltd. 2010.
2. R.Rao, Z.S.Bojkovic, D.A.Milovanovic, “Multimedia Communication Systems: Techniques, Standards, and Networks”, Pearson Education, 2007.
3. Ranjan Parekh, “Principles of Multimedia”, 2nd Edition, TMH, 2012.

BEC016 INFORMATION THEORY AND CODING TECHNIQUES L T P C
3 0 0 3

OBJECTIVES

- To acquire knowledge about information and entropy.
- To learn about syndrome calculation and design of an encoder and decoder
- To gain knowledge about convolution coding and Viterbi algorithm

UNIT I INFORMATION THEORY 9

Information theory – Concept of amount of information - units, Entropy - marginal, conditional and joint entropies -relation among entropies and Mutual information, information rate, channel capacity, redundancy and efficiency of channels. Discrete channels – Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary asymmetric channel and Shannon theorem. Continuous channels – Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Tradeoff between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.

UNIT II SOURCE CODING 9

Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes, Arithmetic coding, LZW algorithm, Audio- Psychoacoustic model, Speech-Linear Predictive Coding

UNIT III SOURCE CODING APPLICATION 9

Image and Video Formats – GIF, Image compression: JPEG, Video Compression: Principles-I, B, P frames, Principles of JPEG and MPEG standard

UNIT IV ERROR CONTROL CODING: BLOCK CODES 9

Codes for error detection and correction – Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes – Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.

UNIT V ERROR CONTROL CODING: CONVOLUTIONAL CODES 9

Convolutional codes – Encoding- State, Tree and Trellis diagrams, Maximum likelihood decoding of convolutional codes -Viterbi algorithm, Sequential decoding -Stack algorithm. Interleaving techniques – Block and convolutional interleaving, Coding and interleaving applied to CD digital audio system -CIRC encoding and decoding, interpolation and muting. ARQ – Types of ARQ, Performance of ARQ, Probability of error and throughput.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Simon Haykin, "Communication Systems", John Wiley & Sons. Private Limited, 5th Edition, 2009.
2. K Sayood, "Introduction to Data Compression", Elsevier, 3rd Edition, 2006.
3. R Bose, "Information Theory, Coding and Crptography", TMH, 2007.
4. Fred Halsall, "Multimedia Communications: Applications, Networks, Protocols and Standards", Pearson Education, 2002.

REFERENCES

1. S Gravano, "Introduction to Error Control Codes", Oxford University Press, 2007.
2. Amitabha Bhattacharya, "Digital Communication", TMH, 2006.
3. Bernard Sklar, "Digital Communication", Pearson Education, 2nd Edition, 2006.

BIT008	WIRELESS SENSOR NETWORKS (Common to IT & ECE)	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the basics of Sensor Networks.
- To learn various fundamental and emerging protocols of all layers.
- To study about the issues pertaining to major obstacles in establishment and efficient management of sensor networks.
- To demonstrate the nature and applications sensor networks.

UNIT I INTRODUCTION **9**

Challenges for wireless sensor networks, Comparison of sensor network with ad hoc network, Single node architecture – Hardware components, energy consumption of sensor nodes, Network architecture – Sensor network scenarios, types of sources and sinks, single hop versus multi-hop networks, multiple sinks and sources, design principles, Development of wireless sensor networks.

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, Power Management.

UNIT III DATALINK LAYER **9**

MAC protocols – fundamentals of wireless MAC protocols, low duty cycle protocols and wakeup concepts, contention-based protocols, Schedule-based protocols - SMAC, BMAC, Traffic-adaptive medium access protocol (TRAMA), Link Layer protocols – fundamentals task and requirements, errorcontrol,framing, link management.

UNIT IV NETWORK LAYER **9**

Gossiping and agent-based uni-cast forwarding, Energy-efficient unicast, Broadcast and multicast, geographic routing, mobile nodes, Data-centric routing – SPIN, Directed Diffusion, Energy aware routing, Gradient-based routing – COUGAR, ACQUIRE, Hierarchical Routing – LEACH, PEGASIS, Location Based Routing – GAF, GEAR, Data aggregation – Various aggregation techniques.

