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For members only

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY



THIRTY FIRST MEETING OF THE ACADEMIC COUNCIL

DATE : 02nd March, 2012

TIME : 11:30 A.M.

VENUE : VC SECTT., DWARKA CAMPUS

PROCEEDINGS

SECTOR – 16C, DWARKA, NEW DELHI

THIRTIETH MEETING OF ACADEMIC COUNCIL HELD ON
02nd March, 2012

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31.03	To consider and approve the guidelines framed for intra - university relocation and inter-university migration of students for pursuance of a particular programme in the second year (Third Semester) under Ordinance – 7 captioned 'Migration of Students'.	8
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S.No.	Particulars	Page No.
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31.10	To consider and approved recommendation of the sub-committee of the Academic Council of School of Information Technology regarding scheme of various M.Tech programmes conducted by it.	12
31.11	To consider and approve the recommendation of SRC and BOS of University School of Biotechnology for change of prefix in the codes assigned to paper of B.Tech. Biotechnology.	13
31.12	To apprise about the approval granted by the Vice Chancellor for the revised Scheme of Examination and detailed syllabi for B.Tech./ M.Tech. (ECE) Dual degree and some modifications/ revisions in the syllabus of MCA and other M.Tech. programmes.	13
Any other item with the permission of Chair		
31.13	To consider the proposal of Financial requirements of the Guru Gobind singh Indraprastha University for the 12 th Five Year Plan period to be sent to the University Grants Commission for its funding	13-14
31.14	To consider the proposal of fixation of fee for inspection of evaluated answer sheets and the 'Procedure for Implementation of Regulation for Inspection of Answer Sheet 2011 including the format for application of the request for inspection.	14-15

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Agenda Item No. 31.11 : To consider and approve the recommendation of SRC and BOS of University School of Biotechnology for change of prefix in the codes assigned to paper of B.Tech. Biotechnology.

The proposal of converting the BA codes to BT course with suggestion that the faculty of the University School of Biotechnology shall teach the papers was not accepted by the Council as the basic feature/ purpose of the University for Inter-disciplinary Approach for conduct of programmes at various schools shall be defeated under the circumstances. It was further suggested by the council that both deans of the respective schools are well aware of the University's philosophy and must promote inter-dependent existence and resolve the issues among themselves.

The council has further approved for the proposed M.Tech. (Food Processing Technology) programme to start w.e.f. academic session 2012-2013.

Agenda Item No.31.12 : To apprise about the approval granted by the Vice Chancellor for the revised Scheme of Examination and detailed syllabi for B.Tech./ M.Tech. (ECE) Dual degree and some modifications/ revisions in the syllabus of MCA and other M.Tech. programmes.

The proposal was approved as recommended by the Board of Studies and sub-committee of the University School of Information Technology by the Academic Council., however it noted that no revision for MCA programme had been proposed.

Agenda Item No.31.13 : To consider the proposal of Financial requirements of the Guru Gobind singh Indraprastha University for the 12th Five Year Plan period to be sent to the University Grants Commission for its funding

The Council deliberated on subject at length and keeping in view that the Universities have been given full autonomy to visualize their perspective plan by the



SCHEME & SYLLABI

for

Bachelor / Master of Technology (Dual Degree) Electronics and Communications Engineering

Offered by

University School of Information communication and Technology

1ST SEMESTER TO 8TH SEMESTER



GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

Guru Gobind Singh Indraprastha University

Dwarka, Sector 16/C, New Delhi – 110 078 [INDIA]

www.ipu.ac.in

Entrepreneurship Employability Skill development

Bachelor of Technology (Electronics and Communications Engineering)

Programme Education Objectives (PEO)

- PEO 1: To be well acquainted with fundamentals of Electronics & Communication Engineering for leading a successful career in industry or as an entrepreneur or pursuing higher education.
- PEO 2: To inculcate rational approach towards constantly evolving technologies with ethical responsibilities.
- PEO 3: To foster technical skills for innovative solutions in Electronics & Communication Engineering or related areas.
- PEO 4: To participate in life-long learning in the relevant domain for addressing global societal needs.

Programme Specific Outcomes (PSO)

On completion of the programme of study, the students will have the ability to:

- PSO1: To understand and analyse the principles and working of different electronic systems.
- PSO2: To utilize their knowledge, skills and resources to demonstrate and implement technology-based systems as per the requirement.
- PSO3: To offer real time and efficient solutions problems that are directly or indirectly related to Electronics and Communication Engineering areas and will contribute towards the development of society.
- PSO4: Ability to collaborate different fields of science and technology with right blend of attitude and aptitude for placements and higher education or to become a successful Entrepreneur and a worthy global citizen.

Semester I

Paper Code	Paper ID	Paper	C	L	T	P
Theory						
HS101	98101	Communications Skills – I	3	2	1	-
BA105	99103	Theory and Technology of Semiconductors	3	3	0	-
IT105	15105	Introduction to Computers	3	3	0	-
EC107	101107	Network Analysis	3	3	0	-
BA109	99109	Mathematics – I	4	3	1	-
BA111	99111	Physics – I	3	2	1	-
*HS119	98119	Impact of Science and Technology on Society - I	1	1	-	-
Practical						
BA151	99151	Theory and Technology of Semiconductors Lab.	1	-	-	2
BA153	101153	Engineering Physics – I Lab.	1	-	-	2
IT155	15155	Computer Lab.	1	-	-	2
IT157	15157	Engineering Graphics – I Lab.	1	-	-	2
EC159	101159	Network Analysis Lab.	1	-	-	2
HS161	101161	Communications Skills - I Lab.	1	-	-	2
Total			26	17	3	12

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Semester II

Paper Code	Paper ID	Paper	C	L	T	P
Theory						
HS102	98102	Communications Skills – II	3	2	1	-
EC104	101104	Analog Electronics – I	3	3	0	-
EM106	99106	Environment Studies	3	2	1	-
BA108	99108	Mathematics – II	4	3	1	-
BA110	99110	Physics – II	3	2	1	-
EC112	101112	Signals and Systems	3	2	1	-
*HS126	98126	Impact of Science and Technology on Society - II	1	1	-	-
Practical						
EC152	101152	Analog Electronics – I Lab	2	-	-	4
IT154	15154	Engineering Graphics – II Lab.	1	-	-	2
BA156	99156	Physics – II Lab.	1	-	-	2
EM158	99158	Environment Studies Lab.	1	-	-	2
HS160	98160	Communications Skills– II Lab.	1	-	-	2
Total			26	15	5	12

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Semester III

Paper Code	Paper ID	Paper	C	L	T	P
Theory						
IT201	15201	Computational Techniques	4	3	1	-
EC203	101203	Communications Systems – I	4	3	1	-
EC205	101205	Engineering Electromagnetics	4	3	1	-
IT207	15207	Object Oriented Programming Using C++	4	3	1	-
EC209	101209	Digital Electronics	4	3	1	-
EC211	101211	Analog Electronics – II	4	3	1	-
Practical						
EC251	101251	Computational Techniques Lab.	1	-	-	2
EC253	101253	Communications Systems – I Lab	1	-	-	2
EC255	101255	Object Oriented Programming Using C++ Lab.	1	-	-	2
EC257	101257	Digital Electronics Lab.	1	-	-	2
EC259	101259	Analog Electronics – II Lab.	1	-	-	2
Total			29	18	6	10

Semester IV

Paper Code	Paper ID	Paper	C	L	T	P
Theory						
EC202	101202	VHDL based Design	4	3	1	-
EC204	101204	Communications Systems – II	4	3	1	-
EC206	101206	Transmission Lines, Waveguides and Antennas	4	3	1	-
EC208	101208	Control Engineering	4	3	1	-
EC210	101210	Data Structures and Algorithms	4	3	1	-
EC212	101212	Computer Architecture and Operating Systems	4	3	1	-
Practical						
EC252	101252	VHDL based Design Lab.	1	-	-	2
EC254	101254	Communications Systems – II Lab.	1	-	-	2
EC256	101256	Control Engineering Lab.	1	-	-	2
EC258	101258	Data Structures and Algorithms Lab.	1	-	-	2
Total			28	18	6	8

Semester V

Paper Code	Paper ID	Paper	C	L	T	P
Theory						
EC301	101301	Microwave Devices and Circuits	4	3	1	-
EC303	101303	Microprocessors and Interfacing	4	3	1	-
EC305	101305	Microelectronics	4	3	1	-
EC307	101307	Relational Database Management Systems	4	3	1	-
EC309	101309	Stochastic Systems and Processes	4	3	1	-
MS311	101311	Principles of Management	2	2	-	-
Practical						
EC351	101351	Microwave Devices and Circuits Lab.	1	-	-	2
EC353	101353	Microprocessors and Interfacing Lab.	1	-	-	2
EC355	101355	Microelectronics Lab.	1	-	-	2
EC357	101357	Relational Database Management Systems Lab.	1	-	-	2
*EC359	101359	Summer Training (held at the end of the IVth semester) Report	1	-	-	-
Total			27	17	5	8

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Semester VI

Paper Code	Paper ID	Paper	C	L	T	P
Theory						
EC302	101302	Digital System Processing and Applications	4	3	1	-
EC304	101304	Computer Networking	4	3	1	-
EC306	101306	Information Theory and Coding	4	3	1	-
EC308	101308	Telecommunications Networks	4	3	1	-
EC310	101310	Opto – Electronics and Optical Communications	4	3	1	-
EC312	101312	Mobile Communications	4	3	1	-
Practical						
EC352	101352	Digital System Processing and Applications Lab.	1	-	-	2
EC354	101354	Computer Networks Lab.	1	-	-	2
EC356	101356	Telecommunications Networks Lab.	1	-	-	2
EC358	101358	Opto-Electronics and Communications Lab.	1	-	-	2
Total			28	18	6	8

Semester VII

Paper Code	Paper ID	Paper	C	L	T	P
Theory						
IT 417	101417	Embedded Systems	4	3	1	-
EC401	101401	Satellite Communication	4	3	1	-
Electives (Choose any two)						
EC405	101405	Measurement and Instrumentation	4	3	1	-
IT407	101407	Artificial Intelligence	4	3	1	-
EC411	101411	Neural Networks and Applications	4	3	1	-
EC413	101413	Software Engineering	4	3	1	-
EC415	101415	Radar and Navigation Engineering	4	3	1	-
EC417	101417	Reliability Engineering	4	3	1	-
EC421	101421	Radio and Television Engineering	4	3	1	-
MS425	101425	Principles of Organizational Behaviour	4	4	-	-
Practical						
EC451	101451	Embedded Systems Lab.	1	-	-	2
EC453	101453	Laboratory work based on Electives or MATLAB	2	-	-	4
EC455	101455	Minor Project	4	-	-	8
*EC457	101457	Summer Training (held at the end of the VIth semester) Report	1	-	-	-
Total			24	12-14	2-4	14

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Semester VIII

Paper Code	Paper ID	Paper	C	L	T	P
Theory						
*HS402	98402	Technical Writing	2	2	-	-
*HS424	98424	Ethics and Moral Values	1	1	-	-
Electives (Choose any two)						
IT404	15404	Advanced Computer Architecture	4	3	1	-
EC406	101406	IC Design	4	3	1	-
EC408	101408	Power Electronics	4	3	1	-
IT410	15410	Soft Computing	4	3	1	-
EC412	101412	Multimedia Communications	4	3	1	-
MS416	101416	Principles of Human Resource Management	4	4	-	-
EC418	101418	Digital Image Processing and Applications	4	3	1	-
EC420	101420	Fuzzy Logic and Systems	4	3	1	-
EC422	101422	Linear and Nonlinear Optimization Techniques	4	3	1	-
EC424	101424	Advances in Wireless Communications	4	3	1	-
EC426	101426	Object Oriented Programming Using Java	4	3	1	-
Practical						
EC452	101452	Laboratory work based on Elective or MATLAB	2	-	-	4
EC454	101454	Major Project	8	-	-	16
*EC456	101456	Seminar and Progress Report	1	-	-	-
Total			22	8-10	0-2	20

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**The student will submit a synopsis at the beginning of the semester for approved by the school committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

Note:

1. The total no. of credits of the Programme B. Tech. (ECE) =210
2. Each student shall be required to appear for examination in all courses. However, for the award of the degree a student shall be required to earn a minimum of 200Credits.

Code: HS 101
Paper ID: 98101

Paper: Communication Skills – I

L
2

T/P
1

C
3

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks :60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

I. Remedial Grammar

- (a) Simple sentences – their phrase structure
- (b) Parts of speech
- (c) Tense and concord
- (d) Gerunds, Participles & Infinitives
- (e) Complex and Compound sentences (Use of connectives)
- (f) Conditional clauses
- (g) Question tags & short responses
- (h) Common errors

II. Vocabulary and Usage

- (a) Synonyms & Antonyms
- (b) One word substitutions
- (c) Words often confused
- (d) Idioms / Idiomatic expressions
- (e) Foreign Phrases (Greek and Latin)

III. Presentation of Technical Information:

Technical description of

- (a) Simple objects, tools, appliances
- (b) Processes and operations
- (c) Scientific principles

IV. Composition:

- (a) Comprehension – Unseen passages
- (b) Dialogues – Creation of mock situations.
- (c) Debates – Discussing the pros and cons of a given topic.
- (d) Thematic Appreciation Exercises / Development of situational outlines.

V. Prose

Selected prose pieces from prescribed texts.

Code:BA105		L	T/P	C
PaperID:99103	Paper: Theory and Technology of Semiconductors	3	1	4

SKILL DEVELOPMENT & EMPLOYABILITY

Unit I:

(Each unit of 10 hours.)

Crystal Properties and Growth of Semiconductors: Types of Solids and their electrical properties, Semiconductor Materials, Periodic Structures, Crystal Lattices, Bulk Crystal Growth, Starting Materials, Wafers, Doping, Epitaxial Growth, Lattices Matching in Epitaxial Growth, Vapor Phase Epitaxy, Molecular Beam Epitaxy.

Atoms and Electrons: Physical Models, Experimental Observations, Photoelectric Effect, Atomic Spectra, Quantum Mechanics, Uncertainty Principle, Schrodinger Wave Equation, Potential Well Problem, Tunnelling, Atomic Structure and the Periodic Table, The Hydrogen Atom.

Unit –II:

Energy Bands and Charge Carriers in Semiconductors: Band theory for solids, semiconductors types, Charge carriers and their properties. Fermi Level Invariance of the Fermi level at equilibrium, Carrier concentration at Equilibrium, Temperature and doping effect on carrier concentration, conductivity and mobility, Compensation and Space Charge Neutrality, Effect of Electric and Magnetic Fields, Drift and Resistance, High – field effects, The Hall effect.

Unit – III:

Excess Carriers in Semiconductors: Optical absorption, Optical and Electro Luminescence, photoconductivity, direct and indirect combination of electrons and holes, Steady state Carrier Injection, carrier diffusion and drift, Diffusion Length, Haynes Shockley Experiment, Gradients in Quasi Fermi Level.

Unit – IV:

Junctions: Fabrication of p-n Junction (Thermal oxidation, diffusion, rapid thermal processing, ion implantation, chemical vapor deposition, photolithography, etching metallization). Contact potential, Equilibrium Fermi Levels, Space Charge at Junction, Junction Biasing, Current flow across junction, Zener breakdown, Rectifiers, Transient and AC conditions, Variation of stored charge, capacitance of p-n junctions, Transition region properties, Ohmic losses, graded junctions, Metal-semiconductor Junctions, Schottky Barriers, Rectifying contacts, Ohmic contacts, Hetrojunctions, different types of diodes and their prioperties. Optical Devices and their properties, Semiconductor Power Devices.

Text/Reference:

1. B. Streetman, “Solid State Electronic Devices”, Prentice Hall,1994.
2. D. A. Neamen, “Semiconductor Physics and Devices: Basic Principles”, McGraw Hill, 2003 (3rdEd.).
3. S. M. Sze and K. K. Ng, “Physics of Semiconductor Devices”, Wiley, 2007 (3rdEd.).

Code : IT105
Paper ID:15105

Paper: Introduction To Computers

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks :60

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks. Apart from Question No. 1, the students should be asked to attempt 2 questions from unit I (1 question out of 2) and attempt 3 questions from Unit II (3 questions out of 5).

SKILL DEVELOPMENT & EMPLOYABILITY

Unit – I

Introduction: Overview of computer organization and historical perspective computer applications in various fields of science and management.

Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions. Binary arithmetic, Floating point arithmetic, signed and unsigned numbers.
Data Storage: Primary and Secondary storage, Introduction to various computer devices such as keyboard, mouse, printers, disk files, floppies etc. Concept of computing, contemporary, Operating Systems such as DOS, Windows'95, UNIX etc. (only brief user level description). Introduction to organization and architecture of mainframe, mini and micro systems. Introduction to E-mail, ftp, login and other network services, world wide web, MS-Office.

Introduction to Programming: Concept of algorithms, Flow charts, Example of Algorithms such as how to add ten numbers, roots of a quadratic equation. Concept of sequentially following up the steps of an algorithm. Notion of program, programmability and programming languages, Structure of programs, Object codes, compilers.

Introduction to the Editing tools such as vi or MS-VC editors. Concepts of the finite storage, bits, bytes, kilo, mega and gigabytes, Concepts of character representation. (11 hours)

Unit – II

- **Programming using C:** The emphasis should be more on programming techniques rather than the language itself. The C programming language is being chosen mainly because of the availability of the compilers, books and other reference materials. Example of some simple C program. Dissection of the program line by line, Concepts of Variables, program statements and function calls from the library (printf for example)
- C data types, int, char, float etc.
- C expressions, arithmetic operations, relational and logic operations.
- C assignment statements, extension of assignment to the operations. C primitive input output using getch and putchar, exposure to the scanf and printf functions.
- C statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.
- Concepts of loops, example of loops in C using for, while and do-while, Optionally continue may be mentioned.
- One dimensional arrays and example of iterative programs using arrays, 2-d arrays. Use in matrix computations.
- Concept of Sub-programming, functions, Example of functions, Argument passing mainly for the simple variables.
- Pointers, relationship between arrays and pointers, Argument passing using pointers, Array of pointers, Passing arrays as arguments.
- Strings and C string library
- Structures and Unions. Defining C structures, passing strings as arguments, programming examples.
- File I/O, Use of fopen, fscanf and fprintf routines etc. (30 Hours)

Code: EC 107

Paper ID: 101107

Paper: Network Analysis

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks :60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

(Each unit of 10 hours.)

Unit – I:

Circuits: Voltage, Ideal Voltage Source, Current Ideal Current Sources, Classification of Circuits, Ohm's Law, Resistively, Temperature Effect, Resistors, Resistor Power Absorption, Nominal Values and Tolerances, Colour Codes, Open and Short Circuits, Internal Resistance. Operational Amplifiers. Capacitance, Inductance, Transformers.

Unit - II:

DC Circuits: Series and Parallel Circuits, Kirchoff's Voltage and Current Law, Mesh Analysis, Loop Analysis, Nodal Analysis, Thevenin's and Norton's Theorem, Maximum Power Transfer Theorem, Superposition Theorem, Millman's Theorem, Tellegens Theorem, Y - Δ and Δ - Y Transformation, Bridge Circuits.

Unit – III:

AC Circuits: Circuits containing Capacitors and Inductors, Transient Response, Alternating Current and Voltages, Phasors, Impedances and Admittance, Mesh Analysis, Loop Analysis, Nodal Analysis, Thevenin's and Norton's Theorem, Y - Δ and Δ - Y Transformation, Bridge Circuits. Resonant Circuits, Complex Frequency and Network Function, Maximum Power Transfer Theorem, Superposition Theorem.

Unit IV:

Two port Networks. Passive Filters. Graph Techniques for Network Analysis, Laplace Transforms, Fourier series and Transform Methods for Network Analysis.

Text/Reference:

1. K. S. S. Kumar, "Electric Circuits and Networks", Pearson, 2009.
2. van Valkenberg, "Network Analysis", PHI/Pearson, 2000.
3. J. W. Nilsson and S.A. Riedel, "Electric Circuits", Pearson, 2008.
4. D. R. Choudhary, "Networks and Systems" New Age International, 1999.

Code: BA 109
Paper ID: 99109

Paper: Mathematics - I

L	T/P	C
2	1	3

I(a) Calculus of functions of Onevariable

(i) Successive Differentiation, Leibnitz's theorem (without proof). Lagrange's Theorem, Cauchy Mean value theorems, Taylor's theorem (without proof), Remainder term, Asymptotes, Curvature, Curve Tracing.

