SCHEME OF EXAMINATION

&

SYLLABI

for

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

Offered by

University School of Information Technology

1ST SEMESTER TO 8TH SEMESTER

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

Guru Gobind Singh Indraprastha University
Kashmere Gate, Delhi – 110 403 [INDIA]
www.ipu.ac.in

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

*NUES

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

*NUES

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

*NUES

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						
IT417	15417	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	-
EC409	101409	Introduction to Nanotechnology	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	-
EC419	101419	Computer Graphics and Multimedia	4	3	1	-
EC421	101421	Radio and Television Engineering	4	3	1	-
MS423	101423	Principles of Managerial Economics	4	4	-	-
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

*NUES

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	-
MS414	101414	Financial Management	4	4	-	-
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

*NUES

**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 200 Credits.

Code: HS 101		L	T/P	C
Paper ID: 98101	**Paper: Communication Skills – I**	**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

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: BA 105		L	T/P	C
Paper ID: 99103	Paper: Theory and Technology of Semiconductors	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:

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 (3rd Ed.).
3. S. M. Sze and K. K. Ng, “Physics of Semiconductor Devices”, Wiley, 2007 (3rd Ed.).

Code : IT105		L	T/P	C
Paper ID:15105	Paper: Introduction To Computers	3	0	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, the students should be asked to attempt 2 questions from unit I (1 questions out of 2) and attempt 3 questions from Unit II (3 questions.out of 5).

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 a 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 that 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 getchar 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		**L**	**T/P**	**C**
Paper ID: 101107	**Paper: Network Analysis**	**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, Kirchhoff'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, Impedences 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		L	T/P	C
Paper ID: 99109	Paper: Mathematics - I	2	1	3

1(a) Calculus of functions of One variable

(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 n^{th} 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

1(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 interferrometer, Fabry Perot interferrometer)

7 hrs.

Diffraction

(Fresnel and Fraunhofer types of diffraction) Fraunhofer difraction: 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 FIBRE OPTICS

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: Kenneth Krane
3. Fundaments of Optics: Jenkins and White
4. Optics: Ghatak
5. Fundamental of Physics by RESNICK & HALLIDAY

Practicals:

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

Practicals based on BA105.

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

Practicals based on BA109.

Code: IT155		L	T/P	C
Paper ID:15155	**Paper: Computer Lab.**	**0**	**2**	**1**

Practicals based on IT105.

Code: IT157		L	T/P	C
Paper ID: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**	

Practicals based on EC107.

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

Practicals based on HS101.

Code: HS102		L	T/P	C
Paper ID:98102	**Paper: Communication Skills – II**	**1**	**2**	**3**

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		L	T/P	C
Paper ID: 101104	Paper: Analog Electronics – I	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

Junction Diode Charactersistics: 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, Varactar 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-I V

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 others TMH.
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		L	T/P	C
Paper ID: 99106	Paper: Environment Studies	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

(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, SOx and particulates, effect of pollutants on man & environment: photochemical smog, acid rain and global warming, CO_2 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; compositing, 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, Academic Press.
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, Balaram Pani
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

I. Linear Algebra: Linear Independence and dependence of vectors, Systems of linear equations – consistency and inconsisitency, 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 (without proof).

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 Bernouilli 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. Graw Hill.
7. Schaum Outline Series "Complex Variables" Mc. Graw Hill.
8. Schaum Outline Series "Linear Algebra" Mc. Graw Hill.
9. Schaum Outline Series "Probability" Mc. Graw Hill

PHYSICS - II

Paper Code: BA – 110

L	T/P	Credits
2	1	3

I. Quantum Mechanics

Wave particle duality, deBroglie 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, Ferminos 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 applicatons 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 by Kittle
4. Electronic Principles: Malvino
5. Statistical Mechanics by Garg Bansal and Ghosh (TMH)

Code: EC 112	**L**	**T/P**	**C**
Paper ID: 101112 Paper: Signal and Systems	**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

(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. AlanV.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.

Practicals:

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

Practicals based on EC104 and EC112.

Code: IT154		L	T/P	C
Paper ID:15154	**Paper: Engineering Graphics Lab.**	**0**	**2**	**1**

Basic Concepts

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**

Practicals based on BA110.

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

Practicals based on BA106.

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

Practicals based on HS102.