UNIT V CASE STUDY **9**

Target detection tracking, Habitat monitoring, Environmental disaster monitoring, Practical implementation issues, IEEE 802.15.4 low rate WPAN, Operating System Design Issues, Introduction to TinyOS – NesC, Interfaces, modules, configuration, Programming in TinyOS using NesC, Emulator TOSSIM.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Holger Karl , Andreas willig, “Protocol and Architecture for Wireless Sensor Networks”, John Wiley Publication, Jan 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, "Ad Hoc 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.

BMG002 ENTREPRENEURSHIP DEVELOPMENT L T P C
3 0 0 3

OBJECTIVE

- To develop the entrepreneurship potential by providing requisite skills and knowledge to Start a successful business enterprise.

UNIT I ENTREPRENEURSHIP 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurical Growth.

UNIT II MOTIVATION 9

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self-Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

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 of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM – Taxation – Income Tax, Excise Duty – Sales Tax.

UNIT V 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.

TOTAL: 45 PERIODS

TEXT BOOKS

1. S.S.Khanka “Entrepreneurial Development” S.Chand and Company Limited, Ram Nagar, New Delhi, 2008.
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.

BEC017 WAVELETS AND ITS APPLICATIONS L T P C
3 0 0 3

OBJECTIVES

- To study the basics of signal representation and Fourier theory
- To understand Multi Resolution analysis and Wavelet concepts
- To understand the wavelet transform in discrete domain
- To understand the design of wavelets using lifting scheme
- To understand the applications of wavelet transform

UNIT I FUNDAMENTALS OF SIGNAL DECOMPOSITIONS 9

Series expansion of signals, Multi resolution concepts – Hilbert spaces – Vectors space and inner products, complete inner product spaces, orthogonal and general basis. Fourier theory and sampling – Fourier transform, Fourier series, direct function, Impulse trains and Poisson sum formula, DFT, DTFT, DTFS. Signal Processing – Continuous, Discrete and Multi rate discrete time signal processing. Time frequency representation.

UNIT II DISCRETE TIME BASIS AND FILTER BANKS 9

Series expansion of DTS – DTFS, Haar expansion of DTS, Sinc expansion of DTS. Tree – Structured filter banks – Octave-band filter bank, Discrete time Wavelet series and properties, Multi resolution, Interpretation, Wavelet packets. Multi channel filter banks – Block and lapped orthogonal transforms, Analysis of multi channel and modulated filter banks. Multi dimensional filter banks – Analysis and Synthesis.

UNIT III MULTI RESOLUTION CONCEPT AND MODULATED BASES 9

Multi resolution analysis – Wavelet function, DWT. bases, orthogonal basis and biorthogonal bases. Scaling function, scaling coefficients, Wavelet and wavelet coefficients – Scaling function and wavelet. Properties of scaling function and wavelet. Parameterization of scaling coefficients. Calculating the basic scaling function and wavelet. Local cosine bases – Rectangular window, smooth window and general window.

UNIT IV WAVELET SYSTEM DESIGN 9

Daubechies method for zero wavelet moment design. Non-maximal regularity wavelet design. Relation of zero wavelet moments to smoothness, Approximation of scaling coefficients by sample of the signal and by scaling function projection. Tiling the time frequency and time scale plane.

UNIT V APPLICATIONS 9

Wavelet, wavelet packets and matching pursuits with bio medical applications – analysis of phonocardiogram signals, feature extraction for neuro physiological signals, speech enhancements for hearing aids. Wavelets in medical imaging – wavelets applied to mammograms, adapted wavelet encoding in FMRI, wavelet compression of medical images. Video compression, denoising, edge detection, and discrete wavelength multi tone modulation.