14 hrs

(ii) Infinite Series: Convergence, divergence, Comparison test, Ration Test, Cauchy nth root test, Leibnitz's test (without proof), Absolute and Conditional Convergence, Taylor and Meclaurin series, Power Series, Radius of Convergence.

5 hrs

(iii) Integral Calculus: Reduction Formulae of trigonometric functions, Properties of definite Integral, Applications to length, area, volume, surface of revolution, Definition of improper integrals, Beta-Gamma functions.

8 hrs

I(b) Calculus of Functions of several variables:

Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials. Maxima, Minima and saddle points, Method of Lagrange multipliers. Differentiation under Integral sign, Jacobians and transformations of coordinates. Double and Triple integrals. Simple applications to areas, Volumes etc.

12 hrs

II Vector Calculus:

Scalar and vector fields, Curves, Arc length, Tangent, normal, Directional Derivative, Gradient of scalar field, divergence and curl of a vector field. Line integral (independent of path), Green's theorem, Divergence theorem and Stoke's theorem (without proofs), Surface Integrals.

12 hrs

Text/Reference:

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic Geometry", 6th edition, Addison-Wesley/Narosa, 1985.
2. Shanti Narayan, "Differential Calculus", S. Chand & Co.
3. Shanti Narayan, "Integral Calculus", S. Chand & Co.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publ.
5. E. Kreyszig, "Advanced Engineering Mathematics", 5th Edition, Wiley Eastern, 1985.
6. Murray R. Spiegel, "Theory and Problems of Vectors Analysis", Schaum's Outline Series, Mc Graw Hill Ed.
7. S.C. Malik, "Mathematical Analysis", Wiley Eastern Ltd.
8. "Advanced Calculus", Schaum's Outline Series, Mc Graw Hill Ed.
9. Widder, "Advanced Calculus", 2nd Edition, Prentice Hall Publishers.

Code: BA 111		L	T/P	C
Paper ID: 99111	Paper: Physics – I	2	1	3

I OPTICS

Polarization

Types of polarization, elliptically and circularly polarized light Brewsters law, Malu's law, Nicol prism, double refraction, quarter-wave and half-wave plates, optical activity, specific rotation, Laurent half shade polarimeter.

5 hrs.

Interference

Coherence and coherent sources, interference by division of wave front (young's double slit experiment, Fresnel's biprism), interference by division of amplitude (thin films, Newton's rings, Michelson's interferometer, Fabry Perot interferometer)

7 hrs.

Diffraction

(Fresnel and Fraunhofer types of diffraction) Fraunhofer diffraction: Single slit, double slit, circular aperture and N-slit, diffraction grating wavelength determination, resolving power and dispersive power, Fresnel Diffraction: Zone plate, circular aperture, opaque circular disc, narrow slit.

7 hrs.

II LASER AND FIBREOPTICS

Lasers

Introduction, coherence, Einstein A and B coefficients, population inversion, basic principle and operation of a laser, type of lasers, He-Ne laser, Ruby laser, semiconductor laser, holography-theory and applications.

5 hrs.

Fibre Optics:

Introduction to optical fibre, types of optical fibres and their characteristics, (Attenuation and dispersion step index and graded index fibres, principle of fibre optic communication-total internal reflection, numerical aperture, fibre optical communication network (qualitative)-its advantages.

5 hrs.

III Theory of relativity

Absolute and Inertial frames of reference, Galenlian transformations, Michelson-Morley experiment, the postulates of the special theory of relativity, Lorentz transformations, time dilation, length contraction, velocity addition, mass energy equivalence.

5 hrs.

Recommended Books

1. Concepts of Modern Physics: A.Beiser
2. Modern Physics: KennethKrane
3. Fundaments of Optics: Jenkins andWhite
4. Optics:Ghatak
5. Fundamental of Physics by RESNICK &HALLIDAY

Paper Code: HS -119

L	T/P	C
1	-	1

Paper ID-98119 Paper :Impact of Science and Technology on society I

Unit – I:

Sociology of Scientific Knowledge: What is the relationship between science and the social?–Conventional view of philosophers and historians of science-Sociology of Science (Karl Manheim-Robert K. Merton)

Unit – II:

Social Function of Science-(Joseph Bernal)-The Radical Science Movement-the Kuhnian intervention-Science as a social activity: Strong Programme-Laboratory Studies/ethnography of science- Actor Network Theory (Bruno Latour)-communicating science to peers- scientific controversies-public engagement with S&T-the changing configuration of science- mode II knowledge production

Unit – III:

Technology – Society Interface Technoscience and the Interpenetration of Science & Technology Questioning of the traditional boundary between science (knowing) and technology (doing)—how science and technology together shape the ways in which knowledge is constructed---Technological Determinism, Power and the Politics of Knowledge Production

Unit - IV

Social-Psychological Theories of Innovation: What are the bases of innovation? Whether everyone is innovative? Why one is innovative and others are not? Such individual level question will be asked in this unit and try to look into individual level motivation to innovate, neurophysiological basis of innovations and social factors which affect innovations.

Text Books:

- 1.Collins, Harry and Pinch, Trevor 1993 : The Golem: What Everyone should Know about Science. Cambridge: Cambridge University Press.
- 2.Hess, David J. 1995. Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artefacts. New York: Columbia Press.
3. Hess, David J. 1997. Science Studies: An Advanced Introduction. New York: NewYork University Press.
4. Jasanoff, Sheila et al. (eds.). 1995. Handbook of Science and Technology Studies. Thousand Oaks, CA: Sage Publications.

Practicals:

Code: BA151 Paper ID:99151 **Paper: Theory and Technology of Semiconductors Lab.** **L 0 T/P 2 C 1**

This lab course will be based on Theory and Technology of Semiconductors (BA 105). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: BA153 Paper ID:99153 **Paper: Engineering Physics– I Lab.** **L 0 T/P 2 C 1**

This lab course will be based on Physics – I (BA111). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: IT155 PaperID:15155 **Paper: ComputerLab.** **L 0 T/P 2 C 1**

This lab course will be based on Introduction to Computers (IT105). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

PaperID:15157 **Paper: Engineering Graphics–I** **0 2 1**

1. **General**
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic projections, B.I.S. Specifications.
2. **Projections of Points and Lines**
Introduction of planes of projection, Reference and auxiliary planes, projections of points and lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on auxiliary planes, shortest distance intersecting and non-intersecting lines.
3. **Planes Other than the Reference Planes**
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., projections of points and lines lying in the planes, conversion of oblique plane into auxiliary plane and solution of related problems.
4. **Projections of Plane Figures**
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes). Obtaining true shape of the plane figure by projection.
5. **Projection of Solids**
Simple cases when solid is placed in different positions, Axis, faces and lines lying in the faces of the solid making given angles.
6. **Development of Surface**
Development of simple objects with and without sectioning.
7. **Nomography**
Basic concepts and use.

Code: EC159		L	T/P	C
Paper ID:101159	Paper: Network Analysis Lab.	0	2	1

This lab course will be based on Network Analysis (EC107). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: HS161		L	T/P	C
Paper ID:98161	Paper: Communications Skills – I Lab.	0	2	1

This lab course will be based on Communications Skills – I (HS101). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: HS102
Paper ID:98102

Paper: Communication Skills – II

L	T/P	C
1	2	3

COURSE OUTCOMES:

1. Understand the medium of communication.
2. Ability to write technical reports and business letters.
3. Ability to speak with clarity and fluency.
4. Ability to participate in a group discussion and have effective listening capability.

1. Some Key Concepts:

Communication as sharing; context of communication; the speaker/writer and the listener/reader; medium of communication; barriers to communication; accuracy, brevity, clarity and appropriateness in communication.

2. Writing:

Selecting material for expository, descriptive, and argumentative pieces; business letters; formal report; summarizing and abstracting; expressing ideas within a restricted word limit; paragraph division, introduction and the conclusion; listing reference material; use of charts, graphs and tables; punctuation and spelling; semantics of connectives, modifiers and modals, variety in sentences and paragraphs.

3. Reading Comprehension:

Reading at various speeds (slow, fast, very fast), reading different kinds of texts for different purposes (e.g., for relaxation, for information, for discussion at a later stage, etc.); reading between the lines.

4. Speaking:

Achieving desired clarity and fluency; manipulating paralinguistic features of speaking (voice quality, pitch, tone, etc.); pausing for effectiveness while speaking, task-oriented, interpersonal, informal and semiformal speaking; making a short classroom presentation.

5. Group Discussion:

Use of persuasive strategies including some rhetorical devices for emphasizing (for instance; being polite and firm; handling questions and taking in criticism of self; turn-taking strategies and effective intervention; use of body language).

6. Listening Comprehension:

Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English and American English, intelligent listening in situations such as an interview in which one is a candidate.

Code: EC 104**Paper ID: 101104 Paper: Analog Electronics – I**

L	T/P	C
3	1	4

INSTRUCTIONS TOPAPERSETTERS:**Maximum Marks :60**

1. Question No.1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10marks

(Each unit of 10 hours.)**Unit- I**

Junction Diode Characteristics: Review of semi conductor Physics – n and p –type semi conductors, Hall Effect, Fermi level in intrinsic and extrinsic semiconductors, Open-circuited p-n junction, The p-n junction Energy band diagram of PN diode, PN diode as a rectifier (forward bias and reverse bias), The current components in p-n diode, Law of junction, Diode equation, Volt-ampere characteristics of p-n diode, Temperature dependence of VI characteristic, Transition and Diffusion capacitances, Step graded junction, Breakdown Mechanisms in Semi Conductor (Avalanche and Zener breakdown) Diodes, Zener diode characteristics, Characteristics of Tunnel Diode with the help of energy band diagrams, Varactor Diode, LED, and photo diode

Unit- II

Trasister and FET Characteristics: Junction transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Detailed study of currents in a transistor, Transistor alpha, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, Relation between Alpha and Beta, typical transistor junction voltage values, JFET characteristics (Qualitative and Quantitative discussion), Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Symbols of MOSFET, Comparison of Transistors, Introduction to SCR and UJT.

Unit-III

Biasing and Stabilisation: BJT biasing, DC equivalent model, criteria for fixing operating point, Fixed bias, Collector to base bias, Self bias techniques for stabilization, Stabilization factors, (S , S' , S''), Compensation techniques, (Compensation against variation in V_{BE} , I_{CO}) Thermal run away, Thermal stability,

Unit-IV

Amplifiers and Oscillators: Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on input and output characteristics, Condition for oscillations. RC-phase shift oscillators with Transistor and FET, Crystal oscillators.

Text :

1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – Salivahanan and othersTMH.
3. Electronic Devices and Circuits – D. R. Cheruku and B. T. Krishna, Pearson,2008

References:

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.,1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill,1988.
4. Electronic Devices and Circuit Theory – R. L. Boylestad and L. Nashlesky, Pearson, 10th Ed.,2009.

Code: EM106
Paper ID: 99106

Paper: Environment Studies

L	T/P	C
2	1	3

INSTRUCTIONS TO PAPER SETTERS:		Maximum Marks :60
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.	
2.	Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks	

COURSE OUTCOMES:	
1.	The course is designed to impart basic knowledge of the environment and its components.
2.	The course deals in creating awareness about the energy resources and current environmental problems faced by the world.
3.	To understand and learn about environment pollution.
4.	Understand environmental laws and the role and types of polymers.

(Each unit of 7 hours.)

Unit-I:

Definition, scope and importance, need for public awareness, introduction to concept of green technology. Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forest 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. Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources-green fuel. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Resource Management-Sustainable development.

Unit-II:

Air Pollution - Types of pollutants, source, effects, sink & control of primary pollutants– CO, NO_x, HC, SO_x and particulates, effect of pollutants on man & environment: photochemical smog, acid rain and global warming, CO₂ Sequestration. Water Pollution - Classification of Pollutants, their sources, waste water treatment (domestic and industrial). Soil Pollution – Composition of soil, classification and effects of solid pollutants and their control.

Unit – III:

Solid Waste Pollution – Classification, waste treatment and disposal methods; composting, sanitary land filling, thermal processes, recycling and reuse methods. Hazardous wastes - Classification, radioactive, biomedical & chemical, treatment and disposal- Physical, chemical and biological processes. Marine Pollution – Causes, effects and control of marine pollution, coastal zone management. Toxic chemicals in the environment, Impact of toxic chemicals on enzymes, biochemical effects of arsenic, cadmium, lead, chromium, mercury, biochemical effects of pesticides.

Unit-IV:

Polymer synthesis, Environmental degradation of polymers, photodegradable polymers, hydrolysis and hydro- biodegradable polymers, biopolymers and bioplastics, thermal degradation of plastics during recycling.

Bioaccumulation, biodegradation, bioremediation, bioleaching, Biomethanation, Introduction, Basic principles of green technology, concept of Atom economy, Tools of Green technology, zero waste technology. Environmental Impact Assessment, Some important Environmental laws, Green bench, Carbon Credits, Environmental Management System standards-ISO 14000 series.

Text/Reference:

1. Roger Perman et. al., Natural Resources & Environmental Economics, 2nd Ed., Longman, USA,2000
2. Stern, A.C. (1980), Air Pollution, Vol. 1-VIII, AcademicPress.
3. James M., Lynch & Alan Wiseman, Environmental Bio-monitoring : The Biotechnology Ecotoxicology Interface, Cambridge University Press,1998.
4. John Glasson, Riki Therivel and Andrew Chadwick, Introduction to Environmental Impact Assessment, 2nd Ed., UCL Press, Philadelphia, USA,1994.
5. Richard K. Morgan, Environmental Impact Assessment: A methodological perspective, Kluwar Academic Publications, Boston,1998.
6. Gabriel Bitton, Wastewater Microbiology, 2nd Ed., Wiley-Liss, New York,1999.
7. Environmental Chemistry & Pollution Control, S. Chand & Co. (Latest ed.), By S.S.Dara
8. Environmental Chemistry, I.K. Publishers, 2007, BalaramPani
9. Environmental Chemistry, New Age Int. Publ. (Latest ed.), A.K.De.
10. Environmental Studies, S.K. Kataria Publ. . (Latest ed.), S.K.Dhamija.
11. A text book in Environmental Science, Narosa Publ. 2007, V.Subramanian.

Mathematics - II

Paper Code: BA – 108

L	T/P	Credits
3	1	4

COURSE OUTCOMES:

1. Ability to use linear algebraic techniques to solve problems.
2. Ability to use ODE techniques to solve problems.
3. Ability to use complex analysis techniques to solve problems.
4. Ability to use probabilistic techniques to solve problems.

I. Linear Algebra: Linear Independence and dependence of vectors, Systems of linear equations – consistency and inconsistency, Gauss elimination method, rank of a matrix, Bilinear, Quadratic, Hermitian, Skew – Hermitian Forms, Eigenvalues and Eigenvectors of a matrix, diagonalization of a matrix, Cayley – Hamilton Theorem (withoutproof).

10 hrs.

II. Ordinary Differential Equations: Formation of ODE's, definition of order, degree and solutions. ODE's of first order: Method of separation of variables, homogeneous and nonhomogeneous equations, exactness and integrating factors, linear equations and Bernoulli equations, operator method, method of undetermined coefficients and nonhomogenous, operator method, method of undetermined coefficients and variation of parameters. Solutions of simple simultaneous ODE's. Power series method of solution of DE, Legendre's Equation, Legendre's Polynomials, Bessel's equation, Bessel's function.

10 hrs.

III. Complex Variables: Curves and Regions in the Complex Plane, Complex Functions, Limits, Derivative, Analytic Function, Cauchy-Riemann Equations, Laplace's Equation, Linear Fractional Transformations, Conformal Mapping, Complex Line Integral, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivatives of Analytic Function, Power Series, Taylor Series, Laurent Series, Methods for obtaining Power Series, Analyticity at Infinity, Zeroes, Singularities, Residues, Residue Theorem, Evaluation of Real Integrals.

18 hrs.

IV. Probability: Definition of Sample Space, Event, Event Space, Conditional Probability, Additive and Multiplicative law of Probability, Baye's Law theorem, Application based on these results.

5 hrs.

Suggested Text Books & References

1. M. K. Singhal & Asha Singhal "Algebra", R. Chand & Co.
2. Shanti Narayan, "Matrices" S. Chand & Co.
3. G.B. Thomas and R.L. Finney, "Calculus and Analytic Geometry" Addison Wesley / Narosa.
4. E. Kreyszig, "Advanced Engineering Mathematics", 5th Edition, Wiley Eastern Ltd. 1985.
5. N. M. Kapoor "Differential Equations" Pitamber Pub. Co.

6. Schaum Outline Series “Differential Equations” Mc. GrawHill.
7. Schaum Outline Series “Complex Variables” Mc. GrawHill.
8. Schaum Outline Series “Linear Algebra” Mc. GrawHill.
9. Schaum Outline Series “Probability” Mc. GrawHill

PHYSICS - II**Paper Code: BA – 110**

L	T/P	Credits
2	1	3

COURSE OUTCOMES:

1. Understand quantum mechanical systems and solve simple problems.
2. Understand quantum statistical systems and solve simple problems.
3. Understand and use band theory of solids to explain working of diodes and transistors.
4. Understand how planar EM waves are generated.

I. Quantum Mechanics

Wave particle duality, de Broglie waves, evidences for the wave nature of matter – the experiment of Davisson and Germer, electron diffraction, physical interpretation of the wave function and its properties, the wave packet, the uncertainty principle

4 hrs.

The Schrodinger wave equation (1 – dimensional), Eigen values and Eigen functions, expectation values, simple Eigen value problems – solutions of the Schrodinger's equations for the free particle, the infinite well, the finite well, tunneling effect, simple harmonic oscillator (qualitative), zero point energy.

6 hrs.**II. Quantum Statistics**

The statistical distributions: Maxwell Boltzmann, Bose-Einstein and Fermi-Dirac statistics, their comparisons, Fermions and Bosons Applications: Molecular speed and energies in an ideal gas. The Black body spectrum, the failure of classical statistics to give the correct explanations – the applications of Bose-Einstein statistics to the Black body radiation spectrum, Fermi-Dirac distribution, free electron theory, electronic specific heats, Fermi energy and average energy – its significance.

10 hrs.**III Band Theory of Solids**

Origin of energy bands in solids, motion of electrons in a periodic potential – the Kronig – Penny model. Brillouin zones, effective mass, metals, semi-conductors and insulators and their energy band structures. Extrinsic and Intrinsic semiconductors, doping – Fermi energy for doped and undoped semiconductors, the p-n junction (energy band diagrams with Fermi energy), the unbiased diode, forward and reverse biased diodes – tunnel diodes, zener diode, photo diode its characteristics, LED, Introduction to transistors.

10 hrs.

IV Overview of Electro –Magnetism

Maxwell's Equations: The equation of continuity for Time – Varying fields, Inconsistency in ampere's law Maxwell's Equations, conditions at a Boundary Surface, Introduction to EM wave.

4 hrs.

Recommended Books

1. Concept of Modern Physics: A.Beiser
2. Modern Physics: Kenneth Krane
3. Solid State Physics byKittle
4. Electronic Principles:Malvino
5. Statistical Mechanics by Garg Bansal and Ghosh(TMh)

Code: EC 112**Paper ID: 101112 Paper: Signal and Systems**

L	T/P	C
2	1	3

INSTRUCTIONS TOPAPERSETTERS:**Maximum Marks :60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

COURSE OUTCOMES:

1. Understand the classification and properties of signals and systems.
2. Ability to understand Fourier series and Fourier transform. Application of Fourier transform to solve partial differential equations and apply to characterize linear systems (continuous and discrete).
3. Ability to understand Laplace and Z transform. Application of Laplace transform and Z-Transform to solve partial differential equations and apply to characterize linear systems (continuous and discrete, respectively).
4. Ability to design the structure of a filter.

(Each unit of 07 hours.)**Unit- I**

Continuous and discrete time signals: Classification of Signals – Periodic aperiodic even – odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – periodicity – properties of discrete time complex exponential unit impulse – unit step impulse functions – Transformation in independent variable of signals: time scaling, time shifting. Determination of Fourier series representation of continuous time and discrete time periodic signals – Explanation of properties of continuous time and discrete time Fourier series. Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals.

Unit – II:

Continuous time Fourier Transform and Laplace Transform analysis with examples – properties of the Continuous time Fourier Transform and Laplace Transform basic properties, Parseval's relation, and convolution in time and frequency domains. Basic properties of continuous time systems: Linearity, Causality, time invariance, stability, magnitude and Phase representations of frequency response of LTI systems -Analysis and characterization of LTI systems using Differential Equations and Continuous time LTI systems. Laplace transform: Computation of impulse response and transfer function using Laplace transform.