SCHEME OF EXAMINATION

&

SYLLABI

for

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

Offered by

University School of Information Technology

1ST SEMESTER TO 8TH SEMESTER

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

Guru Gobind Singh Indraprastha University
Kashmere Gate, Delhi – 110 403 [INDIA]
www.ipu.ac.in

Code: HS 101		L	T/P	C
Paper ID: 98101	**Paper: Communication Skills – I**	**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

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: BA 103		**L**	**T/P**	**C**
Paper ID: 99103	**Paper: Theory and Technology of Semiconductors**	**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:

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 (3rd Ed.).
3. S. M. Sze and K. K. Ng, “Physics of Semiconductor Devices”, Wiley, 2007 (3rd Ed.).

Code : IT105		L	T/P	C
Paper ID:15105	Paper: Introduction To Computers	3	0	3

Pre-requisite

+2 Maths

Aim

To familiarize with basic concepts of computer , memory storage devices and computing

Objectives

1. **To understand the concept of C Programming**

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, the students should be asked to attempt 2 questions from unit I (1 questions out of 2) and attempt 3 questions from Unit II (3 questions.out of 5).

Unit – I

Introduction:.

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.

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 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 a algorithm.Notion of program, programmability and programming languages, Structure of programs, Object codes, compilers.

UNIT II

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. Algorithm / pseudo code, flowchart, program development steps, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation.Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, programming examples.

UNIT III

Designing structured programs, Functions, basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, twodimensional and multi-dimensional arrays, applications of arrays.

pointers- concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions,pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions,command line arguments, c program examples.

UNIT IV

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bitfields, C program examples.Input and output – concept of a file, text files and binary files, streams, standard I/o, Formatted I/o, file I/o operations, error handling, C program examples.

TEXT BOOKS :

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
2. DataStructures Using C – A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson

education.

REFERENCES :

1. C& Data structures – P. Padmanabham, B.S. Publications.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
3. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
4. Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
5. Data Structures and Program Design in C, R.Kruse, C.L. Tondo, BP Leung, Shashi M, Second Edition, Pearson Education.

Code: EC 107 **L T C**
Paper ID: 101107 **3 1 4**

Paper: Network Analysis
Pre requisites:
+2 Physics and Mathematics

Aim:
To learn fundamentals of circuit analysis using various techniques

Objective:

- **To study the concept of an electrical circuit and electrical elements (active and Passive)**
- **To use various rules and theorems to solve problems of circuit analysis.**
- **To perform DC and AC analysis of circuits**

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, Kirchhoff'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, Impedences 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 Books:

T1. H C Dorf
T2. Del toro"Electrical Engg Fundamentals"2nd Edition Prentice Hall India
T3. van Valkenberg, "Network Analysis", PHI/Pearson, 2000.
T4. D. R. Choudhary, "Networks and Systems" New Age International, 1999.

Referenc Books

R1 K. S. S. Kumar, "Electric Circuits and Networks", Pearson, 2009.
R2 J. W. Nilsson and S.A. Riedel, "Electric Circuits", Pearson, 2008.
R3. Hayt & Kemmerly

Code: BA 109		L	T/P	C
Paper ID: 99109	Paper: Mathematics - I	2	1	3

1(a) Calculus of functions of One variable

(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 n^{th} 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

1(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 interferrometer, Fabry Perot interferrometer)

7 hrs.

Diffraction

(Fresnel and Fraunhofer types of diffraction) Fraunhofer difraction: 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 FIBRE OPTICS

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: Kenneth Krane
3. Fundaments of Optics: Jenkins and White
4. Optics: Ghatak
5. Fundamental of Physics by RESNICK & HALLIDAY

Practicals:

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

Practicals based on BA103.

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

Practicals based on BA109.

Code: IT155		L	T/P	C
Paper ID:15155	**Paper: Computer Lab.**	**0**	**2**	**1**

Practicals based on IT105.

Code: IT157		L	T/P	C
Paper ID: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**	

Practicals based on EC107.

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

Practicals based on HS101.

Code: HS102		L	T/P	C
Paper ID:98102	Paper: Communication Skills – II	1	2	3

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.