TOTAL: 45 PERIODS

TEXT BOOKS

1. M.Vetterli and J. Kovacevic, “Wavelets and sub band coding”, Dover Publication, 2013.
2. C. Sidney Burrus, Ramesh Gopinath & Haito Guo, “Introduction to wavelets and wavelet Transform”, Prentice Hall, 1998.

REFERENCES

1. Metin Akay, “Time frequency and wavelets in biomedical signal processing”, Wiley-IEEE Press, October 1997.
2. Raguveer m Rao & Ajith S. Bopardikar, “Wavelet transforms – Introduction to theory and Applications”, Addison Wesley, 2nd Edition, 2008.
3. S.Mallet, “A Wavelet tour of signal processing”, Academic Press, 3rd Edition, 2008.
4. G.Strang and T.Nguyen, ‘Wavelet and filter banks’, Wesley and Cambridge Press.

BEC018 EMBEDDED AND REAL TIME SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES

- This course discusses organization, architecture, design and development of real time embedded systems.

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 PROCESS AND OPERATING SYSTEMS 9

Multiple tasks and multi processes – Processes – Context Switching – Operating Systems Scheduling policies - Multiprocessor – Inter Process Communication mechanisms – Evaluating operating system performance – Power optimization strategies for processes.

UNIT IV HARDWARE ACCELERATES AND NETWORKS 9

Accelerators – Accelerated system design – Distributed Embedded Architecture – Networks for Embedded Systems – Network based design – Internet enabled systems.

UNIT V CASE STUDY 9

Data Compressor - Software Modem – Personal Digital Assistants – Set–Top–Box. – System-on Silicon.

TOTAL: 45 PERIODS

TEXT BOOK

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

REFERENCES

1. David E-Simon, “An Embedded Software Primer”, Pearson Education, 2007.
2. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dreamtech Press, 2005.
3. Tim Wilmshurst, “An Introduction to the Design of Small Scale Embedded Systems”, Pal grave Publisher, 2004.
4. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc-Graw Hill, 2004.
5. Tammy Noergaard, “Embedded Systems Architecture”, Elsevier, 2006.

BEC019 BIOSIGNAL PROCESSING L T P C
3 0 0 3

OBJECTIVES

- To study about various filtering techniques.
- To perform frequency domain analysis of non stationary signal.

UNIT I SIGNALS AND FILTERING TECHNIQUES 9

Characteristics of some dynamic biomedical systems, signal conversion. Filters – IIR FIR, Integer filters, Homomorphic filters-Generalized linear filters, Homomorphic deconvolution and application. Matched filter - Detection of spikes and wave complexes.

UNIT II SIGNAL AVERAGING AND FILTERING FOR REMOVAL OF ARTIFACTS 9

Random noise, structured noise and physiological interference. Stationary and nonstationary processes. Time - Domain filters - Moving average filter, synchronous averaging artifacts. Frequency domain filters - optimal filters-Wiener filter, adaptive filter for removal of interference Application - ECG, Maternal - Fetal ECG, Muscle contraction interference.

UNIT III FREQUENCY DOMAIN ANALYSIS OF NON-STATIONARY SIGNALS 9

Fourier spectrum, Estimation of PSD function - Periodogram, averaging, estimation of autocorrelation function. Measures derived from power spectral density and application Time variant systems, fixed segmentation, Adaptive segmentation, Adaptive filter for segmentation Application - ECG, PCG and Heart rate variability.

UNIT IV BIOSIGNAL CLASSIFICATION AND DIAGNOSTIC DECISION 9

Diagnostic of bundle-branch block - Illustration, Pattern classification, supervised classification, unsupervised pattern classification, probabilistic models and statistical decision. Training test steps, Neural Network and application

UNIT V NON LINEAR FILTERING TECHNIQUES 9

Non linear signal processing - state space reconstruction - Lyapunov exponents, correlation dimension, Entropy non linear diagnostics. Empirical non linear filter – non linear noise reduction, comparison of NNR and ICA. Model based filtering - non linear model parameter estimation, state space model based filtering.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Willis J Tompkins, “Bio Medical Digital Signal Processing”, Prentice Hall of India, New Delhi, 2003.
2. Rangaraj M.Rangayyan, “Biomedical Signal Analysis- A case study approach”, Wiley Inter Science/IEEE press, 2002.