Unit – III:

Discrete time system analysis using Difference equations, Discrete Time Fourier Transform, Discrete Fourier Transform, FFT and their property and usage in the analysis of Discrete time systems.

Basic principles of z-transform - z-transform definition – region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between z-transform and Fourier transform. Properties of convolution and the interconnection of LTI Systems – Causality and stability of LTI Systems. Computation of Impulse & response & Transfer function using Z Transform.

Unit – IV:

Systems with finite duration and infinite duration impulse response – recursive and non-recursive discrete time system – realization structures – direct form – I, direct form – II, Transpose, cascade and parallel forms.

Text / Reference:

1. Alan V. Oppenheim, Alan S. Willsky with S. Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.
2. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, 3rd edn., PHI, 2000.
3. M. J. Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.
4. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999
5. K. Lindner, “Signals and Systems”, McGraw Hill International, 1999.
6. Moman .H. Hays, “Digital Signal Processing”, Schaum’s outlines, Tata McGraw-Hill Co Ltd., 2004.
7. B. P. Lathi, “Signal Processing and Linear System”, Berkeley Cambridge Press, 1998.
8. H. P. Hsu, “Schaum’s Outlines of The Theory and Problems of Signals and Systems”, McGraw-Hill, 1995.
9. S. Poornachandra, “Signal and Systems”, Thomson Learning, 2004.

Paper Code: HS -126

L	T/P	Credits
1	-	1

Paper ID-98126

Paper : Impact of Science and Technology on society II

Unit – I

Technology in Context: Perspectives in STS Studies This section examines various perspectives on Technology in STS studies A) Social Shaping of Technology B) Social Construction of Technology C) Actor Network Theory D) Transition in Socio-Technical Systems: Multi-Level Perspective E) Critical Theory of Technology

Unit – II

Gender and Technology How gender influences technologies and the social organization of scientific and technical workspaces---technologies constructed as masculine and feminine—technologies as both ‘liberating’ and ‘limiting’ women---contributions of Cynthia Cockburn & Donna Haraway

Unit – III

Public Engagement with Technology Contributions of Trench, Lewenstein, Jasanoff & Vishvanathan---governance and ethical issues in the context of emerging technologies-----constructing risk....role of State, civil society organizations and industry---regulatory dilemmas of transnational capitalism and influence of local contexts—democratisation and ‘up-stream’ public engagement with technology

Unit – IV

Innovation and its impact in the society: Whether all innovations are good or bad? Who are benefited from these innovations? Is there any difference between formal and informal sector innovations. These questions will be discussed in this unit. We will look into innovation and its role in the development process, what are the policy implications of innovation and some specific cases such as grassroots innovations will be taken up to understand the role of innovations in the society.

Text Books:

- 1.Collins, Harry and Pinch, Trevor 1993 : The Golem: What Everyone should Know about Science. Cambridge: Cambridge University Press.
- 2.Hess, David J. 1995. Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artefacts. New York: Columbia Press.
3. Hess, David J. 1997. Science Studies: An Advanced Introduction. New York: NewYork University Press.
4. Jasanoff, Sheila et al. (eds.). 1995. Handbook of Science and Technology Studies. Thousand Oaks, CA: Sage Publications.

Practicals:

Code:EC152	L	T/P	C
PaperID:101152 Paper: Analog Electronics – I and Signal and Systems Lab.	0	4	2

This lab course will be based on Analog Electronics – I (EC104) and Signals and Systems (EC112). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code:IT154	L	T/P	C
PaperID:15154 Paper: Engineering Graphics-III Lab.	0	2	1

Basic Concepts

1. I. S. drawing conventions, line symbols, kinds of line, drawing sheet lay-out, rules of printing, preferred scales.
2. Projections
Perspective, orthographic, isometric and oblique projections, isometric scale, isometric drawing, Technical sketching.
3. Shape Description (External)
Multiplanar representation in first- and third angle systems of projections, glass-box concept, sketching of orthographic views from pictorial views, precedence of lines.

Sketching of pictorial (isometric and oblique) views from Multiplanar orthographic views, Reading exercises, Missing line and missing view exercises.
4. Shape Description (Internal)

Importance of sectioning, principles of sectioning, types of sections, cutting plane representation, section lines, conventional practices.
5. Size Description

Dimensioning, tools of dimensioning, Size and location dimensions, Principles of conventions of dimensioning, Dimensioning exercises.
6. Computer Aided Drafting

Basic concepts and use.

Code: BA156		L	T/P	C
Paper ID:99156	Paper: Physics– II Lab.	0	2	1

This lab course will be based on Physics – II (BA110). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Practicals based on.

Code: EM158		L	T/P	C
Paper ID:99158	Paper: Environment Studies Lab.	0	2	1

This lab course will be based on Environment Studies (EM106). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: HS160		L	T/P	C
Paper ID:98160	Paper: Communications Skills - II Lab.	0	2	1

This lab course will be based on Communications Skills – II (HS102). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

SECOND SEMESTER

PaperID:15201		L T/P	C
PaperCode:IT201	Paper: Computational Methods	3 1	4

Prerequisites: BA-108 Maths I

Skill development and Employability

Unit – 1:

Errors in computation, Review of Taylor Series, Mean Value Theorem. Representation of numbers (integers and Floating Point). Loss of Significance in Computation. Location of Roots of functions and their minimization: Bisection method (convergence analysis and implementation), Newton Method (convergence analysis and implementation), Secant Method (convergence analysis and implementation). Unconstrained one variable function minimization by Fibonacci search, Golden Section Search and Newton's method. Multivariate function minimization by the method of steepest descent, Nelder-Mead Algorithm.

Unit – 2:

Interpolation and Numerical Differentiation: Interpolating Polynomial, Lagrange Form, Newton Form, Nested Form, Inverse Interpolation, Neville's Algorithm, Errors in interpolation, Estimating Derivatives and Richardson Extrapolation. Numerical Integration: Definite Integral, Riemann – Integral Functions, Trapezoid Rule, Romberg Algorithm, Simpson's Scheme, Gaussian Quadrature Rule.

Unit – 3:

Linear System of Equations: Conditioning, Gauss Elimination, Pivoting, Cholesky Factorization, Iterative Methods, Power Method Approximation by Spline Function: 1st and 2nd Degree Splines, Natural Cubic Splines, B Splines, Interpolation and Approximation.

Unit – 4:

Differential Equations: Euler method, Taylor series method of higher orders, Runge – Kutta method of order 2 and 4, Runge – Kutta – Fehlberg method, Adams – Bashforth – Moulton Formula. Solution of Parabolic, Hyperbolic and Elliptic PDEs. Implementation to be done in C/C++.

Text Books:

T[1] D. Kincaid and W. Cheney, “Numerical Analysis: Mathematics of Scientific Computing”, Thomson/Brooks-Cole.,2001.

Reference Books:

R[1] D. Kincaid and W. Cheney, “Numerical Analysis”, Thomson/Brooks-Cole., 2002.

R[2] R.L.BurdenandJ.D.Faires,“NumericalAnalysis”,Thomson/Brooks-Cole,2001.

R[3] W. Y. Yang, W. Cao, T.-S. Chung and J. Morris,“Applied Numerical Methods Using Matlab”, Wiley,2005.

R[4] J.H.MathewsandK.D.Fink,“NumericalMethodsUsingMatlab”,PrenticeHall,1999.

R[5] S. D. Conte and C. de Boor, “Elementary Numerical Analysis: An Algorithmic Approach”, McGraw Hill,1980.

R[6] J.D.Hoffman,“NumericalMethodsforEngineersandScientists”,MarcelDekkerInc.,2001. R[7]

J.StoerandR.Bulirsch,“IntroductiontoNumericalAnalysis”,Springer–Verlag,1993.

R[8] W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery, “Numerical Recipes in C”, CUP,2002.

R[9] W. Boehm and H. Prautzch, “Numerical Methods”, Universities Press,2005.

R [10] C. F. Gerald, and P. O. Wheatly, “Applied Numerical Analysis”, Pearson, 1994

R [11] H. M. Antia, “Numerical Methods for Scientists & Engineers”, Hindustan Book Agency, 2002.

Paper Code: EC-203

PaperID:101203

L T C

Paper: Communication System-I

3 1 4

Pre-requisites

EC-104 Analog Electronic –I

EC-107 Network Analysis

EC-112 Signals and Systems

Each unit is of 10hrs.)

Unit I

Introduction to Electronic Communication systems: Frequency spectrum of EM waves, Types of communications, Analog, pulse and digital, Need for modulation, Bandwidth and information capacity

Noise: Internal noise (Thermal, shot, Transit time Miscellaneous); External noise (Atmospheric, Industrial, Extra Terrestrial); Noise calculations; Noise figure; Noise temperature.[T1, R1, R2,R4]

Unit – II

Amplitude Modulation systems: Transmission (Principle, spectrum, efficiency, power and current calculation); AM envelop; AM Modulator circuits; AM transmitters; QAM; AM Receivers: Receiver Parameters; (Selectivity,sensitivity,dynamicrange,fidelity);TRFReceiver;Superhetrodynereceiver,LownoiseAmplifier, Mixer / converter, Noise limiter, Automatic Gain Control circuit

Single sideband communication systems: Single Sideband system, AM SSB full carrier, AM SSB reduced carrier, AM SSB suppressed carrier, AM independent sideband, AM vestigial sideband, Comparison of single sideband transmission to conventional AM, Single sideband generation methods; Single sideband transmitter[T1,T2, R1,R2,R3]

Unit-III

Angle Modulation system: Mathematical Analysis, Deviation sensitivity, Waveforms, Phase deviation and modulation index, Frequency analysis of angle modulated system, Bandwidth requirement of angle modulated system; Noise and angle modulation, Pre-emphasis and de-emphasis, Generation of FM waves, Demodulation of FM waves, Angle Modulation vs. amplitude modulation.[T1,T2,R2]

Unit –IV

Pulse Analog Modulation, Nyquist theorem: Practical sampling, PAM, PWM and PPM generation and detection.

Noise in CW modulation:Noise calculation in communications system, Noise in Amplitude modulation system, Noise in Angle modulated system, Narrowband noise. [T2,R1,R5,R6]

Text Books:

[T1] George Kennedy, "Communication System" TMH – 4th Edition

[T2] B.P.Lathi, "Modern Digital and Analog Communication System" Oxford University Press – 3rd Edition.

Reference Books:

- [R1] Simon Haykin , “Communication Systems” John Wiley & Sons, Inc 4th Edition.
- [R2] Taub Schilling, “Principles of Communication Systems” TMH, 2ndEdition
- [R3] W.Tomasi, “Electroniccommunicationssystemsbasicsthroughadvanced”, PearsonEducation, 2th ed,2004.
- [R4] J.C.Hancock, “AnIntroductiontothePrinciplesofCommunicationTheory”, McGrawHill, 1961 .
- [R5] S. Haykins, “Introduction to Analog and Digital Communication”, Wiley,1986.
- [R6] J.G.Proakis,M.S.alehi, “CommunicationsSystemsEngineering”, PHI,2nded,2002. [R7] D. Roddy and J. Coolen, “Electronic Communications”, PHI,1995.

Paper Code : EC-205

L T C

Paper : **Engineering Electromagnetics**

3 1 4

Pre-requisite

BA-109 Maths-I

BA-111 Physics-1

BA-110 Physics-II

BA-108 Maths II

(Each unit of 10 hours.)

UNIT-I

Review: Coordinate Systems, Vector Calculus with significance of Del operator.

Electrostatics: Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law of electrostatics, Electric Potential, Relations Between E and V, Maxwell's Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Linear, Isotropic and Homogeneous Dielectrics, Continuity Equation, Boundary Conditions, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors [T1, T2, T3, R1].

UNIT-II

Magneto Statics: Biot-Savart Law, Ampere's Circuital Law, Magnetic Flux Density, Maxwell's Two Equations for Static EM fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy. Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Integral and differential forms. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces. [T1, T2, T3, R1]

UNIT III

Electromagnetic Waves: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H. Sinusoidal Variations. Wave Propagation in Lossless and Conducting Media. Conductors & Dielectrics, Reflection by a perfect conductor, insulator with normal and oblique incidence, Brewster Angle, Polarization, Surface Impedance. [T1, T2, T3, R1]

UNIT IV

Guided Waves and Flow of power: Poynting Vector and Poynting Theorem, Applications, Power Loss in a Plane Conductor. Transmission line analogy, Waves between parallel planes, Characteristics of TE and TM waves. Transverse electromagnetic waves. Velocity of propagation and wave impedance. [T3, R1, R2]

TEXT BOOKS :

T1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.

T2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

T3. [Microwave Devices and Circuits, Samuel Y Liao](#)

REFERENCES :

R1. Engineering Electromagnetics – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.

R2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.

R3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.

PaperID: 15207

L T/P C

Code: IT207

Paper: Object Oriented Programming using C++

3 1 4

Employability and skill development

PREREQUISITES
IT-105 : INTRODUCTION TO COMPUTERS

Unit – 1:

Objects, relating to other paradigms (functional, data decomposition), basic terms and ideas (abstraction, encapsulation, inheritance, polymorphism).

Review of C, difference between C and C++, cin, cout, new, delete operators.

Unit – 2:

Encapsulation, information hiding, abstract data types, object & classes, attributes, methods. C++ class declaration, state identity and behavior of an object, constructors and destructors, instantiation of objects, default parameter value, object types, C++ garbage collection, dynamic memory allocation, metaclass/abstract classes.

Unit – 3:

Inheritance, Class hierarchy, derivation – public, private & protected; aggregation, composition vs classification hierarchies, polymorphism, categorization of polymorphic techniques, method polymorphism, polymorphism by parameter, operator overloading, parametric polymorphism, generic function – template function, function name overloading, overriding inheritance methods, run time polymorphism.

Unit – 4(Skill development ,Entrepreneurship)

Standard C++ classes, using multiple inheritance, persistent objects, streams and files, namespaces, exception handling, generic classes, standard template library: Library organization and containers, standard containers, algorithm and Function objects, iterators and allocators, strings, streams, manipulators, user defined manipulators, vectors, valarray, slice, generalized numeric algorithm.

Text:

- T[1] S.B.Lippman&J.Lajoie,“C++Primer”,3rdEdition,AddisonWesley,2000. T[2].
A.R.Venugopal,Rajkumar,T.Ravishanker“MasteringC++”,TMH

References:

- R[1] Rumbaugh et. al. “ Object Oriented Modelling & Design”, Prentice Hall
R[2] G.Booch“ObjectOrientedDesign&Applications”,Benjamin,Cummings.
R[3] E.Balaguruswamy, “Objected Oriented Programming with C++”, TMH
R[4] R. Lafore, “Object Oriented Programming using C++”,Galgotia.
R[5] D . Parsons, “Object Oriented Programming with C++”,BPBPublication.
R[6] Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas
Publication.

Paper Code: EC 209

Paper ID: 101209

Paper: Digital Electronics

L	T/P	C
3	1	4

Pre-requisites

- Basic Knowledge of semiconductors and Electrical Science

Unit -1

Analog & Digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra. Standard representation of Logical functions, K-map representation and simplification of logical functions, Quinn-McClusky's Algorithm, Don't care conditions, X-OR & X-NOR simplification of Kmaps.[T1,T3]

Unit – 2:

Combinational circuits: Multiplexers, demultiplexers, Decoders & Encoders, Adders & Subtractors, Code Converters, comparators, decoder/drivers for display devices.[T1,T3]

Sequential circuits: Flip Flops: S-R, J-K, D & T Flip-flops, excitation table of a flip-flop, Master– Slave Flip-Flops, Edge Triggered Flip Flop , Race around condition.[T1,T3]

Unit – 3:

Shift registers, Ripple counter, Design of Synchronous counters and sequence detectors. [T1,T3] 555 Timer and its application as mono-stable and as multi-vibrator,[T1,T2]

Nyquist Sampling Theorem, A / D and D / A converters: Binary-weighted DAC, R-2 R Ladder type networks, Successive approximation ADC, Linear-ramp ADC, Dual-slope ADC [T1,T2]

Unit – 4:

Bipolar-Transistor Characteristics, RTL and DTL circuits, TTL, ECL and CMOS Logic families.[T1,T3]

Logic Implementations using ROM, PAL & PLA [T1,T4]

Semiconductor Memories: Memory organization & operation, classification and characteristics of memories, RAM, ROM and content addressable memory.[T1,T3,T4]

Text:

[T1]. R.P. Jain, "Modern Digital Electronics", TMH, 2nd Ed,

[T2]. Malvino and Leach, "Digital principles and applications", TMH [T3].

Morris Mano, "Digital Design", PHI, 2nd Ed.

[T4]. R. J. Tocci, "Digital Systems", PHI, 2000

References

[R1] I. J. Nagrath, "Electronics, Analog & Digital", PHI, 1999.

[R2]. J.M. Yarbrough, "Digital Logic-Application and Design", PWSPublishing. [R3].

B. S. Nai, " Digital Electronics and Logic Design", PHI

[R4]. Balabanian and Carlson, "Digital Logic Design Principles", Wiley Pub.

Paper Code: EC-211

PaperID:101211

L T C

Paper: Analog Electronics–II

3 1 4

Pre-requisite

BA-103 Theory and Technology of Semiconductors

EC-104 Analog Electronics – I

(Each unit is of 10hrs.)

Unit I

Multistage Amplifiers: Cascaded amplifiers, Calculation of gain Impedance and bandwidth, Design of multistage amplifiers. RC coupled Amplifier, low frequency and high frequency response.

Power Amplifiers: Power dissipations in transistors, Harmonic distortion, Amplifiers Classification, (Class-A, Class-B, Class-C, Class-AB) Efficiency, Push-pull and complementary Push-pull amplifiers, Tuned amplifiers.[T1,R2,R4]

Unit – II

Building Blocks of Analog ICs: Differential amplifier, Op-amp Model, op-amp DC & AC parameters, virtual ground, Inverting and non-inverting amplifiers, differential amp, adders, Voltage to current, current to voltage Converter, Integrators, Differentiators, Current mirrors, Active loads, Level shifters[T2,R1,R3]

Unit-III

Linear & Non Linear Wave shaping: Clipping & Clamping Circuits Comparators, Schmitt trigger, Triangular and sine wave generator, Multivibrator: Monostable and Astable; log/antilog circuits using Op-amps, precision rectifiers [T2,R3]

Unit – IV

Active Filters: Idealistic & Realistic response of filters (LP, BP, HP), Butter worth & Chebyshev approximation filter functions, All pass filter, Notch Filter, Operational transconductance amplifier (OTA)-C filters.

Applications of IC Analog Multiplier: IC phase locked loops, IC voltage regulators, IC function generators. [T2,R3]

Text Books

[T1] Electronic Devices and Circuits—J. Millman, C. C. Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 2007

[T2] R. A. Gayakward, “Opamps and Linear Integrated Circuit” PHI – 3rd Edition.

Reference Books

[R1] Sedra Smith “Microelectronics Circuit” Oxford University Press, 4th Edition. [R2]

J. B. Gupta, “Electronic Devices & Circuits” S. K. Kataria—2nd Edition.

[R3] D. Roychaudhary, S. B. Jain, “Linear Integrated Circuits” New Age International—2000 [R4]

B. Kumar and S. B. Jain, “Electronic Devices and Circuits”, Prentice Hall of India, 2007

Code: EC251	L	T/P	C
Paper ID:101251 Paper: Computational Techniques Lab	0	2	1

This lab course will be based on Computational Techniques (IT201). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC253	L	T/P	C
Paper ID:101253 Paper: Communications Systems – I Lab	0	2	1

This lab course will be based on Communications Systems – I (EC 203). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC255	L	T/P	C
Paper ID:101255 Paper: Object Oriented Programming Using C++ Lab.	0	2	1

This lab course will be based on Object Oriented Programming Using C++ (IT207). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC257	L	T/P	C
Paper ID:101257 Paper: Digital Electronics Lab.	0	2	1

This lab course will be based on Digital Electronics (EC209). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC259	L	T/P	C
Paper ID:101259 Paper: Analog Electronics – II Lab	0	2	1

This lab course will be based on Analog Electronics – II (EC211). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper

Fourth Semester

ECE-202

VHDL Based Design:**Skill development and Employability**

Paper Code	Paper ID	Paper	C	L	T	
EC202	101202	VHDL based Design	4	3	1	

Pre-requisite**EC-209 Digital electronics****Each unit of 10 hours.)****UNIT I**

Introduction to logic families, Types of programming logic (SPLD,CPLD,FPGA,ASIC), Gajski-Kuhn Chart, Hardware-Software Co-design Design flow, VHDL design elements, program structure, types and constants, functions and procedures, libraries and packages. Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation synthesis.[T1,T2,R1,R2]

UNIT II

LOGIC DESIGN : Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Barrel shifter, comparators, floating-point encoder, dual parity encoder. Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design. Asynchronous design Methodology.[T1,T2,R1,R2]

UNIT III

TESTING THE DESIGN : Model Simulation , Synthesis, Scan Methodology, Full Scan and Partial Scan Boundary Scan , Writing a Test Bench, Different levels of test bench, Dumping Results in to file.[T1,T2,R1,R2]

UNIT IV**STATE MACHINES :**

Moore machine, Mealy Machine , Mealy and Moore variants, output = state machine , moore machine with clocked outputs, mealy machine with clocked output, state coding , Asynchronous state machines, VHDL coding [T1,T2,R2]

TEXT BOOKS :

- T1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
T2. VHDL Primer – J. Bhasker, Pearson Education/ PHI,3rd Edition.