	L	T	C
Paper Code: EC 104			
Paper ID: 101104	**3**	**1**	**4**

Paper: Analog Electronics – I

Aim:
To study semiconductor material and it's application as diode BJT FET etc

Objective

- **Tostudy and analyse semiconductor devices**
- **To study BJT as amplifier**
- **To analyse different biasing schemes and their stability**

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
Junction Diode Charactersistics*:* 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, Varactar 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-I V
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 :

T1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 2007.
T2. Electronic Devices and Circuits – Salivahanan and others TMH.
T3. Electronic Devices and Circuits – D. R. Cheruku and B. T. Krishna, Pearson, 2008

References:

R1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
R2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
R3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
R4. Electronic Devices and Circuit Theory – R. L. Boylestad and L. Nashlesky, Pearson, 10th Ed., 2009.

Code: BA106		L	T/P	C
Paper ID: 99106	Paper: Environment Studies	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

(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, SOx and particulates, effect of pollutants on man & environment: photochemical smog, acid rain and global warming, CO_2 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; compositing, 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, Academic Press.
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, Balaram Pani
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

I. Linear Algebra: Linear Independence and dependence of vectors, Systems of linear equations – consistency and inconsisitency, 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 (without proof).

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 Bernouilli 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. Graw Hill.
7. Schaum Outline Series "Complex Variables" Mc. Graw Hill.
8. Schaum Outline Series "Linear Algebra" Mc. Graw Hill.
9. Schaum Outline Series "Probability" Mc. Graw Hill

PHYSICS - II

Paper Code: BA – 110

L	T/P	Credits
2	1	3

I. Quantum Mechanics

Wave particle duality, deBroglie 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, Ferminos 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 applicatons 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 by Kittle
4. Electronic Principles: Malvino
5. Statistical Mechanics by Garg Bansal and Ghosh (TMH)

Code: EC 112		L	T/P	C
Paper ID: 101112	Paper: Signal and Systems	2	1	3

Pre-requisite
BA-108 Math II
BA-109 : Math I

Aim
To understand the behavior of various systems under different signal conditions.

Objectives

- **To get the Knowledge about the important Signal characteristics and operation of Systems in different conditions**
- **To study the application of different transforms.**

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

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.[T1,T2]

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. [T1,T2,T3]

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. [T3,T2]

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. [T1,T2]

Text Books

T1. AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.

T2. John G.Proakis and Dimitris G.Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, 3rd edn., PHI, 2000.

T3. M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.

T4. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999

T5.

Reference Books:

R1 K.Lindner, "Signals and Systems", McGraw Hill International, 1999.

R2 Moman .H. Hays," Digital Signal Processing ", Schaum's outlines, Tata McGraw-Hill Co Ltd., 2004.

R3. B. P. Lathi, "Signal Processing and Linear System", Berkeley Cambridge Press, 1998.

R4. H. P. Hsu, "Schaum's Outlines of The Theory and Problems of Signals and Systems", McGraw-Hill, 1995.

R5. S. Poornachandra, "Signal and Systems", Thomson Learning, 2004.

Practicals:

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

Practicals based on EC104 and EC112.

Code: IT154		L	T/P	C
Paper ID:15154	**Paper: Engineering Graphics Lab.**	**0**	**2**	**1**

Basic Concepts

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**

Practicals based on BA110.

Code: BA158		L	T/P	C
Paper ID:99158	**Paper: Environment Studies Lab.**	**0**	**2**	**1**

Practicals based on BA106.

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

Practicals based on HS102.

THIRD SEMESTER

		L	T/P	C
Paper ID: 15201				
Paper Code: IT201	**Paper: Computational Methods**	**3**	**1**	**4**

Prerequisites: BA-108 Maths I

IT-105: INTRODUCTION TO COMPUTERS

AIM

With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically

OBJECTIVES

At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:

i. The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and Eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.

ii. When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.

iii. The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.

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, Adas – 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. Burden and J. D. Faires, "Numerical Analysis", 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. Mathews and K. D. Fink, "Numerical Methods Using Matlab", Prentice Hall, 1999.

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

R [6] J. D. Hoffman, "Numerical Methods for Engineers and Scientists", Marcel Dekker Inc., 2001.