REFERENCE

1. Gari D. Clifford, Francisco Azuaje and Patrick E McSharry, “Advanced Methods and tools for ECG Data Analysis”, Artech House, 2006.

BEC020 ADVANCED ELECTRONIC SYSTEM DESIGN L T P C
3 0 0 3

OBJECTIVES

- To study RF components such as resonator, filter, transmission lines, etc.
- To learn design of RF amplifiers using transistors.
- To study modern Power Supplies using SCR and SMPS technology
- To learn 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 filter 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(S_{12} =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 foldback 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.

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.
3. Walter C.Bosshart, "Printed circuit Boards – Design and Technology", TATA McGraw-Hill, 31st reprint, 2008.

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.

BEC021 GLOBAL NAVIGATION SATELLITE SYSTEM L T P C
3 0 0 3

OBJECTIVES

To gain knowledge about

- Types of signals used in the GPS systems and accuracy limits.
- Latest versions of GPS and its application.

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.

TOTAL: 45 PERIODS

TEXT BOOKS

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

REFERENCES

1. B. Hoffman-Wellenhof, H. Liehtenegger and J. Collins, "GPS – Theory and Practice", Springer, 5th Edition, 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, 2nd Edition, 2003.

BEC022 MOBILE ADHOC NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES

- To give knowledge of mobile adhoc networks, design and implementation issues, and available solutions.
- To give information about Medium Access Protocol and Network Protocol.
- To design cross layer and integration for 4G networks.

UNIT I INTRODUCTION 9

Introduction to adhoc networks - definition, characteristics features, applications. Characteristics of Wireless channel, adhoc Mobility Models: - Indoor and out door models.

UNIT II MEDIUM ACCESS PROTOCOLS 9

MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT III NETWORK PROTOCOLS 9

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.

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 CROSS LAYER DESIGN AND INTEGRATION OF ADHOC FOR 4G 9

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective, Sensor Network Architecture, Data Dissemination, Data Gathering, Location Discovery, Quality of a Sensor Network Integration of adhoc with Mobile IP networks.

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 Ad hoc networks", IEEE communication Survey and tutorials, v 9.no.1, 2007.
4. Jonathan Loo, Jaime Lloret Mauri, "Mobile Adhoc Networks: Current status and Future Trends", CRC Press, 1st Edition, 2011.

BCS009	HIGH SPEED NETWORKS (Common to CSE & IT)	L	T	P	C
		3	0	0	3

OBJECTIVES

- To provide an understanding of the networking standards that can be adopted with the current day requirements of complex and voluminous content transfer over heterogeneous platforms.
- To have a primitive level performance analysis for of traffic with different networking standards and to study the standards adopted for handling high traffic.
- To get a feel of designing a High speed network setup with specialized hardware and optimization approaches like parallelism and pipelining.

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 CONGESTION AND TRAFFIC MANAGEMENT 9

Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 9

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – 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.

TOTAL: 45 PERIODS

TEXT BOOKS

1. William Stallings, "High-speed Networks and Internet", 2nd Edition, Pearson Education, 2002. (UNIT I-V)
2. Jean Warland, Pravin Varaiya, "High-performance Communication Networks", 2nd Edition, Jean Harcourt Asia Private Limited, 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.

BMG701 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.

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.

UNIT II 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, Kaizen, 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 – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – 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 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Dale H.Besterfiled, et at., “Total Quality Management”, Pearson Education (Asia), 3rd Edition, Indian Reprint, 2010.
2. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, 6th Edition, South-Western (Thomson Learning), 2005.

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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.