REFERENCES :

- R1. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications,1998.
R2. Introduction to Logic Design – Alan B. Marcovitz,TMH,2nd Edition,2005.
R3. Fundamentals of Digital Logic with Verilog Design – Stephen Brown, Zvonko Vransesic, TMH, 2003.
R4. Cypress Semiconductors Data Book(Download from website).
R5. Fundamentals of Digital Logic with VHDL Design – Stephen Borwn and Zvonko Vramesic, McGraw Hill,2nd Edition.,2005.
R6. Linear Integrated Circuit Applications by K. Lal kishore, Pearson Educations 2005

EC-204

Paper Code: EC-204

PaperID:101204

L T C

Paper: CommunicationSystem-II

3 1 4

Pre-requisites

EC-112 Signals and Systems

EC203 Communication system I

(Each unit is of 10hrs.)

Unit I

Random Process Probability, Random variable, Random Process, mean, moments, correlation & autocorrelation and covariance functions, ergodicity, power spectral density, Gaussian distribution. [T2]

Unit – II

Baseband Modulation: Review of sampling theorem, uniform and non- uniform quantization, PCM, DPCM, DM, ADM, Mary waveforms, companding

Baseband Detection: Error performance degradation in communication system, maximum likelihood receiver structure, matched filters, error performance of binary signaling, inter symbol interference, demodulation and detection of shaped pulses, channel characterization, eye pattern [T1, T3]

Unit-III

Band pass modulation and demodulation: ASK, FSK ,PSK DPSK, QPSK MSK coherent and non coherent detection of ASK ,FSK ,PSK and other keying techniques.

Probability of bit error for coherently detected BPSK FSK differentially, DPSK etc and comparison of bit error performance for various modulation types.[T3,R2,R3,R4]

Unit – IV

Line coding: NRZ, RZ, walsh codes, AMI coding, High density bipolar code, binary with n-zero substitution codes.

Source & Channel coding: Concept of Information, Rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shannon hartly capacity theorem. Shannon Fano, Huffman and LZ coding. Error control coding: Introduction, Error detection and correction codes, block codes and convolution codes [T1, T3, R1]

Text Books:

- [T1] Taub Schilling, “Principles of Communication Systems” TMH, 2ndEdition
- [T2] Simon Haykin , “Communication Systems” John Wiley & Sons, Inc 4thEdition.
- [T3] B.P.Lathi,“ModernDigitalandAnalogCommunicationSystem”OxfordUniversityPress–3rd Edition.

Reference Books:

- [R1] Simon Haykin, “Digital communication Systems”, WileyPublishers
- [R2] W.Tomasi,“Electroniccommunicationssystemsbasicsthroughadvanced”,PearsonEducation, 2th ed,2004.
- [R3] S. Haykins, “Introduction to Analog and Digital Communication”, Wiley,1986.
- [R4] J. G. Proakis, M. S.alehi, “Communications Systems Engineering”, PHI, 2nded,2002.

Paper Code : EC-206

L T C

Paper : Transmission Lines, Waveguides and Antennas

3 1 4

Pre-requisite

BA-109 Maths-I

BA-111 Physics-I

BA-110 Physics-II

BA-108 Maths II

EC-205 : Engineering Electromagnetics

(Each unit of 10 hours.)

UNIT I

Transmission line theory: Different types of transmission lines – Definition of Characteristic impedance and Propagation Constant. General Solution of the transmission line – The two standard forms for voltage and current of a line terminated by an impedance. Input impedance of a lossless line terminated by impedance, Meaning of reflection coefficient – wavelength and velocity of propagation. Distortionless transmission line, Standing wave ratio on a line, The quarter wave line and impedance matching, single stub matching and double stub matching The Smith Chart – Application of the

Smith Chart – Conversion from impedance to reflection coefficient and vice-versa. Impedance to Admittance conversion and vice-versa. [T3, T4, T5]

UNIT II

Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics, Transverse Electromagnetic waves – Velocities of propagation – component uniform plane waves between parallel planes – Attenuation of TE and TM waves, Wave impedances. Transverse Magnetic Waves in Rectangular Waveguides – Transverse Electric Waves in Rectangular Waveguides – characteristic of TE and TM Waves – Cutoff wavelength and phase velocity – Impossibility of TEM waves in waveguides – Dominant mode in rectangular waveguide – Attenuation of TE and TM modes in rectangular waveguides – Wave impedances – characteristic impedance – Excitation of modes. [T4, T5, T6]

UNIT III

Circular waveguides and resonators. Bessel functions – Solution of field equations in cylindrical coordinates – TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide – excitation of modes – Microwave cavities, Rectangular cavity resonators, circular cavity resonator, semicircular cavity resonator, Q factor of a cavity resonator for TE₁₀₁ mode. [T4, T5, T6]

UNIT –IV

Introduction to antenna Characteristics, Power radiated by a current element, Hertzian dipole, Half wave dipole Antenna, Quarter wave monopole antenna, Far field approximation, Loop antenna, Transmission loss between antennas, Antenna temperature and signal to noise ratio, Antenna arrays, Radiation from a current sheet, Radiation from electromagnetic horns. Parabolic reflector antenna for satellite communications, Microstrip antennas. [T2, T3, T4, T5, T6]

TEXT BOOKS

T1. J.D. Ryder "Networks, Lines and Fields", PHI, New Delhi, 2003. (Unit I & II)

T2. E.C. Jordan and K.G. Balmain "Electromagnetic Waves and Radiating Systems", PHI, New Delhi, 2003.

T3. **Transmission Lines** And Networks by **Umesh Sinha**

T4. **ELECTRONIC COMMUNICATION SYSTEMS** BY **KENNEDY AND DAVIS**

T5. **Antenna** and Wave Propagation by **K.D. Prasad**

T6. [Microwave Devices and Circuits, Samuel Y Liao](#)

REFERENCES BOOKS

R1. Ramo, Whineery and Van Duzer: "Fields and Waves in Communication Electronics" John Wiley, 2003.

R2. David M. Pozar: Microwave Engineering – 2nd Edition – John Wiley.

R3. . Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001

Paper Code:EC-208

L T C

PaperID101208

3 1 4

Paper : **Control engineering**

Pre-requisites

EC-204 Analog Electronics-I

EC-107 Network Analysis

EC-112 Signals and Systems

Unit I

Definitions of Control Systems, Closed Loop and Open Loop Control, Examples of Control Systems; Laplace Transformation and Solution of Differential Equations; Concept of Mathematical model, Linear and Non-Linear Systems, Transfer Function with Simple Examples; Deriving transfer function of physical systems (Mechanical Translational Systems), Armature controlled and field controlled DC servomotors; AC servomotors and deriving their transfer functions; Block Diagram representation and Simplification.

Unit II

Signal Flow graph, Mason gain formula; Basic Control Actions: Proportional, integral and Derivative controllers, effect of feedback on control system; Transient and steady state response of first order system; Second order system, transient; Routh's Stability criterion, relative stability analysis; Static error co-efficients, position, velocity and acceleration error co-efficients.

Unit III

Root Locus Techniques Bode Diagram, Minimum and Non-Minimum phase systems; Determination of Transfer from Bode Diagram; Polar Plots; Nyquist Plot; Stability Analysis using; Constant M & N loci.

Unit IV

Introduction to Compensators; Definitions of state, state variables, state space, representation of systems; Solution of time invariant, homogeneous state equation, state transition matrix and its properties; Z transform and solution of different equation; Transducers, synchro-transmitter; Stepper Motor, Tachogenerators; Rotating Amplifiers and Magnetic Amplifiers.

Text Books:

1. I.J.Nagrath,M.Gopal,“ControlSystemEngineering”NewAgeInternational,2000.
2. N.K.Jain,“AutomaticControlSystemEngineering”DhanpatRai,2ndEdition.

Reference Books:

1. Ogata, “Modern Control Engineering” EEE, 4thEdition.
2. Kuo, “Automatic Control Systems” PHI – 7thEdition

Paper Code:EC 210

PaperID:	L	T	C
Paper: Data Structures and Algorithms	3	1	4

Employability and Skill development

Pre-requisite

IT105 Introduction to Computers

Unit – 1:

Basic Terminology, Elementary Data Organization, Structure operations, Algorithm Complexity and Time-Space trade-off, Array Definition, Representation and Analysis, Single and Multidimensional Arrays, application of arrays, Character string operation, Array as Parameters, Ordered List, Sparse Matrices and Vectors, Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursive definition and processes, example of recursion, Tower of Hanoi Problem, Backtracking, recursive algorithms, principles of recursion.

Unit – 2:

Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues. Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction

Unit – 3:

Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees, Huffman Algorithm, Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

Unit – 4:

Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees. Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

Text:

[T1] S. Sahni and E. Horowitz, "Data Structures, Algorithms and applications in C++", 2nd edition, Universities Press.

Reference

- [R1] R.F.Gilberg,andB.A.Forouzan,“Datastructures:APseudocodeapproach with C”, Thomson Learning.
- [R2] A.V.Aho,J.E.Hopcroft,J.D.Ulman“DataStructuresandAlgorithm”,Pearson Education.
- [R3] Tanenbaum: “Data Structures using C”,Pearson/PHI.
- [R4] T .H . Cormen, C . E . Leiserson, R .L . Rivest “Introduction to Algorithms”,PHI/Pearson.

ECE -212

Paper Code: EC 212

PaperID:101212

Paper: Computer Architecture and Operating System3

L **T/P** **C**

1

4

Pre-requisites

Unit –I

Definition of Computer Organization Architecture and design, information representation, Register Transfer and Microoperations : Register Transfer language register transfer, Bus and memory transfers, Arithmetic Microoperations, Logic micro operation, shift micro operations, ALU Design, Bus based architecture PCI bus, RS 232, IEEE 488, RS-422, IEEE 1394 ,USB. [T1,T3]

Unit-II

Instruction formats, Instruction types, Instruction sequencing and Interpretation, Hardwired control, Micro programmed control, I/O Devices. Comparison of CISC and RISC Architectures. Overview of Pipeline and Vector Processing, virtual memory, cache memory [T1,T2,T5]

Unit –III

Introduction to the Operating System: Types of OS: Batch System, Time Sharing System, Real Time System, Multiuser / Single User System, System Calls, System Call Interface.[T4]

Function of Operating System: Process Management, Memory Management, File Management, I/O Devices Management, Information Management.[T4]

Process Management: Process Concept, Process State, Process Control Block, Process Scheduling, Context Switch, CPU Scheduling, Scheduling Criteria, Scheduling Algorithms, Pre Emptive/ Non Preemptive Scheduling, Threads, Thread Structure.[T4]

Unit -IV

Memory Management: contiguous Allocation, External Internal Fragmentation, Paging Segmentation, Segmentation with Paging.[T4]

Virtual Memory: Virtual Memory Concept, Demand Paging, Page Replacement, PR Algorithms, Allocation of Frames, Thrashing, Working set Model. [T4]

Device Management: Disk Structure, Disk Scheduling Algorithms, Disk Management[T4]

Text:

[T1] Morris Mano, “ Computer System Architecture” , PHI

[T2] J. P. Hayes, “Computer Architecture and Organization”, McGraw Hill, 1988.

[T3]. W. Stallings, “Computer organization and Architecture”, PHI, 7th ed, 2005.

[T4]. Silbershatz and Galvin, “Operating System Concept”, Addition Weseley, 2002.

[T5]J. D. Carpinelli, “Computer Systems Organization and Architecture”, Pearson Education, 2006.

Reference:

[R1].J.LHennessyandD.A.Patterson,“ComputerArchitecture:Aquantitativeapproach”,Morgon Kauffman,1992.

[R2]. A. S. Tannenbaum, “Operating System Concept”, Addition Weseley, 2002

Code: EC252

L	T/P	C
0	2	1

Paper ID:101252 Paper: VHDL based Design Lab

This lab course will be based on VHDL based Design (EC202). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC254

L	T/P	C
0	2	1

Paper ID: 101254 Paper:Communications Systems – II Lab

This lab course will be based on Communications Systems – II (EC204). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC256

L	T/P	C
0	2	1

Paper ID:101256 Paper: Control Engineering Lab

This lab course will be based on Control Engineering (EC208). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC258

L	T/P	C
0	2	1

Paper ID:101258Paper: Data Structures and Algorithms Lab

This lab course will be based on Data Structures and Algorithms (EC210). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC301

L T/P C

Paper ID: 101301

Paper: Microwave devices and Circuits

3 1 4

Pre-requisite

BA-103 Theory and Technology of Semiconductors

EC205 Engineering electromagnetic

EC206 Transmission lines, wave guide and Antenna

(Each unit is of 10hrs.)

Unit- I

Microwave IEEE frequency bands, Microwave systems, two port S-parameters, Microwave Hybrid circuits: waveguide tee, Magic tee, Hybrid Rings, waveguide corners, bends and twists Directional couplers, circulators and isolators

Microwave Tubes: Klystron Amplifier, Reflex- Klystron; Magnetron (cylindrical); Overview of TWT [T1, T2, R2]

Unit- II

M/W Solid-State Device: principle of operation and characteristics of M/W Bipolar Transistor; Tunnel diode, MESFET, CCD, Gunn Diode; Read Diode, Impatt, Trapatt, Baritt [T1, R2]

Unit-III

Introduction to Microwave Detectors, Mixers, Switches, Microwave Measurements (Measurements of frequency, power, attenuation, phase shift, VSWR, impedance), Introduction to Microwave filters. [T1 T2 R2]

Unit-IV

MICS: Introduction to MIC, Stripline and Microstrips; Introduction to fabrication of MICs

Introduction to Radar: Radar range equation; Overview of pulsed radar; Overview of CW Doppler Radar; Overview of MTI radar. [T1 R1 R3]

Text Books

[T1] S.Y. Liao, "Microwave Devices & CIRCUITS" PHI – 3rd Edition.

[T2] Pozar, "Microwave Engineering" John Wiley, 2003.

Reference Books:

[R1] Kennedy, "Electronic Communication System" TMH, 4th Edition.

[R2] Kulkarni, "Microwave & Radar Engg." Umesh Publications, 2nd Edition

[R3] Rizzi, "Microwave Engg. Passive Circuits" PHI – 2001

[R4] R. E. Collin, "Foundation of Microwave Engineering" Mc. Graw Hill, 2nd Edition.

Paper Code: EC 303

Paper ID: 101303

	L	T/P	C
3	1	4	

Paper: Microprocessor and Interfacing

Pre-requisites

EC -209 Digital Electronics

Aim

Unit I

Introduction – Microprocessors Evolution and types (Intel 4004 – Core2 duo and road maps)[**T1**]
Study of 8085 Microprocessor Pin out ,signals and bus timing, its internal architecture, Overview of 8085 instruction set and programming.[**T5**]
Study of 8086 – 8086/8088 Pin out and signals, internal architecture and register Organization, Execution unit, Bus Interface Unit, Signal Description, Physical Memory Organization, General Bus Operation, I/O addressing capabilities, Minimum mode and maximum mode timing diagrams, Comparison with 8088[**T1,T2,T3**]

Unit II

8086 programming – Addressing modes, Instruction set description, Assembler directives and operators, Procedures and Macros, Assembly language program development tools (editor, linker, loader, locator, Assembler, emulator and Debugger), Writing programs for use with an assembler, Using Assembly Language with C/C++
Basic Memory and I/O interfacing, 8086 Interrupts and Interrupt Programming [**T1,T4**]

Unit III

8086 Interfacing – Direct Memory Access and DMA controlled I/O, Interfacing 8086 with , 8255, 8254, 8251, 8279, A/D and D/A converters, Numeric processor 8087, I/O processor 8089[**T1,T2**].

Unit IV

Overview of architecture of 80186, 80286, 80386, 80486, Pentium I, II, III, IV and Core 2 duo microprocessors. Overview of microcontrollers and embedded processors, comparison with microprocessors.[**T1,T6**]

Text:

[T1]. Barry B. Brey, Intel Microprocessors, 8th Edition , Pearson Education/Prentice Hall ,2009

[T2]. Y.-C. Liu and G. A. Gibson, “Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design”, PHI, 2000.

[T3]4. A. K. Ray and K M Bhurchandi, “Advanced Microprocessors and Peripherals”, TMH, 2000.

[T4]D.V. Hall, “Microprocessors and Interfacing”, TMH, 2nd Ed. 1991.

[T5]R.S Gaonkar,“Microprocessor Architecture, Programming and Applications with 8085/8080A”,Wiley Eastern Limited,1992

[T6]D.A. Godse, A.P.Godse, “ Microcontrollers and Embedded Systems”, Technical Publications, Pune.

References:

[R1]. J. L. Antonakes, “An Introduction to the Intel Family of Microprocessors”, Thomson, 1996.

[R2]. K. J. Ayala, “The 8086 microprocessor”, Thomson, 1995

[R3]. Peter Able, “IBM PC assembly language programming”, PHI, 2000.

Paper Code : EC-305
Paper ID : 101305

L	T	C
3	1	4

Paper : Microelectronics

Employability and Skill development

Unit I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS. Technologies-oxidation, lithography, diffusion, ion implantation, metallization, encapsulation, probe testing, integrated resistors and capacitors. VLSI design flow, MOS transistor theory- MOS structure, enhancement & depletion transistor, threshold voltage, MOS device design equations, CMOS inverter- DC characteristics, static load MOS inverter, pull up/ pull down ratio, static & dynamic power dissipation, CMOS & NMOS process technology – explanation of different stages in fabrication, latch up, biCMOS circuits and their characteristics.

Unit II

Switching characteristics & inter connection effects: Rise time, fall time delays inverter design with delay constants, parasitic effect, super buffer. Clocked CMOS logic, pass transistor logic, domino, zipper CMOS, clocking strategies, clocked system, latches & registers, system timing set-up & hold timing, signal phase memory structure, 2 phase clocking, two phase memory structure.

UNIT III

Two phase logic structure, four phase memory & logic structure, design hierarchy, concept of regularity, modularity & locality, VLSI design style, design quality, computer aided design technology, design capture and verification tools. VLSI CIRCUIT DESIGN PROCESSES: MOS layers, stick diagrams, design rules and layout, CMOS design rules for wires, contacts, and transistors layout diagrams for NMOS and CMOS inverters and Gates, scaling of MOS circuits, limitations of scaling.

UNIT IV

GATE LEVEL DESIGN: basic circuit concepts, sheet resistance R_s and its concept to MOS, area capacitance units, delays, driving large capacitive loads, wiring capacitances, Fan in and fan out, choices of layers, fan in, fan out, typical NAND, NOR, delays transistor sizing XOR, and XNOR gates, CMOS logic structures, CMOS complimentary logic, Pseudo NMOS logic. CMOS testing: CMOS testing, need for testing, test principles, design strategies for test, chip level test techniques, system level test techniques, layout design for improved testability.

Text books:

1. Essentials of VLSI circuits and systems- Kamran Eshraghian Douglas and A. picknell, PHI, 2005, edition.
2. Principles of CMOS VLSI design – Weste and Eshraghian, Pearson education, 1999.

Paper Code: EC307

PaperID: 101307

L T C

Paper : RDBMS

3 1 4

Pre Requisites: None

Employability and Skill development

(Each unit is of 10 Hrs.)