R [7] J. Stoer and R. Bulirsch, "Introduction to Numerical Analysis", 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

Paper ID: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

Aim: -

To Understand the various Analog and pulse communication systems

Objectives: -

1. **To impart the knowledge of modulation and demodulation techniques of various analog communication systems**
2. **To study the concept of noise, bandwidth and application of various communication techniques**

	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 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, dynamic range, fidelity); TRF Receiver; Superhetrodyne receiver, Low noise Amplifier, 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 communication system, Noise in Amplitude modulation system, Noise in Angle modulated system, Narrow band 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, 2nd Edition

[R3] W. Tomasi, "Electronic communications systems (baics through advanced)", Pearson Education, 2th ed, 2004.

[R4] J. C. Hancock, "An Introduction to the Principles of Communication Theory", McGraw Hill, 1961.

[R5] S. Haykins, "Introduction to Analog and Digital Communication", Wiley, 1986.

[R6] J. G. Proakis, M. S.alehi, "Communications Systems Engineering", PHI, 2nd ed, 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

AIM

To understand the concepts, calculations for electric, magnetic and electromagnetic fields and devices,

OBJECTIVES

- To understand properties of materials .
- To understand the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.

	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

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

Eleectrostatics: 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 Propagtion 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

PREREQUISITES
IT-105 : INTRODUCTION TO COMPUTERS

AIM
To present the concept of object_oriented programming and discuss the important elements of C++.

OBJECTIVES
Since C++ play a predominant role in software development it is felt that the following objectives can be achieved after studying this subject.

- Understand the concepts of Object oriented Programming.
- Write simple applications using C++

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:

Standard C++ classes, using multiple inheritance, persistant 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", 3rd Edition, Addison Wesley, 2000.

T[2]. A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH

References:

R[1] Rumbaugh et. al. " Object Oriented Modelling & Design", Prentice Hall

R[2] G . Booch "Object Oriented Design & 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 . Parasons, "Object Oriented Programming with C++",BPB Publication.

R[6] Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication.

Paper Code: EC 209		L	T/P	C
Paper ID: 101209	Paper: Digital Electronics	3	1	4

Pre-requisites

- Basic Knowledge of semiconductors and Electrical Science

Aim

- To understand various digital systems , digital ICs and their applications

Objectives

- **To get the Knowledge about the design principles of different digital electronic circuits**
- **To study the application of above circuits.**

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

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

Unit – 4:

Bipolar-Transistor Characeristics, RTL and DTL circuits, TTL, ECL and C MOS 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”, PWS Publishing.
[R3]. B. S. Nai, “ Digital Electronics and Logic Design”, PHI
[R4]. Balabanian and Carlson, “Digital Logic Design Principles”, Wiley Pub.

Paper Code: EC-211

Paper ID: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

Aim

To understand the function of various analog ICs and their application in electronic design

Objectives

- **To get the Knowledge about the important electrical characteristics and operation of different analog IC's**
- **To study the application of above IC's in the design of electronic circuit**

	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 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, "Opams 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

Fourth Semester

ECE-202

VHDL Based Design:

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

Pre-requisite

EC-209 Digital electronics

Aim

To understand font end design and process of FPGA design.

Objectives

- **To get the Knowledge Register transfer level language.**
- **To learn the concepts of modelling a digital system using Hardware Description Language.**
- **To learn techniques of chip design using programmable devices**.

	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

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

Sem VI

ECE-204

Paper Code: EC-204

Paper ID:101204 **L T C**

Paper: Communication System –II **3 1 4**

Pre-requisites

EC-112 Signals and Systems

EC203 Communication system I

Aim: -

To Understand modern Digital communication systems

Objectives: -

1. **To facilitate the student with the basics of digital communications aspects that are required for understanding of base band, band pass and wireless communications**
2. **To study the concept and role of probability theory and information theory in any communication system**

	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 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, intersymbol interference, demodulation and detection of shaped pulses, channel characterization, eye pattern [T1, T3]

Unit-III

Bandpass 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 theorm. 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, 2nd Edition

[T2] Simon Haykin , "Communication Systems" John Wiley & Sons, Inc 4th Edition.

[T3] B. P. Lathi, "Modern Digital and Analog Communication System" Oxford University Press – 3rd Edition.

Reference Books:

[R1] Simon Haykin, "Digital communication Systems", Wiley Publishers

[R2] W. Tomasi, "Electronic communications systems(baics through advanced)", Pearson Education, 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, 2nd ed, 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-1

BA-110 Physics-II

BA-108 Maths II

EC-205 : Engineering Electromagnetics

To understand the concept of transmission lines ,wave guides and their applications.