UNIT 1:

Basic concepts: Database systems, Characteristics of the database, concepts and architecture, Data models, schemas & instances, RDBMS architecture & data independence, Database languages & interfaces, Database users, DBA, Data Manager, Data modeling using the entity-relationship approach, Extended ER features, Conversion of ER model to relational model.

UNIT 2:

Relational model languages & systems: Relational data model, Formal Query Languages: Relational algebra, Relational Calculus, Commercial Query Languages: SQL – DML, Data types, Queries, Sub queries, Joins in SQL Data definition using SQL - DDL, specifying constraints and indexes in SQL, Database views, SQL – DCL, Roles & Privileges

UNIT 3:

Relational data base design: Functional dependencies & normalization for relational databases, Closure of functional dependencies, Armstrong's Axioms, Concept of keys, Lossless join and dependency preserving decomposition, Normal forms based on functional dependencies, (1NF, 2NF, 3NF & BCNF), Normal Forms due to multi valued and join dependencies (4NF and 5NF), DKNF.

UNIT4:

Concurrency control & recovery techniques: Transactions, ACID properties of transactions, Serializability, Lock based protocols, Time stamp ordering based protocol, Granularity of data items, Recovery techniques: Log based and Shadow paging techniques.

RDBMS Architecture: Logical Data Structures Physical Data Structure, Instances, Table Spaces, Internal Memory Structure, Background Processes, Stored Procedures, User Defined Functions, Cursors, Database Triggers. Case Study: Oracle xi / DB2 / MySQL (Any one)

Text Books:

- T1. Elmsari and Navathe, "Fundamentals of Database Systems", Pearson Education.
- T2.A. Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts" Fifth Edition, Tata McGraw Hill.

Reference Books:

- R1. Date, C. J., "An introduction to database systems", 7rd Edition, Addison Wesley.
- R2. S.K.Singh, "Database Systems: Concept, Design, and Applications", Pearson Education
- R3. Kiffer, "Database Systems: An Application oriented Approach", Pearson Education
- R4. Ullman, J. D., "Principals of database systems", Galgotia publications.
- R5. Desai, B., "An introduction to database concepts", Galgotia publications.
- R6. Reference Manual: Oracle xi / DB2 / MySQL.

Paper Code: EC309:

Paper ID: 101309

	L	T	C
	3	1	4

Paper: Stochastic Systems and Process

Prerequisites:

BA 109: Mathematics I

BA 108 :Mathematics II

Unit I

Sets, Probability, Conditional Probability, Bernoulli Trials, Asymptotic Theorems, Poisson Theorem, Random Variables, Distribution and Density Functions, Conditional and Total Probability, Mean, Variance, Moments, Cumulants, Characteristic Functions.[T1]

Unit II

Bivariate and Multivariate Random Variables, Joint Moments, Joint Characteristic Functions, Conditional Distributions, Conditional Expected Values, Sequences of Random variables, Mean Square Estimation, Stochastic Convergence and Limit Theorems, Random Numbers: Meaning and Generation, Parameter Estimation, Hypothesis Testing.[T1]

Unit III

Systems with Stochastic Inputs, Power Spectrum, Digital Processes, Random Walks, Brownian Motion, Thermal Noise, Poisson Point and Shot Noise, Modulation, Cyclo stationary Processes, Band limited Processes and Sampling Theory, Spectral Representation.[T1 R1]

Unit IV

Ergodicity, Spectral Estimation, Extrapolation and System Identification, Prediction, Filtering, Kalman Filters, Entropy, Maximum Entropy Principle, Markov Processes.[T1 R2 R10]

Text:

T1 .A. Popoulis and S. V. Pillai, "Probability, Random Variables and Stochastic Processes," TMH, 2002.

References:

R1. H. C. Tijms, "A First Course in Stochastic Models," Wiley, 2003.

R2. S. Ross, "A First Course in Probability," PHI, 1998.

R3. W. Feller, "An Introduction to Probability Theory and its Applications," vol. 1, Wiley, 1968.

R4.G.Schay,"IntroductiontoProbabilitywithStatisticalApplications,"Birkhauser,2007.

R5.T.T.Soong,"FundamentalsofProbabilityandStatisticsforEngineers,"Wiley,2004.

R6. L. B. Korolov and Y. G. Sinai, "Theory of Probability and Random Processes," Springer, 2007.

R7. H. P. Hsu, "Theory and Problems of Probability, Random Variables and Random Processes," Schaum's Outline Series, MH, 1997.

R8. A. V. Skorokhod, "Basic Principles and Applications of Probability Theory," Springer, 2005.

R9. G. Bolch, S. Greiner, H. de Meer and K. S. Trivedi, "Queueing Networks and Markov Chains," Wiley, 2006.

B.Tech ECE Paper Code: MS 311
Subject: Principles of Management
Lectures 2 Credit 2

Unit I

Introduction: Concept, nature, Process and significance of management: Managerial levels, skills, function and roles: Management Vs. Administration: Development of management thought: classical, neo-classical, behavioural, systems and contingency approaches

Unit II

Planning: Nature, scope and objectives of Planning: Types of plans; Planning process; Business forecasting: MBO; concept, types, process and techniques of decision-making; Bounded Rationality.
Organizing: Concept, nature process and significance, Principles of an organization; Span of Control; Departmentation; Types of an organization: Authority-Responsibility; Delegation and Decentralization: Formal and Informal Organization.

Unit III

Motivating and Leading: Nature and Importance of motivation; Types of motivation; theories of motivation- Maslow, Herzberg, X, Y and Z: Leadership-meaning and importance; Traits of a leader; leadership Styles – Liker's System of Management, Tannenbaum & Schmidt Model and Managerial Grid.

Unit IV

Controlling Nature Scope of control; Types of Control; Control process: control techniques- traditional and modern; Effective Control System.

Text Books:

- o Stoner, Freeman and Gilbert Jr. ((2010)) Management, 8th Edition. Pearson Education.
- o Robbins, (2009). Fundamental of Management: Essentials Concepts and Applications, 6th edition, Person Education
- o Gupta, C. B. (2008), Management Concepts and Practices, Sultan Chand and Sons, New Delhi.

Reference Books:

- o Koontz, H. (2008), Essentials of Management McGraw Hill Education.
- o Ghillyer, A, W., (2008) Management – A Real World Approach, McGraw Hill Education
- o Mukherjee, K (2009), Principles of Management, 2nd Edition McGraw Hill Education.
- o Tulsian, P.C., (2009) Business Organisation & Management, 2nd edition, Pearson Education

Code: EC351	L	T/P	C
Paper ID:101351 Paper: Microwave Devices and Circuits Lab	0	2	1

This lab course will be based on Microwave Devices and Circuits (EC301). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC353	L	T/P	C
Paper ID:101353 Paper: Microprocessors and Interfacing Lab	0	2	1

This lab course will be based on Microprocessors and Interfacing (EC303). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC355	L	T/P	C
Paper ID:101355 Paper: Microelectronics Lab	0	2	1

This lab course will be based on Microelectronics (EC305). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC357	L	T/P	C
Paper ID:101357 Paper: Relational Database Management Systems Lab.	0	2	1

This lab course will be based on Relational Database Management Systems (EC307). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC359	L	T/P	C
Paper ID:101359 Paper: Summer Training (held at the end of the IVth semester) Report	0	0	1

Students will undergo summer training / industry visit / In-house training / In-house project during the summer break after the completion of fourth semester. Report of the same is required to be submitted to the school. Viva-voce examination will be conducted based on the report submitted by the student. A panel of examiner will be appointed by the Dean, USICT

Paper Code: EC-302

Paper ID:101302

L T C

3 1 4

Paper: Digital Signal Processing & Applications

Prerequisites:

EC112:Signals and Systems

Unit I

DFT, FFT, Algorithms, Hilbert transform, stability, structures of FIR, IIR filters Design of FIR filter using window method, Park Mcdleard method, Effect of finite register length in FIR filter design.[T1 R1]

Unit II

DesignofIIRfilter,Butterworth,chebyshevandellipticapproximation,transformationmethods,L P,BP,HPBS filters. [T1 R1R2]

Unit III

Algorithms for optimizations and design of digital filters
Adaptive Filters: Kalman filter, wiener filters, applications in adaptive filtering.[T1 R1]

Unit IV

Parametric and nonparametric spatial estimation, introduction to multirate signal processing
Application of DSP to speech and Radar signal processing DSP processor architecture
[T1 T2 R1]

Text Books:

T1. Proakias, “Digital Signal Processing” PHI – 3rdEdition.

T2. Openheing & Schafer, “Digital Signal Processing” PHI –1997.

Reference Books:

R1. S. K. Mitra, “Digital Signal Processing” (PHI) – 2ndEdition.

R2. Johny Johnson, “Introduction to Digital Signal Processing” PHI –1992.

Paper Code : EC-304
Paper ID : 101304

L	T	C
3	1	4

Paper : **Computer Networking**

Pre-requisites

IT-105 Introduction to Computers

Employability and Skill development

Unit I

Introduction: Uses of Computer Networks, Network and Protocol Architecture, Reference Model (ISO-OSI, TCP/IP-Overview)

Physical Layer: Data and signals, Transmission impairments, Data rate limits, performance factors, Transmission media, Wireless transmission, Telephone system (Structure, trunks, multiplexing & Switching)

Unit II

Data Link Layer: Design issues, Error detection & correction, Data Link Protocols, sliding window protocols, HDLC, WAN Protocols, Channel allocation problem, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, high-speed LANs, Network Devices-repeaters, hubs, switches bridges.

Unit III

Network Layer: Design issues, IPv4, Routing Protocols (RIP, OSPF and BGP), Internetwork protocols, Internetwork operation.

Unit IV Upper Layers:

TCP, UDP, Introduction to application layer protocol such as DNS, HTTP, e-mail, FTP etc.

Text :

3. B. A Forouzan., "Data Communications & Networking", 4th Ed, Tata McGraw Hill, 2007.
4. A. S. Tanenbaum. "Computer networks", Pearson Education, 4th ed ,2006.

References:

1. W. Stallings, "Data and Computer Communications", Pearson Education, 8thEd, 2007.
2. D. E. Comer., "Computer Networks & Internets", Pearson Education, 4thEd, 2007
3. N. Olifer and V. Olifer, "Computer Networks", Wiley, 2006
4. L. L. Peterson and B. S. Davie, "Computer Networks", Elsevier, 4th Ed, 2007.
5. L. A. Gallo, "Computer Communications & networking technologies", Cengage Learning, India 1stEd, 2007.

Paper Code: EC 306:

Paper ID :101306

L T C

3 1 4

Paper: Information Theory and Coding

Prerequisites:

EC204:Communication Systems II

Unit I

Definitions, Uniquely Decodable Codes, Instantaneous Codes, Kraft's Inequality, McMillan's Inequality, Optimal Codes, Binary Huffman Codes, r-ary Huffman codes, Information and Entropy, Properties of Entropy Function, Entropy and Average Word-Length, Shannon-Fano Coding, Shannon's First Theorem, Information Channels, Binary Symmetric Channel, System Entropies, System Entropies for Binary Symmetric Channel, Extension of Shannon's First Theorem to Information Channels, Mutual Information, Mutual Information for the Binary Symmetric Channel, Hamming Distance, Shannon's Second (Fundamental) Theorem, Converse of Shannon's Theorems.[T1 T2R1]

Unit II

Linear Codes: Block Codes, Linear Codes, Hamming Codes, Majority Logic Coding, Weight Enumerators, The Lee Metric, Hadamard Codes, Golay Codes (Binary and Ternary), Reed Muller Codes, And Kerdock Codes. Bounds on Codes: Gilbert Bound, Upper Bound, Linear Programming Bounds, Hamming's Sphere –Packing Bound, Gilbert Varshamov Bound, Hadamard Matrices and Codes[T1 T3].

Unit III

Cyclic Codes: Generator Matrix, Check polynomial, Zeros of Cyclic Codes, BCH Codes, Reed-Solomon Codes, Quadratic Residue Codes, Generalized Reed-Muller Codes. Perfect Codes and Uniformly Packed Codes: Lloyd's Theorem, Characteristic Polynomial of a Code, Uniformly Packed Codes, Nonexistence Theorems.[T2 R1 R3]

Unit IV

Quaternary Codes, Binary Codes Derived from codes over Z_4 , Galois Rings over Z_4 , Cyclic Codes over Z_4 . Goppa Codes. Algebraic Curves, Divisors, Differentials on a Curve, Riemann – Roch Theorem, Codes from Algebraic Curves. Arithmetic Codes: AN Codes, Mandelbaum – Barrows Codes, Convolutional Codes.[T1 T2 T3]

Text:

T1. G. A. Jones and J. M. Jones, "Information and Coding Theory", Springer, 2000.

T2. J. H. van Lint, "Introduction to Coding Theory", Springer, 1999.

T3. Cover Thomas, "Elements of Information Theory", and Wiley 2006.

Reference:

R1. R. W. Hamming, "Coding and Information Theory", Prentice Hall, 1986.

R2. T. M. Cover and J. A. Thomas, "Elements of Information Theory", Wiley, 1991.

R3. R. E. Blahut, "Principles and Practice of Information Theory," AWL, 1987.

R4. A. I. Khinchin, "Mathematical Foundations of Information Theory", Dover, 1957.

R5. F. M. Reza, "An Introduction to Information Theory", Dover, 1994.

R6. R. B. Ash, "Information Theory", Dover, 1990.

R7. T. K. Moon, "Error Correction Coding: Mathematical Methods and Algorithms", Wiley, 2006.

R8. W. C. Huffman and V. Pless, "Fundamentals of Error – Correcting Codes", CUP, 2003

R9. S. Lin and D. J. Costello, "Error Control Coding: Fundamentals and Application", 1983.

R10. R. H. Morelos-Zaragoza, "The Art of Error Correcting Codes", Wiley, 2002.

R11. R. E. Blahut, "Theory and Practice of Error Control Codes," AWL, 1983.

Paper Code:EC 308

Paper ID:101308

L	T	C
3	1	4

Paper: Telecommunication Network

Pre-requisite

EC204 Communications Systems

Employability and Skill development

UNIT I :

Introduction to Telecommunication networks, **Basic Switching System: manual and electromagnetic exchanges, Control of switching system:** Stored Programme Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software,

Space division switching: Two stage network; Multistage network; Blocking probabilities, Lee graphs

Time Division Switching: Time Division space switching; Time Division Time Switching; Time multiplexed space switching; Time multiplexed Time Switching; Combination Switching.(two stage- TS,ST switch); Multistage Switching networks (TST, STS ,n-stage switches); Blocking probabilities, Lee graphs of multistage switching networks.

Unit-II

SONET/SDH : SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring. ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems

UNIT III :

Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues. Telecommunication transmission and Subscriber loops: Cable hierarchy for subscriber loops; Reference equivalents (RE); Two wire to four wire interface; Echoes and ringing; Echo suppressors and echo cancellers; Subscriber loop interface (SLIC) and BORSCHT functions; Switching Hierarchy and Routing; Transmission Plans; Signaling Techniques; In channel, Voice frequency signaling; PCM signaling; Common channel signaling; Overview of SS6 and SS7 signaling systems

Unit IV

Network Performance and management: Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization,

ATM: Concept, interface standards, AAL

Applications Frame relay: Concept, basic operation

FDDI: specifications, frame format, design issues

TEXT BOOK

[T1]. Bellamy John, "Digital Telephony", John Wiley & Sons, Inc. 3rd edn. 2000.

[T2]. Viswanathan. T., "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.

Reference Books:

- [R1]. J. E. Flood, "Telecommunication switching and traffic networks" Pearson education, 2002.
- [R2]. Freeman, "Telecommunication systems engineering" Wiley, New York – 3rd Edition.
- [R3]. W Tomasi, "Electronics Communication systems" Pearson – 5th Edition.
- [R4]. B.P Lathi, "Modern analog and digital communication systems" Oxford, 3rd Edition

Paper Code: EC-310

Paper ID: 101310

L T C

Paper: Opto-Electronic Optical Communication

3 1 4

Pre-requisite

EC104 Analog Electronics – I

EC204 Communications Systems – II

Aim

(Each unit is of 10hrs.)

Unit I

Basic Optical Communication System, Advantage of Optical Communication System. Ray theory transmission, skew rays, Mode theory Propagation in dielectric Waveguides: Introduction, Step-index Fibers, Graded Index Fibers, Modes & Rays, Slab Wave Guide. single mode fibers, cutoff wavelength, mode field diameter, effective refractive index for single mode fiber[T1 R1]

Unit – II

Transmission Characteristics of Optical fiber, Attenuation in optical fibers, intrinsic and extrinsic absorption, linear and non linear scattering losses, fiber bend losses. Dispersion and pulse broadening, intramodal and intermodal dispersion for step and graded index fibers, modal noise, over all fiber dispersion for multimode and mono-mode fiber, dispersion modified fibers, modal birefringence and polarization maintaining fibers[T1 R1]

Unit-III

Optical Sources: Requirement for optical source, Double Hetro-junction and homo-junction injection lasers structure & Characteristics. Drawback and advantages of LED, DHLED, LED structures and characteristics. **Optical detectors:** Requirement for photo detections p-n photodiode, characteristics of photo detections, p-i-n and avalanche photodiodes

Optical Transmitter Circuit: source laminations, LED and laser drive circuits, optical receiver circuits for pre-amplifier, automatic gain control and equalization, Regenerative repeater, optical power budgeting for digital optical fiber system[T1 R1]

Unit – IV

Multiplexing Strategies: OTDM, Subcarrier, OFDM, WDM, OCDM, Hybrid multiplexing

Optical Fiber network evolution: First Generation, Second Generation, Third Generation. Optical network node and switching elements, Wavelength division multiplexed networks, Public telecommunication network overview, Optical network transmission modes, layers and protocols, Wavelength routing network, Optical switching networks[T1R2]

Text Books

[T1] JM Senior, “Optical Fiber Communications, Principles & Practice”, 3rded. Pearson education

Reference Books

[R1] Keiser, “Optical Fibre Communication” Mc. Graw Hill – 2nd Edition.

[R2] J. Gowar, “Optical Communication System” EEE – 2nd Edition.

Paper Code: EC312

Paper ID:

L T C

Paper: Mobile Communication

3 1 4

Pre-requisite

EC204 Communications Systems

Employability and Skill development

Unit-I

Basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, analog & digital cellular systems, Elements of Cellular Radio Systems Design: General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems, Introduction to co-channel interference, co-channel measurement design of antenna system, antenna parameter and their effects.

Unit-II

General introduction, obtaining the mobile point to point mode, Radio propagation characteristics: models for path loss, shadowing and multipath fading, propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point to point prediction model characteristics, cell site, antenna heights and signal coverage cells, mobile to mobile propagation, Characteristics of antennas, antenna at cell site, mobile antennas, Frequency management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment, Why hand off, types of handoff and their characteristics, handoff analysis, dropped call rates & their evaluation.

Unit-III

Modulation methods in cellular wireless systems, OFDM, Block Coding, convolution coding and Turbo coding, FDMA/TDMA, CDMA. FDM/TDM Cellular systems, Cellular CDMA, soft capacity, Erlang capacity comparison of FDM/TDM systems and Cellular CDMA.

Unit-IV

GSM Architecture, Mobility management, Network signaling, Frequency allocation and control, Base System and Master System, GSM, DCS 1800, Various value added services, Mobile IP, Wireless LAN, Routing protocols for MANETs: DSDV, DSR, AODV, Role of TCP in MANTs

TEXT BOOKS:

[T1]. William, C. Y. Lee, "Mobile Cellular Telecommunications", 2nd Edition, McGraw Hill, 1990.

[T2]. Theodore S Rappaport, "Wireless Communication Principles and Practice", 2nd Edition, Pearson Education, 2002.

REFERENCE BOOKS:

[R1]. "Mobile Communication Hand Books", 2nd Edition, IEEE Press.

[R2]. Mischa Schwartz, "Mobile Wireless Communications", Cambridge University Press, UK, 2005.

[R3]. Lawrence Harte, "3G Wireless Demystified", McGraw Hill Publications, 2001.

[R4]. Kaveh Pahlavan and Prashant Krishnamurthy, "Principles of Wireless Networks", PHI, 2001.

	L	T/P	C
Code: EC352			
Paper ID: 101352 Paper: Digital System Processing and Applications Lab	0	2	1

This lab course will be based on Digital System Processing and Applications (EC302). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

	L	T/P	C
Code: EC354			
Paper ID: 101354 Paper: Computer Networks Lab	0	2	1

This lab course will be based on Computer Networking (EC304). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

	L	T/P	C
Code: EC356			
Paper ID: 101356 Paper: Telecommunications Networks Lab.	0	2	1

This lab course will be based on Telecommunications Networks (EC308). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

	L	T/P	C
Code: EC358			
Paper ID: 101358 Paper: Opto-Electronics and Communications Lab.	0	2	1

This lab course will be based on Opto – Electronics and Optical Communications (EC310). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Paper: Embedded System Design

PaperCode:IT-417

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Paper ID: 15417

PREREQUISITES:

**ECE-303 MICROPROCESSORSANDINTERFACING,
IT-105 :INTRODUCTION TOCOMPUTERS**

Employability and Skill development

Unit –I

Introduction to Embedded Systems, Special Challenges with Embedded Systems, Introduction to the 68HC12 and HCS12 Microcontrollers, HCS12 Family, Advantages of programming in assembly Language and HLL, Choosing the best HLL available for Embedded Systems, Structured Programming and Design, Programming & Debugging Procedures, Emulators and Logic analysers, Cross compiler

Unit-II

Architecture of 68HC12/HCS12 System, Modes of Operations: Normal operating Modes, B32 EVB Modes of Operation, Register Block Relocation, Port System, B32 Memory System, B32 Memory Map, Memory Resource Remapping, HCS12 DP256 Memory System, Exception processing, 68HC12 Interrupt Response

Unit-III

The Timing System-the standard timer module, component of timer module, free running counter and its associated register, I/O channel, Real-time Interrupt, the Enhanced Capture Timer: MC68HC12BE32 Serial Communications, 68HC12 Serial Communication Interface, Serial Peripheral Interface, Input/output interfacing concepts, RS-232 Interface, I²C interfacing, USB Interfacing

Unit – IV

Real-Time Operating Systems: Review of Concepts, Basic Concepts, Types of RTOS, RTOS Issues, Implementing of RTOS, Distributed Processing Systems-Networking with CAN: Design Approaches, CAN protocol, The controller Unit for the 68HC12 msCAN12, Timing issue

Text book:

T[1] Embedded Systems: Design and Applications with 68HC12 and HCS12 by Steven F. Barrett and Daniel J. Pack, Pearson Education,2005

Reference book:

- R[1] Embedded System Design by Raj Kamal, THM,2005
- R[2] Embedded Microcomputer Systems by Jonathan W. Valvano, Cenage Learning,2008
- R[3] Real Time System by C. M. Krishna, MGH,2005
- R[4] Real Time System by Levi and Agarwal, MGH,2005
- R[5] Real Time System: Specification, Validation & Analysis by Mati Joseph,PHI
- R[6] Real Time System by Jane W.S. Liu, Pearson Education,2005
- R[7] The Co-design of Embedded Systems: A Unified Hardware Software Representation, Kluwer Academic Publisher,2002.
- R[8] Introduction to Real-time software design by S. Allworth, Spriner-Verlag,2004.

Paper Code EC 401

L T C

Paper ID : 101401

3 1 4

Paper : Satellite Communication

Prerequisites :

EC204 :Communication Systems II

Unit-1

Introduction:

Origin and brief history of satellite communications, an overview of satellite system engineering, satellite frequency bands for communication.

Orbital theory:

Orbital mechanics, locating the satellite in the orbit w.r.t. earth look angle determination. Azimuth & elevation calculations.[T1]

Unit-2

Spacecraft systems:

Attitude and orbit control system, telemetry, tracking and command (TT&C), communications subsystems, transponders, spacecraft antennas.

Satellite link design:

Basic transmission theory, noise figure and noise temperature, C/N ratio, satellite down link design, satellite uplink design.[T1 T2]

Unit-3

Modulation, Multiplexing, Multiple access Techniques:

Analog telephone transmission, Fm theory, FM Detector theory, analog TV transmission, S/N ratio Calculation for satellite TV linking, Digital transmission, base band and band pass transmission of digital data, BPSK, QPSK , FDM, TDM,

Access techniques: FDMA, TDMA, CDMA.[T1 R1]

Unit-4

Encoding & FEC for Digital satellite links:

Channel capacity, error detection coding, linear block, binary cyclic codes, and convolution codes.

Satellite Systems:

Satellite Earth station Technology, satellite mobile communication, VSAT technology, Direct Broadcast by satellite (DBS).[T1 T2]

Text Books:

T1. Timothy Pratt, Charles W. Bostian, "Satellite communication", John Wiley & sons

Publication, 2003

T2. J.J. Spilker, "Digital Communication by satellite, PHI Publication, 1997

Reference books

R1. J. Martin, "Communication satellite systems", PHI publication, 2001

Paper Code: EC 405
Paper ID : 101405

L	T	C
3	1	4

Paper: Measurement & Instrumentation

Prerequisite:
EC107:Network Analysis

Unit I

Measuring Instruments: Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – Extension of range of E. S. Voltmeters.[T1 T2]

Unit II

Instrument transformers – CT and PT – Ratio and phase angle errors – design considerations – Testing of CT's – Silsbee's method – Variable mutual inductance methods.
Measurement of Power: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers.
Measurement of Energy: single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – trivector meter, maximum demand meters.[T1 R2]

Unit III

Type of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters – Frequency meters – resonance type and Weston type – synchrosopes.
Principle and operation of D. C. Cromptons potentiometer – standardization – Measurement of unknown resistance, current, voltage.
A.C. Potentiometers: Polar and coordinate types standardization – application. [T1 R1]

Unit IV

Method of measuring low, medium and high resistance – sensitivity of Wheatstones bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance- loss of charge method – Price's guard method – Megger.
A.C. bridges – Measurement of inductance Maxwell's bridge, Hay's bridge, Anaderson's bridge, owen's bridge – Heaviside bridge and its modifications Measurement of capacitance equivalent circuit of an imperfect capacitor – Desauty bridge. Wien's bridge – Schering Bridge.
Measurement of strain –Gauge sensitivity-temperature compensation-load cell-Measurement pressure using electrical transducers as Secondary transducers-vacuum gauges-Torque measurement-Angular velocity using Tachometers and Digital methods-LVDT type accelerometer-Flow measurement using electromagnetic method-hot

PaperCode:IT-407
PaperID:15407

L:3T/P:1C:4

Paper: Artificial Intelligence

Skill Development/ Entrepreneurship

Unit - I Introduction:

Introduction to intelligent agents

Problem solving:

Solving problems by searching : state space formulation, depth first and breadth first search, iterative deepening

Unit - II

Intelligent search methods:

A* and its memory restricted variants

Production systems:

Design implementation and limitations, case studies

Unit-III

Game Playing:

Minimax, alpha-beta pruning

Knowledge and reasoning:

Propositional and first order logic, semantic networks, building a knowledge base, inference in first order logic, logical reasoning systems

Planning:

STRIP Spatial order planning, uncertain knowledge and reasoning, probabilistic reasoning systems, Bayesian networks

Unit-IV

Learning from observations:

Inductive learning, learning decision trees, computational learning theory, Explanation based learning

Applications:

Environmental Science, Robotics, Aerospace, Medical Science etc.

Text Book:

1. "AI" by Rich and Knight, Tata McGraw Hill, 1992

Reference Books:

1. "Neural Networks in Computer Intelligence" by K M Fu, McGraw Hill
2. "AI: A modern approach" by Russel and Norvig, Pearson Education wire anemometer and ultrasonic types – Capacitance method for liquid level measurement. [T2 R4]

Text Books:

T1. E. W. Gloding and F. C. Widdis - Electrical Measurements and measuring Instruments, Wheeler Publishing, fifth Edition.

T2. A. K. Shawney - Electrical & Electronic Measurement & Instruments, Dhanpat Rai & Sons Publications, 2000

Reference Books:

R1. Buckingham and Price - Electrical Measurements, Prentice – Hall

R2. Harris - Electrical Measurements

R3. Reissland, M. U. - Electrical Measurements: Fundamentals, Concepts, Applications New age International (P) Limited, Publishers.

R4. W. D. Cooper, "Modern Electronics Instrumentation & Measurement Technique" PHI, 1998

Paper Code : EC-411
Paper ID : 101411

L T C
3 1 4

Neural Networks and applications

Employability and Skill development

Pre-requisites:
BA-108 Mathematics-II

Objectives:

- i. To understand the different models of artificial neurons and neural networks.
- ii. To study various supervised, unsupervised and Hybrid learning algorithms.
- iii. To explore different application areas of Artificial Neural Networks

Unit-I: Introduction to Neural Networks Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Artificial Neuron Model, Operations of Artificial Neuron, Types of neuron activation functions, ANN architecture, Learning strategy, Supervised unsupervised reinforcement learning rules.

Unit II : Feed forward neural networks, Perceptrons, limitation of perceptron model. Multilayered feed forward neural networks. Back propagation learning rule, Universal approximation theorem.

UNIT-III: Unsupervised and Hybrid Learning approaches: Principal Component Analysis (PCA), Competitive Learning, Self-Organizing Feature Maps (SOM), ART networks, RBF.

UNIT- IV: Neural Network applications: Blind source Separation, Associative memories, Speech signal Processing, Image Processing.

Text Book:

1. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.

References:

1. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999.
2. Hertz J, Krogh A, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison-Wesley, California, 1991.
3. Hertz J, Krogh A, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison-Wesley, California, 1991.
4. Freeman J.A., D.M. Skapura, "Neural Networks: Algorithms, Applications and Programming Techniques", Addison-Wesley, Reading, Mass, (1992)

Paper Code:EC413

PaperID: 101413

Pre-requisites

Paper: Software Engineering

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Employability and Skill development

- Basic knowledge of computers and at least one programming language

UNIT – 1:

Introduction:

Software Crisis, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM.[T1,T2]

Software Metrics: Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics.[T1,T2]

UNIT – 2:

Software Project Planning:

Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.[T1,T2]

Software Requirement Analysis and Specifications:

Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping.[T1,T2]

UNIT – 3:

Software Design:

Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.[T1,T2]

Software Reliability: Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation.[T1,T2]

UNIT – 4:

Software Testing: Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.[T1,T2]

Software Maintenance:

Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.[T1,T2]

Text:

[T1]. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 3rd ed., McGraw Hill Int. Ed., 1992.

[T2]. K.K. Aggarwal & Yogesh Singh, “Software Engineering”, New Age International, 2001

Reference:

[R1]. R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.

[R2]. P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.

[R3]. Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.

[R4]. James Peter, W Pedrycz, “Software Engineering”, John Wiley & Sons

[R5]. I. Sommerville, “Software Engineering”, Addison Wesley, 1999.

Paper Code: EC 417
Paper ID : 101417

L	T	C
3	1	4

Paper: Reliability Engineering

Prerequisites:

EC309:Stochastic Systems & Processes

Objective:

UNIT I

Reliability Fundamentals: Introduction, Need for Reliability Engineering, Definition, Causes of Failures, Catastrophic Failures and Degradation Failures, Characteristic Types of Failures, Useful Life of Components, The Exponential Case of Chance Failures, Reliability Measures, Failure Data Analysis.

Reliability Mathematics: Fundamentals of Set Theory, Probability Theory, Random Variables, Discrete Distributions, Continuous Distributions, Stochastic Processes, Markov Chains. [T1 R1]

UNIT II

Reliability Analysis of Series Parallel Systems: Introduction, Reliability Block Diagrams, Series Systems, Parallel Systems, Series Parallel Systems, K-out-of-M Systems, Open and Short Circuit Failures, Standby Systems.

Reliability Analysis Nonseries Parallel Systems: Introduction, Path Determination, Boolean Algebra Methods, A Particular Method, Cut Set Approach, Delta-Star Method, Logical Signal Relations Method, Baye's Theorem Method. [T1 T2 R1]

UNIT III

Reliability Prediction: Introduction, Purpose, Classification, Information Sources for Failure Rate Data, General Requirements, Prediction Methodologies, Software Prediction Packages, Role and Limitation of Reliability Prediction.

Reliability Allocation: Introduction, Subsystems Reliability Improvement, Apportionment for New Units, Criticality. [T1T2]

UNIT IV

Redundancy Techniques for Reliability Optimization: Introduction, Signal Redundancy, Time Redundancy, Software Redundancy, Hardware Redundancy.

Maintainability and Availability: Introduction, Forms of Maintenance, Measures of Maintainability and Availability, Maintainability Function, Availability Function, Two Unit Parallel System with Repair, Preventive Maintenance, Provisioning of Spares.

Reliability Testing: Introduction, Kinds of Testing, Component Reliability Measurements, Parametric Methods, Confidence Limits, Accelerated Testing, Equipment Acceptance Testing, Reliability Growth Testing. [T1 R1]

Text Books:

T1.ReliabilityEvaluationofEngg.System –R.Billinton, R.N.Allan,PlenumPress
T2.ReliabilityEvaluationofPowerSystem –R.Billinton,R.N.Allan,PlenumPress

Reference Books:

R1. An Introduction to Reliability and Maintainability Engineering. Sharles E. Ebeling, Tata McGraw Hill edition

Paper Code : EC-415

L T C

Paper ID:101415

3 1 4

Paper : Radar and Navigation Engineering

Prerequisites

EC203:Communication Systems I

EC204:Communication Systems II

EC 309:Stochastic systems and processes

UNIT I

Introduction to Radar

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

MTI and Pulse Doppler Radar

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 II

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 III

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 IV

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)

TEXTBOOK

T1. Merrill I. Skolnik, " Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003

REFERENCES

R1. Peyton Z. Peebles, "Radar Principles", John Wiley, 2004

R2. J.C Toomay, " Principles of Radar", 2nd Edition –PHI, 2004

Paper Code : EC-421
Paper : RADIO AND TELEVISION ENGINEERING

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PREREQUISITES:

ECE-203 COMMUNICATION SYSTEM-I
ECE-204 COMMUNICATION SYSTEM-II

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10marks

UNIT I FUNDAMENTALS OF TELEVISION [10Hours]

Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid state image scanners- monochrome picture tubes- composite video signal-video signal dimension- horizontal sync.

Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission – standard channel bandwidth. Basic A.M. and F.M. transmitter and receiver (blocks), Superheterodyne techniques stereo A.M. and F.M. transmission. Communication receivers (blocks).

UNIT II MONOCHROME TELEVISION [10 Hours]

TV transmitter – TV signal propagation – Interference – TV transmission Antennas – Monochrome TV receiver – RF tuner – UHF, VHF tuner- Digital tuning techniques- AFT-IF subsystems - AGC – Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re- insertion - Video amplifier circuits- Sync separation – typical sync processing circuits- Deflection current waveform

– Deflection Oscillators – Frame deflection circuits – requirements- Line Deflection circuits
– EHT generation – Receiver Antennas.

UNIT III COLOUR TELEVISION [15hours]

Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta – gun-precision – in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments pincushion correction techniques- automatic degaussing circuit- grey scale tracking – colour signal transmission- bandwidth- modulation of colour difference signals – weighting factors- Formation of chrominance signal.

Introduction to different color television systems: NTSC colour TV system, PAL colour TV SECAM system

UNIT IV ADVANCED TELEVISION SYSTEMS [5Hours]

Satellite TV technology- Cable TV – VCR- Video Disc recording and playback- Tele Text broadcast receiver – digital television – Transmission and reception- projection Television – Flat panel display TV receiver – Stereo sound in TV – 3D TV ,LCD, LED Television

TEXT BOOKS

- T1. R.R.Gulati, “ Monochrome Television Practice, Principles, Technology and servicing , Second edition, New age International Publishes, 2004 (Unit I,II,IV and V)
- T2. R.R.Gulati “Monochrome and colour television “, New age International Publisher, 2003 (Unit I,III and IV)

REFERENCES

- R1. A.M Dhake, “Television and Video Engineerign”, Second edition, TMH, 2003.
- R2. S.P.Bali, “ Colour Television, Theory and Practice”, TMH, 1994

Paper ID: 101425

L T/P C

Code: MS-425 Paper : Principles of Organizational Behaviour

4 - 4

Unit I

Introduction: Meaning and nature of management; management systems and process, Tasks and responsibilities of a professional manager; Managerial skills.

UNIT II

Organization Structure and Processes: Organizational climate and culture, Management ethos; Organizational Structure and Design; Managerial Communication; planning process; Controlling. Behavioral Dynamics: individual determinants of Organization Behavior; Perceptions, Learning Personality, attitudes and Values, Motivation; Stress and its management.

UNIT III

Interactive Aspects of Organizational Behavior; Analysis inter- personal relations; Group Dynamics; Management of Organizational Conflicts; Leadership Styles.

UNIT IV

Decision Making: Organizational Context of Decisions, Decision Making Models; Problem Solving and Decision Making.

Text Books:

1. Luthans Fred., "Organizational Behaviour", McGraw Hill, 1998.
2. Robbins (4th ed.) "Essentials of Organizational behavior", Prentice Hall of India Pvt. Ltd., New Delhi, 1995.

Reference Books:

1. Hersey and Blanchard(6th ed.), "Management of organizational behaviour: utilizing human resources", Prentice Hall of India Pvt. Ltd. New Delhi, 1996.
2. Dwivedi, R.S. "Human relations and organizational behavior; a global perspective", Macmillan India Ltd., Delhi, 1995.
3. Arnold, John, Robertson, Ivan t. and Copper, Cary, I., "Work psychology; understanding human behaviour in the workplace", Machmillan India Ltd., Delhi, 1996.

Code: EC451

L T/P C

Paper ID:101451 Paper:Embedded Systems Lab.

0 2 1

This lab course will be based on Embedded Systems (IT-417). The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC453

L T/P C

Paper ID:101453 Paper:Laboratory work based on Electives or MATLAB

0 4 2

This lab course will be based on Electives or MATLAB. The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper.

Code: EC455

L T/P C

Paper ID:101455 Paper: Minor Project

0 8 4

For the minor project, a supervisor shall be allocated by school in the area of interest of student. Student has to submit a report at the end duly approved by supervisor for evaluation.

Code: : EC457

L T/P C

Paper ID:101457 Paper: Summer Training (held at the end of the VIth semester) Report

0 0 1

Students will undergo summer training / industry visit / In-house training / In-house project during the summer break after the completion of sixth semester. Report of the same is required to be submitted to the school. Viva-voce examination will be conducted based on the report submitted by the student. A panel of examiner will be appointed by the Dean, USICT

PaperCode:HS-402
PaperID:15402

L:2T/P:0C:2
Paper:TechnicalWriting

Unit-I

WritingSkills:Descriptive,Narrative,ArgumentiveandDiscursive,ReflectiveandLiterary-EvaluativeWriting.

TechnicalWriting:Definition,PurposeandCharacteristicsofTechnicalWriting.

Unit-II

The Technical Writing Process: Prewriting Stage, The Writing Stage and the Post-writingstage.

Technical Writing Skills: Researching, Summarizing and Outlining, Visual Aids,Definition,Description,SetofInstructions.

Unit-III

FormalFormatting:ArrangementofFormalElements,FrontMaterial,FormatDevices in the Body of Formal Report-Heading, Pagnation, End Material— Citations,ReferencesandBibliography,Appendix.

Unit-IV

Technical Writing Applications: Memorandums and Informal Format, Formal Format,Recommendations and Feasibility Reports, Proposals, Progress Reports, AnalysisReportsProfessionalCommunication,Lettersand Job Applications.

PresentationandMeetings.

Text/References:

1. Forsyth,SandyandLesleyHutchison,“PracticalComposition”,EdinburghOlive r andBoyd,1981.
2. Sides,CharlesH.,“HowtoWriteandPresentTechnicalInformation”,Cambr idge,CambridgeUniversityPress,1999.
3. Guffey,Mary Ellen,“Business Communication, Cincinnati”,South- WesternCollegePublishing,2000.

PaperCode:HS-424
PaperID:15424

L:2T/P:0C:2
Paper: Ethics and Moral Values

Unit I

Human Values: Morals, Values, Ethics, Integrity, Work ethics, Service learning, Virtues, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Cooperation, Commitment, Empathy, Self-confidence, Challenges in the work place, Spirituality [3Hrs]

Unit II

Engineering Ethics: Senses of engineering ethics, Variety of moral issues, Types of inquiries, Moral dilemma, Moral autonomy, Moral development (theories), Consensus and controversy, Profession, Models of professional roles, Responsibility, Theories about right action (Ethical theories), Self-control, Self-interest, Customs, Religion, Self-respect, Case study: Choice of the theory
Engineering as experimentation, Engineers as responsible experimenters, Codes of ethics, Industrial standards, A balanced outlook on law, Case study: The challenger [3Hrs]

Unit III

Safety definition, Safety and risk, Risk analysis, Assessment of safety and risk, Safe exit, Risk-benefit analysis
Safety lessons from 'the challenger', Case study: Power plants, Collegiality and loyalty, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Human rights, Employee rights, Whistle blowing, Intellectual property rights. [4Hrs]

Unit IV

Globalization, Multinational corporations, Environmental ethics, Computer ethics, Weapons development, Engineers as managers, Consulting engineers, Engineers as expert witness, Engineers as advisors in planning and policy making, Moral leadership, Codes of ethics, Engineering council of India, Codes of ethics in Business Organizations [3Hrs]

Textbooks:

1. *A Textbook on Professional Ethics and Human Values*, by R. S. Naagarazan, New Age Publishers, 2006.

References:

1. *Professional Ethics and Human Values* by D. R. Kiran, McGraw-Hill, 2014.
2. *Engineering Ethics*, by Charles E Harris and Micheal J Rabins, Cengage Learning Pub., 2012.
3. *Ethics in Engineering*, Mike Martin and Roland Schinzinger, McGraw Hill Pub., 2017.
4. *Unwritten laws of Ethics and Change in Engineering* by The America Society of Mechanical Engineers, 2015.
5. *Engineering Ethics* by Charles B. Fleddermann, Pearson, 2014.
6. *Introduction to Engineering Ethics* by Mike W. Martin and Roland Schinzinger, McGraw-Hill, 2010.
7. *Engineering Ethics: Concept and Cases* by Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, Cengage, 2009.
8. *Ethics in Engineering Practice and Research* by Caroline Whitbeck, Cambridge University Press, 2007.

Paper Code: IT-404
Paper ID: 15404

L:3 T/P:1 C:4
Paper: Advanced Computer Architecture

Unit-I

Parallel computer models:

The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

Program and network properties:

Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Unit-II Pipelining:

Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

Unit-III

Arithmetic for computers

Signed and unsigned Numbers, Addition and Subtraction, Multiplication, Division, Floating Point.
CPU Performance and Its factors, Evaluating performance of CPU.

Unit – IV

Memory Hierarchy

Introduction, The basics of Cache, Measuring and Improving of Cache Performance, Virtual Memory, Common framework for memory hierarchies
Case study of PIV and AMD opteron memory hierarchies

Text Books:

1. Kai Hwang, “Advanced computer architecture”; TMH. 2000
2. D. A. Patterson and J. L. Hennessey, “Computer organization and design”, Morgan Kaufmann, 2nd Ed. 2002

Reference Books:

1. J.P.Hayes, “computer Architecture and organization”; MGH. 1998
2. Harvey G.Cragon, “Memory System and Pipelined processors”; Narosa Publication. 1998
3. V.Rajaraman & C.S.R.Murthy, “Parallel computer”; PHI. 2002
4. R.K.Ghose, Rajan Moona & Phalguni Gupta, “Foundation of Parallel Processing”, Narosa Publications, 2003
5. Kai Hwang and Zu, “Scalable Parallel Computers Architecture”, MGH. 2001
6. Stalling W, “Computer Organisation & Architecture”, PHI. 2000
7. D.Sima, T.Fountain, P.Kasuk, “Advanced Computer Architecture-A Design space Approach,” Addison Wesley, 1997.
8. M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”; Narosa Publishing. 1998
9. D.A.Patterson, J.L.Hennessey, “Computer Architecture :A quantitative approach”; Morgan Kauffmann feb, 2002.
10. Hwan and Briggs, “Computer Architecture and Parallel Processing”; MGH. 1999

Paper Code:EC 408

L T C

Paper ID : 101408

3 1 4

Paper: Power Electronics

Prerequisites:

EC104 :Analog ElectronicsI

EC211:Analog ElectronicsII

Unit I

Power Semiconductor Devices: Two-transistor Model of Thyristor, Methods of Triggering a Thyristor, Thyristor Types.

Triggering Devices: Triggering Devices, Unijunction Transistor, Characteristics and Applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon-Controlled Switch, Silicon Unilateral Switch, Silicon Bilateral Switch, Shockley Diode, Opto-Isolators. [T1]

Unit II

Thyristor Firing Circuits Turn on systems: Requirements for Triggering Circuits, Thyristor Firing Circuits, Full Wave Control of AC with One Thyristor, Light Activated SCRs (LASCR) Control Circuit, Pulse Transformer Triggering, Firing SCR by UJT, TRIAC Firing Circuit, Phase Control of SCR by Pedestal and Ramp
Controlled Rectifier: Types of Converters, Effect of Inductive Load, Commutating Diode or Free-Wheeling Diode, Controlled Rectifiers, Bi-Phase Half-Wave (Single Way), Single-Phase Full-Wave Phase Controlled Converter Using Bridge Principle (Double Way), Single Phase full-wave phase controlled converter using bridge principle (Double way) harmonics.[T1 R1]

Unit III

Inverters: Types of Inverters, Bridge Inverters, Voltage Source Inverters (VSI), Pulse Width Modulated Inverters, Current Source Inverter

AC Voltage Controllers: Types of AC Voltage Controllers, AC Phase Voltage Controllers, Single-Phase Voltage Controller with R-L Load, Harmonic Analysis of Single-Phase Full-Wave Controller with R-L Load, Gating Signals
DC to DC Converters (Choppers): DC Choppers, Chopper classification, Two Quadrant Chopper, Four Quadrant Chopper, Morgan Chopper.[T1 T2]

Unit IV

Cycloconverters: Types of Cycloconverters, Single-Phase Cycloconverter, Three-Phase Cycloconverters. Thyristor Protection: Protection, dv/dt Protection, di/dt Protection, Over 42, Over voltage protection.

Industrial Applications: "One Shot" Thyristor Trigger Circuit, Overvoltage Protection, Simple Battery Charger, Battery Charging Regulator, AC Static Switches DC Static Switch Microprocessor based Applications. [T1 T2 R1]

Text Books:

T1. "Power Electronics: Circuits, Devices & Applications" PHI – 2nd Edition.

T2. P. C. Sen, "Power Electronics" TMH – 2nd Edition.

Reference Books:

R1. H.C.Rai, "Power Electronics Devices, Circuits, Systems and Application", Galgotia, 3rd Ed. R2. P. S. Bimbhara, "Electrical Machinery, Theory Performance and Applications" Khanna Publications, 7th Ed

Paper Code:EC-406

PaperId :101406

Paper:ICDESIGN

L	T	C
3	1	4

Pre-requisite

BA-103 Theory and Technology of Semiconductors

EC-104 Analog Electronics – I

EC-202 VHDL Based Design

EC-305 Microelectronics

UNIT I

Introduction to VLSI Methodologies - VLSI Physical Design Automation - Design and Fabrication of VLSI Devices .[T1,R1]

UNIT II

A Quick Tour of VLSI Design Automation Tools . Algorithmic Graph theory and computational complexity .[T1,T2]

UNIT III

General purpose methods for combinational optimization - partitioning - floor planning and pin assignment -placement – routing .

Simulation-logic synthesis -Verification-High level synthesis.[R1,T1,T2,R2]

UNIT IV

Physical Design Automation of FPGAs,MCMS-VHDL-Verilog-Implementation of Simple circuits using VHDL[T1,T2,R1,R2]

Text Books:

T1. N.A. Sherwani, " Algorithms for VLSI Physical Design Automation ", 1999.

T2. S.H.Gerez, " Algorithms for VLSI Design Automation ", 1998.

References :

R1. WesteEshraghian Principles of CMOSVLSIdesign

R2. Contemporary Logic Design : Randy H. Katz, University of California, Berke

PaperCode:IT-410
PaperID:15410

L:3T/P:1C:4

Paper:SoftComputing
Employability/Entrepreneurship

Unit-I

NeuralNetworks:

History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit-II Fuzzy Logic:

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Complement, Intersections, Unions, Combination of Operations, Aggregation Operations.

Unit-III

Fuzzy Arithmetic:

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers.

Uncertainty based Information:

Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Unit-IV

Introduction of Neuro-Fuzzy Systems:

Architecture of Neuro Fuzzy Networks.

Application of Fuzzy Logic:

Medicine, Economic etc.

Genetic Algorithm:

An Overview, GA in problem solving, Implementation of GA

Text Books:

1. "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R. G. Palmer, Addison-Wesley, California, 1991.
2. "Fuzzy Sets & Fuzzy Logic", G. J. Klir & B. Yuan, PHI, 1995.
3. "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.
4. "Soft computing and Intelligent System Design", F. O. Karray and C. de Silva, Pearson, 2009.

Reference:

1. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2. "Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J. A. & D. M. Skapura, Addison Wesley, Reading, Mass, (1992).

Paper: Human Resource Management

MS 416

L4 C4

Objectives: the objective of the course is to familiarize students with the different aspects of managing Human Resources in the organization through the phases of acquisition, development and retention.

Unit-I: Introduction

(Lectures- 10)

- a. Concept, Nature, Scope, Objectives and Importance of HRM
- b. Evolution of HRM
- c. HRM Policies, challenges of HRM
- d. Personnel Management vs HRM
- e. Traditional HRM vs Strategic HRM
- f. New Trends in HRM

Unit-II: Human Resource Planning

(Lectures- 10)

- a. Job analysis: Job Description and Job specification
- b. Job design, Job Simplification, Job Rotation, Job Enlargement, Job Enrichment
- c. Recruitment: Sources and process
- d. Selection Process: Tests and Interviews
- e. Placement and Induction
- f. Job changes: transfers, Promotions/ Demotions, Separations

Unit- III: Training and Development

(Lectures- 10)

- a. Concept and Importance of Training
- b. Types of Training
- c. Methods of Training
- d. Design of Training Programme
- e. Evaluation of Training Effectiveness
- f. Executive Development : Process and Techniques
- g. Career Planning and Development
- h. Performance and Potential appraisal: Concept and Objectives Traditional and Modern methods, limitations of performance appraisal methods, Introduction to Performance Management, 360 degree Appraisal, MBO

Unit – IV: Compensation and Maintenance

(Lectures- 10)

- a. Compensation:
 - i. Job Evaluation: Concept, Process and significance;
 - ii. Components of Employee Remuneration: Base and Supplementary
- b. Maintenance:
 - i. Overview of Employee Welfare, Health and safety, Social Security, grievance Redressal Procedure, Employee Participation, Flexitime, ESOPs

Text Books:

1. G. Dessler, Human Resource Management, Pearson Education, 2008.
2. Snell et al, Human resource Management, cenage learning (India Edition), 2010

References:

1. V.S.P. Rao, Human Resource Management: Text and cases, Excel Books, 2007.
2. D.Lepak, & M.Gowan, Human Resource Management, Pearson Education, 2009.

paper Code: EC 426
paper ID: 101426

L	T	C
3	1	4

Paper: Object Oriented Programming Using Java

Pre-requisites:

IT - 207: Object Oriented Programming Using C++

(Each Unit is of 10 hrs.)

Unit I: Overview of the concepts of Object Oriented Programming , Classes , Object , Abstraction , Encapsulation , Inheritance , Polymorphism , Data hiding etc .Structured Programming v/s OOP , Characteristics of Java , Overview of Java Platform and Program Structure , Various options of Compilation and Execution of a Java Program(javac and java switches) . Overview of the Functioning of a Java IDE i.e Eclipse/ Netbeans / BlueJ .

Unit II: Java Fundamentals , Data Types& Literals Variables, Arrays ,Arithmetic Operators, Logical Operators , Control of Flow , Classes and Instances , Class Member Modifiers , Anonymous Inner Class , Inheritance , Interfaces and Packages , Exception Handling applet and its Life cycle

Unit III: Graphical Programming, AWT Components, Component Class, Container Class, Layout Managers , Border Layout , Flow Layout , Grid Layout , Card Layout Grid Bag Layout . AWT Events ,Event Models , Listeners and Adapters , Action Event Methods Focus Event Key Event ,Mouse Events ,Window Event . Threads, Creating Threads , Thread Priority ,Thread Synchronization and Communication using wait , notify and notifyall.

Unit IV: Input/Output Stream , Stream Filters,Buffered Streams ,Data input and Output Stream, Print Stream Random Access File , JDBC , Database connectivity with Oracle , Object serialization , Sockets , development of client Server applications , design of Multithreaded server .Remote Method invocation , Collection API Interfaces , Vector , stack , Hash table classes , enumerations , set , List , Map , Iterators .

Text/References

1. "Java-2 the complete Reference" by Patrick Naughton and Herbertz Schidt.
2. Head first Java, Sierra & bates , O'reilly
3. "Programming with Java" by E Balaguruswamy.
4. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
5. Decker & Hirshfield, "Programming.Java", Vikas Publication.

Paper Code:EC-420
PaperID:101420

L	T	C
3	1	4

Paper : **Fuzzy Logic and Systems**

Pre-requisites:

IT-407 Artificial Intelligence

Unit-1

Overview of Classical Sets, Membership Function, α -cuts, Properties of α -cuts, Decomposition Theorems, Extension Principle.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Unit-2

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Relations: Crisp & Fuzzy Relations, Projections & Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

Unit-3

Possibility Theory: Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory.

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Unit-4

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp sets, Fuzziness of Fuzzy Sets. Design of fuzzy systems

Text Book:

1. G.J.Klir , Yuan, "Fuzzy Sets and fuzzy logic, Theory and applications", Prentice Hall India, 1995.

Reference Books:

1. John Yen, Reza Langari, "Fuzzy Logic Intelligence, Control and Information", Pearson Education, 2006.

2. Ross, "Fuzzy Logic with Engineering Applications", 2nd Edition, John Wiley, 2004.
3. H. Zimmermann, "Fuzzy Set Theory and its applications", 2nd Edition, Allied Publishers, 1996

Paper Code: EC-418

Paper ID: 101418

L T C

3 1 4

Paper: Digital Image Processing and Applications

Prerequisites:

EC302: Digital Signal Processing

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UNIT I DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS

Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.[T1]

UNIT II IMAGE ENHANCEMENT TECHNIQUES:

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging – Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing – Sharpening filters – Homomorphic filtering. [T1]

UNIT III IMAGE RESTORATION AND COMPRESSION

Model of Image Degradation/restoration process – Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition Lossless compression: Variable length coding – LZW coding – Bit plane coding- predictive coding-DPCM. Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization. .[T1 R1 R3]

UNIT IV IMAGE SEGMENTATION AND REPRESENTATION

Edge detection – Thresholding - Region Based segmentation – Boundary representation: chain codes- Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors – Simple descriptors- Texture [T1 R1]

Text Books

T1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education 2003.

References

R1. William K Pratt, Digital Image Processing John Willey (2001)

R2. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Larniy (1999).

R3. A.K. Jain, PHI, New Delhi (1995)-Fundamentals of Digital Image Processing.

R4. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India, 2000

Paper Code :EC422
Paper ID:101422

L	T	C
3	1	4

Paper: Linear and Nonlinear Optimization Techniques

Prerequisites:

IT 201:Computational Techniques

UNIT – I

Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function

– objective function surfaces – classification of Optimization problems.

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – II

Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

Optimization

Quasi-Newton Methods and line search, least squares optimization, Gauss-Newton, Levenberg- Marquardt, Extensions of LP to Mixed Integer Linear Programming (MILP), Non-Linear Programming, The Newton Algorithm, Non-Linear Least Squares, Sequential Quadratics Programming (SQP), Constrained Optimization, SQP Implementation, Multi-Objective Optimization, Branch and Bound Approaches, Genetic Algorithms and Genetic Programming, Singular Based Optimization, On-Line Real-Time Optimization, Optimization in Econometrics Approaches – Blue.

UNIT III

Transportation Problem

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

Unconstrained Nonlinear Programming:

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

Unconstrained Optimization Techniques Univariate method, Powell's method and steepest descent method.

UNIT – IV

Constrained Nonlinear Programming:

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem. **Dynamic Programming:**

Dynamic programming multistage decision processes – types – concept of sub optimization and

the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

Text Books:

- T1. “Engineering optimization: Theory and practice”-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
- T2. “ Introductory Operations Research” by H.S. Kasene & K.D. Kumar, Springer(India), Pvt .LTd.
- T3. Winston W L: Operations Research: Applications and Algorithms
- T4. Rao S.S., Optimization: Theory and Applications.
- T5. Walsh G R: M methods of Optimization.
- T6. Williams H.P.: Model Building in Mathematics Programming.
- T7. Williams H.P.: Model Solving in Mathematics Programming
- T8. G.L. Nemhauser and L.A. Wolsey: Intger and Combinational Optimization.
- T9. R.G. Parker and R.L. Rardin:Discrete Optimization

Reference Books:

- R1 “ Optimization Methods in Operations Research and systems Analysis” – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
- R2. Operations Research – by Dr. S.D.Sharma.
- R3. “Operations Research : An Introduction” – by H.A. Taha, PHI Pvt. Ltd., 6th edition
- R4. Linear Programming – by G. Hadley

Paper Code:EC-424
PaperID:101424

L	T	C
3	1	4

Paper :Advances In Wireless Communication.

Prerequisites:

EC312:Mobile Communication

UNIT-I:

Radio Propagation Characteristics, Models for Path loss, Shadowing & Multipath fading-delay spread, Coherence bandwidth, Coherence Time, Doppler Spread Jake's Channel model.

UNIT - II :

Digital Modulation for Mobile radio, Analysis under fading channel, diversity techniques and Rake demodulator. Introduction to Spread Spectrum Communication Multiple Access Techniques used in Mobile Wireless Communications: FDMA/TDMA/CDMA.

UNIT -III:

The Cellular concept, Frequency Reuse basic theory of hexagonal cell layout, spectrum efficiency, FDM/TDM, Cellular System, channel allocation schemes, handover Analysis, cellular CDMA, Soft capacity, Erlang capacity comparison.

UNIT -IV:

Wireless standards-GSM, IS-95, UMTS-IMT-2000, Signaling, Call Control, Mobility Management and location Tracing. Wireless Internet, Ad hoc wireless networks, Broadband wireless and quality of service, Location management, Pervasive healthcare

Text Books:

T1.Theodore S.Reppeport, Wireless Communications Principles and Practice, IEEE Press, Prentice Hall.

T2.William C.Y.Lee, Mobile Cellular Telecommunication, Analog and Digital Systems, McGraw Hill Inc.

Reference Books:

R1.Kamilo Feher, Wireless Digital Communications, Modernization & Spread Spectrum Applications, Prentice Hall of India, New Delhi.

R2.Kaveh Pahlavan and Allen H. Levesque" Wireless Information Networks", Wiley Series, John Wiley

Paper Code: EC412

PaperID:101412

L	T	C
3	1	4

Paper :Multimedia communications

Prerequisite:

IT 105:Introduction to Computers

EC 204:Communication Systems II

Unit – 1:

Introductory concepts: Multimedia , definition, Different types of multimedia products in different fields , Introduction to making of multimedia – the stages of the projects, the hardware and software requirements etc.,. Authoring tools, Categories of Authoring Tools.

Unit -2:

Lossless and Lossy compression, Run length coding, Statistical Coding, Transform Coding, making of JPEG, making of MPEG, Text compression using static Huffman technique, Dynamic Huffman Technique, Arithmetic Technique etc.,

Unit – 3:

Distributed multimedia systems, Resource management of DMS, IP networking, Multimedia operating systems, distributed multimedia servers, Distributed multimedia applications, Multimedia File Formats

Unit-4

Multimedia communication standards, MPEG-1, MPEG-2, MPEG-4Audio/Video, MPEG-4 Visual Texture coding (VTC), Multimedia communication across networks.

Compression Techniques: JPEG, MPEG

Text:

1. Rao, Bojkovic, Milovanovic, “Multimedia Communication Systems”,PHI
2. Andleigh, Thakrar, “Multimedia System Design”,PHI

References:

1. Sharda, “Multimedia Information Networking”,PHI
2. Vaughan, “Multimedia making it work”, Tata Mc GrawHill

	L	T/P	C
Code: EC452			
Paper ID: 101452 Paper: Laboratory work based on Elective or MATLAB	0	4	2

This lab course will be based on Electives or MATLAB. The concerned teacher shall announce list of practicals in the first week of teaching. At least ten practicals have to be performed by student studying for this paper

Code: EC454	L	T/P	C
Paper ID: 101454 Paper: Major Project	0	16	8

For the major project, a supervisor shall be allocated by school in the area of interest of student. Student has to submit a report at the end duly approved by supervisor for evaluation.

Code: EC456	L	T/P	C
Paper ID: 101456 Paper: Seminar and Progress Report	0	0	1

Seminar shall be given by student at scheduled times together with progress report of major project. The evaluation shall be held by a committee constituted by Dean of school. The paper is a NUES paper.

S. No.	Paper Code	Paper Name	Program me of Study	Course Outcomes
1	HS101	Communication Skills-I	ECE	<ol style="list-style-type: none"> 1. Ability to use tenses and concord; gerunds, participles & infinitives correctly. 2. Ability to use antonyms and synonyms, idioms and foreign phrases correctly. 3. Ability to compose simple technical reports. 4. Ability to present a logical argument.
2	IT 105	Introduction to Computers	ECE	<ol style="list-style-type: none"> 1. Ability to use computers for word processing, spreadsheet calculation, use operating system commands and understand basic structure of a computing system. 2. Ability to describe an algorithm. 3. Ability to write programs in 'C' using functions, arrays, structure, files etc.
3	BA 105	Theory and Technology of Semiconductors	ECE	<ol style="list-style-type: none"> 1. Understand crystal properties and growth of semi-conductors. 2. Understand band theory of solids and use it to describe energy bands and charge carrier properties in semi-conductors. 3. Understand optical absorption, luminescence, carrier injection and current (electron and holes). 4. Understand the fabrication and properties of different type of junctions in semi-conductors.
4	EC 107	Network Analysis	ECE	<ol style="list-style-type: none"> 1. Understand the concept of an electrical circuits, linear elements, operational amplifiers, voltage and current sources, inductance, capacitance and resistive elements. 2. Ability to analyse electrical networks with DC sources and the theorems and transformations (source and circuits) associated. 3. Ability to analyse electrical networks with AC sources and the theorems and transformations (source and circuits) associated. 4. Ability to describe two-port networks in time and transform domains (Fourier and Laplace).
5	BA109	Mathematics – I	ECE	<ol style="list-style-type: none"> 1. Ability to solve problems using differential and integral calculus. 2. Ability to analyse convergence of series with emphasis of Taylor's and Maclaurin series. 3. Ability to solve differential and integral problems of many variables. 4. Ability to solve problems of vector calculus.
6	BA111	Physics – I	ECE	<ol style="list-style-type: none"> 1. Understanding of wave optics (Polarization, Interference and Diffraction). 2. Understand working of different types of lasers. 3. Understand principles and working optical fibres. 4. Understand and be able to solve problems in special theory of relativity.
8	HS102	Communication Skills – II	ECE	<ol style="list-style-type: none"> 1. Understand the medium of communication. 2. Ability to write technical reports and business letters. 3. Ability to speak with clarity and fluency. 4. Ability to participate in a group discussion and have effective listening capability.
9	EC 104	Analog Electronics - I	ECE	<ol style="list-style-type: none"> 1. Understand the characteristics of junction diodes and transistors. 2. Understand the DC equivalent models of semi-conductor devices (diodes and transistors) and mechanism(s) of biasing, stabilization and compensation. 3. To understand the principle of operation of different amplifier circuits like feedback amplifiers, power amplifiers. 4. To understand the principle of operation of different oscillator circuits.
10	EM106	Environment Studies	ECE	<ol style="list-style-type: none"> 1. The course is designed to impart basic knowledge of the environment and its components. 2. The course deals in creating awareness about the energy resources and current environmental problems faced by the world. 3. To understand and learn about environment pollution. 4. Understand environmental laws and the role and types of polymers.
11	BA108	Mathematics – II	ECE	<ol style="list-style-type: none"> 1. Ability to use linear algebraic techniques to solve problems. 2. Ability to use ODE techniques to solve problems. 3. Ability to use complex analysis techniques to solve problems. 4. Ability to use probabilistic techniques to solve problems.
12	BA110	Physics-II	ECE	<ol style="list-style-type: none"> 1. Understand quantum mechanical systems and solve simple problems. 2. Understand quantum statistical systems and solve simple problems. 3. Understand and use band theory of solids to explain working of diodes and

S. No.	Paper Code	Paper Name	Program me of Study	Course Outcomes
				transistors. 4. Understand how planar EM waves are generated.
13	EC112	Signals and Systems	ECE	1. Understand the classification and properties of signals and systems. 2. Ability to understand Fourier series and Fourier transform. Application of Fourier transform to solve partial differential equations and apply to characterize linear systems (continuous and discrete). 3. Ability to understand Laplace and Z transform. Application of Laplace transform and Z-Transform to solve partial differential equations and apply to characterize linear systems (continuous and discrete, respectively). 4. Ability to design the structure of a filter.
14	IT154	Engineering Graphics Lab. - II	ECE	1. Ability to perspective, orthographic, isometric and oblique projections. 2. Ability to sketch and describe shapes using techniques of 1 st and 3 rd angle projections, glass-box concept. 3. Ability to describe size (dimensioning). 4. Elementary understanding of CAD.
Second Year				
15	IT201	Computational Methods / Computational techniques	ECE	1. Ability to find roots of equations. Solve unconstrained one variable minimization problems, and multi-variate minimization problems. 2. Ability to perform numerical interpolation, differentiation and integration. 3. Ability to solve linear equations numerically and to approximate functions using splines. 4. Ability to solve differential equations numerically.
16	EC203	Communication System - I	ECE	1. Understand the characteristics of a communication systems, bandwidth and information capacity and the role and sources of noise in communication systems. 2. Understand the design and specifications for amplitude modulation systems. 3. Understand the design and specifications for angle and frequency modulation systems. 4. Understand the design and specifications for pulse analog modulation systems.
17	EC205	Engineering Electromagnetics	ECE	1. Appraise need analysis for different coordinate systems in electromagnetics and their interrelations. 2. Apply vector calculus to solve field theory problems. 3. Calculate electric and magnetic fields in different coordinates for various charge and current configurations. 4. Exhibit the concept of time varying fields. 5. Demonstrate different aspects of plane wave in dielectric and conducting media. 6. Realize the analogy of wave with transmission line and determine the transmission line performance.
18	IT207	Object Oriented Programming Using C++	ECE	1. Ability to describe the important concepts of object oriented programming like object and class, Encapsulation, inheritance and polymorphism. 2. Ability to write the simple object oriented programs in C++, use features of C++ like type conversion, inheritance, polymorphism, I/O streams and files to develop programs for real life problems. 3. Ability to use advance features like templates and exception to make programs supporting reusability and sophistication. 4. Ability to use standard template library for faster development. 5. Ability to develop applications using object oriented programming with C++.
19	EC209	Digital Electronics	ECE	1. Ability to understand, represent and minimize Boolean Expression for digital circuits. 2. Ability to design circuits for multiplexers, demultiplexers, decoders and encoders, adders and subtractors, code convertors and comparators. 3. Understand the working and design of flip-flops, shift registers, ripple counters, synchronous counters and sequence detectors. Understand the working of 555 timer and its use as mono-stable and astable multi-vibrator. 4. Understand different logic families and their characteristics along with the knowledge of different types of memories.
20	EC211	Analog	ECE	1. Ability to design and analyse multi-stage and power amplifiers.

S. No.	Paper Code	Paper Name	Program me of Study	Course Outcomes
		Electronics II		<ol style="list-style-type: none"> Understand working of analog ICs as differential amplifiers, differentiators, integrators, inverting and non-inverting amplifiers and voltage to current and vice-versa convertors. Understand linear and non-linear wave shaping. Understand and ability to use and design active filters.
21	EC202	VHDL Based Design	ECE	<ol style="list-style-type: none"> Ability to demonstrate the use and application of Boolean Algebra in reduction, expansion, factoring. Ability to use VHDL software to analyse and synthesize digital circuits. Ability to simulate and debug digital systems described in VHDL. Ability to synthesize complex digital circuits at several level of abstractions.
22	EC204	Communications Systems - II	ECE	<ol style="list-style-type: none"> Understand random variables and processes and their relevance in a communication system. Understand the techniques of baseband modulation detection. Understand the techniques of bandpass modulation and demodulation. Understand techniques of line coding and the mathematical theory of communication.
23	EC206	Transmission Lines, Waveguides and Antennas	ECE	<ol style="list-style-type: none"> Understand various types of transmission lines and analyze the lumped circuit model of a transmission line and their characteristics. And the ability to use the smith chart as a graphical tool to solve impedance matching issues Ability to solve Maxwell's equations using vector calculus in three standard coordinate systems. Understand the power flow mechanism of plane wave Deduce EM wave propagation in free space and in dielectric medium. Analyze the electromagnetic wave propagation in guiding structures Have an understanding of antenna radiating principle and the fundamental characteristics and parameters of antennas.
24	EC208	Control Engineering	ECE	<ol style="list-style-type: none"> Familiarization with various components and building blocks of a control system and their transfer function in open loop as well as closed loop configurations. Time domain analysis (Transient as well as steady state) as also knowledge of error constant. Frequency Domain Analysis, specifications and graphical methods to study stability of the system in terms of its parameters/variables. Algebraic and graphical techniques to analysis various systems for stable operation. Concept of controllers and compensation methods to achieve desirable performance of the system.
25	EC210	Data Structures and Algorithms	ECE	<ol style="list-style-type: none"> Ability to design programs using stacks and queues (array based). And, use them for expression representation and evaluation and sparse matrix representation. Also ability to write recursive programs. Ability to utilise linked list (single, doubly linked and circular) to write programs. And, to represent polynomials using lists with addition implementation. Ability to design operations on the tree structure for insertion, deletion and traversal. Ability to use the trees for searching applications. Ability to design operations on the graph structure for insertion, deletion and traversal. Ability to use the trees for searching applications.
26	EC212	Computer Architecture and Operating Systems	ECE	<ol style="list-style-type: none"> Understand the basic architecture of a computer. Understand different architecture families, instruction sets, and the concept of micro-programmed control and the different types of bus architecture. Understand the types, roles, functions, and architecture of an operating systems. Understand techniques of process, scheduling and management and memory management by an OS.
Third Year				
27	EC301	Microwave Devices and Circuits	ECE	<ol style="list-style-type: none"> Learn the basics of S parameters and use them in describing the components. Understand the working of Microwave semiconductor devices and tubes. Realize the importance of the theory of Microwave circuit theory. Work out the complete design aspects of various M.I.C. filters Understand the principles of radar engineering

S. No.	Paper Code	Paper Name	Program me of Study	Course Outcomes
28	EC303	Microprocessors and Interfacing	ECE	<ol style="list-style-type: none"> 1. Understand the architecture of Intel 8086 processor. 2. Ability to write assembly language programs and interface with C/C++. 3. Ability to design and implement systems interfacing with 8255, 8254, 8251, 8279, 8087 and 8089. 4. Understand and appreciate the architecture and capability of Intel 80186, 80286, 80386, 80486, Pentium I, II, III and IV processors
29	EC305	Microelectronics	ECE	<ol style="list-style-type: none"> 1. To understand device structure and properties of NMOS, PMOS and CMOS 2. To understand static and switching characteristics CMOS inverter 3. To design the CMOS based combinational and sequential circuits 4. To understand the concept of hierarchy, regularity, modularity and locality
30	EC307	Relational Database Management Systems	ECE	<ol style="list-style-type: none"> 1. Ability to understand advantages of database systems and use them 2. Ability to design databases for specific use. 3. Ability to write programs in SQL and PL/SQL for data processing. 4. Understand principles of good database design and transaction processing.
31	EC309	Stochastic Systems and Processes	ECE	<ol style="list-style-type: none"> 1. Ability to understand working of stochastic systems and model them. 2. Ability to develop stochastic models based on data and perform hypothesis testing. 3. Ability to apply stochastic modelling techniques to electronic and communications systems.
32	EC302	Digital System Processing and Applications	ECE	<ol style="list-style-type: none"> 1. Ability to use different transforms (DFT, FFT, Hilbert) to solve DSP problems. 2. Ability to design IIR filters 3. Ability to design and optimize filters. Also design adaptive filters. 4. Ability to use DSP techniques to solve problems in the field of speech and radar systems.
33	EC304	Computer Networking	ECE	<ol style="list-style-type: none"> 1. Understand the concepts of computer networks, OSI model and TCP/IP model. 2. Understand the physical layer concepts and signal encoding/decoding techniques. 3. Understand the data link layer functions and protocols. 4. Understand working of the upper layers of the TCP/IP stack..
34	EC306	Information Theory and Coding	ECE	<ol style="list-style-type: none"> 1. Comprehend the quantitative theory of information in conceptualizing a reliable and efficient communication system. 2. Understand the principles of data compression, channel capacity of common communication channels. 3. Design and evaluate the performance linear, Cyclic and Quaternary codes.
35	EC308	Telecommunications Networks	ECE	<ol style="list-style-type: none"> 1. Understand fundamentals of telecomm switching system 2. Understand the concept of Time division Switching and traffic engineering 3. Understand telephone and data networks 4. Understand concepts of SONET, ISDN ATM, Frame relay
36	EC310	Opto – Electronics and Optical Communications	ECE	<ol style="list-style-type: none"> 1. Understand the working of optical communication channel components. 2. Understand the transmission characteristics of optical fibre. 3. Understand the principles and working of optical sources and circuits. 4. Understand optical communication multiplexing strategies and optical fibre network working principles and standards.
37	EC312	Mobile Communications	ECE	<ol style="list-style-type: none"> 1. Understand the working and design of mobile communication systems. 2. Understand the different modulation techniques in mobile communication systems. 3. Understand the GSM architecture and protocols. 4. Ability to design a mobile communications system architecture.
Fourth Year				
38	EC401	Satellite Communication	ECE	<ol style="list-style-type: none"> 1. Understand the basics of satellite communications. 2. Understand the subsystems of satellite communications system. 3. Understand satellite link design 4. Understand the multiple access technique and network aspects of satellite and its applications
39	IT 417	Embedded Systems	ECE	<ol style="list-style-type: none"> 1. To introduce the Building Blocks of Embedded System 2. To Educate in Various Embedded Development Strategies

S. No.	Paper Code	Paper Name	Program me of Study	Course Outcomes
				<ol style="list-style-type: none"> To Introduce Bus Communication in processors, Input/output interfacing. To impart knowledge in various processor scheduling algorithms and to introduce Basics of Real time operating system and example tutorials to discuss on one real time operating system tool
40	EC 405	Measurement and instrumentation	ECE	<ol style="list-style-type: none"> To learn about the basics of instrumentation types of instrument on the basis of their construction. To study Measurement of power & energy (Dynamometer, Wattmeter etc) Measurement of resistance using different types bridges Measurement of pressure ,Torque Angular velocity etc using various instruments
41	IT 407	Artificial Intelligence	ECE	<ol style="list-style-type: none"> To introduce AI, state space search, heuristic search and control strategies To understand knowledge representation, statistical reasoning. To understand planning and natural language processing. To introduce neural networks, fuzzy logic, genetic algorithms and overview of expert systems
42	EC 411	Neural networks and application	ECE	<ol style="list-style-type: none"> To understand the different models of artificial neurons and neural networks. To study various supervised, unsupervised and Hybrid learning algorithms. To explore different application areas of Artificial Neural Networks
43	EC 413	Software Engineering	ECE	<ol style="list-style-type: none"> Ability to analyse Continuous and Discrete time signals/systems and evaluate the frequency response of a discrete time signals/ systems using fourier transforms. Ability to calculate Z-transforms for discrete time signals and system functions. Ability to develop Fast Fourier Transform (FFT) algorithms for faster realization of signals and systems. Ability to understand the design of Digital IIR filters and Digital FIR filter.
44	EC 415	Radra and Navigation Engg	ECE	<ol style="list-style-type: none"> The students will be familiarised with the concept of Radar,radar mathematics and it's types. To studyDifferent navigation systems their antenna systems and applications. To study radio direction finding and ranging To study various applications of RADAR
45	EC 417	Reliability engg.	ECE	<ol style="list-style-type: none"> To be able to analyse various types of systems for reliability(Delta star method,Bayes theorem method etc) To study reliability prediction learn about redundancy techniques for reliability optimization &the concept of maintenance To learn various methods of reliability testing
46	EC 421	Radio and Television Engg	ECE	<ol style="list-style-type: none"> To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes To study the principles of Monochrome Television Transmitter and Receiver systems. To study the various Color Television systems with a greater emphasis on PALsystem. To study the advanced topics in Television systems and Video Engineering
47	HS 402	Technical writing	ECE	<ol style="list-style-type: none"> Develop effective research paper writing skills which has good level of readability in scientific community. Learn to Structure Research Papers Understand the skills needed when writing scientific descriptions Ensure about the ethics and etiquettes of work culture
48	HS424	Ethics and Moral Values	ECE	<ol style="list-style-type: none"> Realize the importance of human values. Understand that excessive desires of the mind make a person unethical and restless, while fewer desires lead to peace and professional progress Assess different types of risks involved in unethical practices. Know various means ofprotesting against unethical practices. Assess the benefits of restraining from unethical practices like bribery,

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				extortion, nepotism, nexus between politicians and industrialists.
49	IT 404	Advance computer architecture	ECE	<ol style="list-style-type: none"> 1. Ability of students to understand concept of parallel computing and hardware technologies. 2. Ability of students to differentiate control flow, data flow, demand driven mechanisms. 3. Ability of students to understand the principles of scalable performance, and advanced processor architectures. 4. Ability of students to the basics of instruction pipelining and memory technologies
50	EC 406	IC design	ECE	<ol style="list-style-type: none"> 1. To understand the design of Integrated Circuits 2. To get the Knowledge about the design methodologies and VHDL Verilog Implementation of VLSI circuits. 3. To study the synthesis and complexity levels 4. To learn physical design automation and FPGA tools
51	EC 408	Power electronics	ECE	<ol style="list-style-type: none"> 1. To study about high power semiconductor devices and their application 2. To study high power application of semiconductor devices 3. Student will be able to understand and analyse the functioning of inverters, SCR's Choppers & regulator etc. 4. To learn industrial applications of power electronics
52	IT 410	Soft computing	ECE	<ol style="list-style-type: none"> 1. Understand soft computing techniques like Neural Networks and their role in problem solving. 2. Conceptualize and parameterize various problems to be solved through basic soft computing techniques in Fuzzy systems 3. Analyze and integrate various Evolutionary algorithms in order to solve problems effectively and efficiently. 4. Understand use of Rough sets and Hybrid Systems in problem solving
53	EC 412	Multimedia communication	ECE	<ol style="list-style-type: none"> 1. To understand various standardization for multimedia structures 2. To learn different authoring tools for multimedia 3. To study various compression and encoding formats of audio and video. 4. To study Multimedia network communication
54	MS 416	Principles of HRM	ECE	<ol style="list-style-type: none"> 1. Describe the concepts of Human Resource Management for taking major human resource decisions 2. Explain the role human resource manager plays the face the different challenges and strategies for organizational development 3. To be able to apply functions of human resource planning for recruitment for the organization. 4. Ability to assess and develop training mechanisms and method of performance and job evaluation.
55	EC 418	Digital image processing and application	ECE	<ol style="list-style-type: none"> 1. To understand the concept of digital image as a two dimensional signal and study various mathematical operations performed on digital images. 2. To make the students analyse Image signal in frequency domain, and perform various operations such as transformation, compression, Restoration and coding. 3. To analyse various segmentation techniques 4. To study various Restoration techniques
56	EC 420	Fuzzy logic and systems	ECE	<ol style="list-style-type: none"> 1. To understand the Fuzzy logic and operations. 2. To understand Fuzzy arithmetic and relations 3. To Design fuzzy Systems 4. To study information uncertainty and fuzzy sets
57	EC422	Linear and nonlinear optimization techniques	ECE	<ol style="list-style-type: none"> 1. To learn linear and non linear optimization techniques 2. To apply optimization techniques in various engineering applications 3. To learn constrained and unconstrained optimization 4. To study classic optimization problems
58	EC 424	Advances in	ECE	<ol style="list-style-type: none"> 1. To study various propagation mechanism in wireless medium

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		wireless communication		<ol style="list-style-type: none"> 2. To study various models of channels and fading. 3. To study and compare the performance of various modulation 4. To study access techniques(TDMA/FDMA/CDMA) and wireless standards
59	EC 426	Object oriented programming using Java	ECE	<ol style="list-style-type: none"> 1. learn to access database through Java programs, using JDBC and invoke the remote methods in an application using RMI 2. Gain the knowledge of Server Side programing by implementing Servlet and JSP 3. Understand struts framework, Combining Struts and Tile to create small applications 4. Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).