OBJECTIVES

- To understand the propagation of signals
- To understand characteristics of waves
- To understand the concept of Resonators, waveguides,antennas.

	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

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. Distortion less 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 Wave guides – Transverse Electric Waves in Rectangular Waveguides – characteristic of TE and TM Waves – Cutoff wavelength and phase velocity – Impossibility of TEM waves in waveguides – Dominant mode in rectangular waveguide – Attenuation of TE and TM modes in rectangular waveguides – Wave impedances – characteristic impedance – Excitation of modes.[T4,T5,T6]

UNIT III

Circular wave guides and resonators.Bessel functions – Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide – excitation of modes – Microwave 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 "Electro Magnetic Waves and Radiating System, 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

	L	T	C
Paper Code : EC-208			
Paper ID 101208	3	1	4

Paper : **Control engineering**

Pre-requisites

EC-204 Analog Electronics-I

EC-107 Network Analysis

EC-112 Signals and Systems

AIM

To Develop the understanding of open-loop systems and closed-loop feed-back control systems

Objectives

i) To understand the modeling and behavior of the .linear systems.

ii) To understand the transient and steady state behavior of the linear systems.

iii) To understand the stability analysis of the systems.

	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	

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

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, “Control System Engineering” New Age International, 2000.

2. N. K. Jain, “Automatic Control System Engineering” Dhanpat Rai, 2nd Edition.

Reference Books:

1. Ogata, “Modern Control Engineering” EEE, 4th Edition.

2. Kuo, “Automatic Control Systems” PHI – 7th Edition

ECE-210

Paper Code:EC 210

Paper ID: **L T C**

Paper: Data Structures and Algorithms **3 1 4**

Pre-requisite

IT105 Introduction to Computers

Aim

To help the student to develop an understanding of the data structures and its implementations

Objectives

- to understand the practical aspect of data organization
- to understand the design of algorithms

INSTRUCTIONS TO PAPER SETTERS:

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.

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, and B. A. Forouzan, "Data structures: A Pseudocode approach with C", Thomson Learning.

[R2] A .V. Aho, J . E . Hopcroft, J . D . Ulman "Data Structures and Algorithm", 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		**L**	**T/P**	**C**
Paper ID: 101212	**Paper: Computer Architecture and Operating System**	**3**	**1**	**4**

Pre-requisites

- Knowledge of basic Digital Electronics, basic Data Structures and a Programming Language

Aim

- To understand design concepts in modern computer architecture.
- To understand the concepts that underlie modern operating systems

Objectives

- To gain knowledge about Control Unit , ALU and BUS Design in a typical computer
- To gain knowledge about various functions of a typical operating system

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

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. L Hennessy and D. A. Patterson, "Computer Architecture: A quantitative approach", Morgon Kauffman, 1992.
[R2]. A. S. Tannenbaum, "Operating System Concept", Addition Weseley, 2002

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
Aim

To understand components, devices and circuits used in microwave frequencies

Objectives

- **To study the operation and functioning of important microwave sources and devices**
- **To study the application of above devices in circuits, ICs and RADAR**

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 is of 10hrs.)

Unit- I

Microwave IEEE frequency bands, Microwave systems, two port S-parameters,
Microwave Hybrid circuits: wave guide 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 R1R3]

Text Books

[T1] S.Y. Liao, "Microwave Devices & CIRCUITS" PHI – 3rd Edition.
[T2] Pozar, "Microwave Engineering" John Wiely, 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 **L T/P C**
Paper ID: 101303 **3 1 4**

Paper: Microprocessor and Interfacing
Pre-requisites
EC -209 Digital Electronics

Aim

- **To understand the architecture, programming and interfacing of microprocessors and their applications and develop skills of assembly language programming** .

Objective

- **To gain knowledge of various microprocessors and their utility in practical applications**

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

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: EC307
Paper ID: 101307 **L T C**

Paper : RDBMS **3 1 4**

Pre Requisites: None

Aim: To understand concepts of Relational Databases and its accessing tools

Objectives: To get the knowledge of data modeling and its commercial applications, Designing of databases and to get inputs how to efficiently access databases.

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 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 multivalued 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. Silberscatz, 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:EC 309 : **L T C**
Paper ID :101309 **3 1 4**

Paper:Stochastic Systems and Process

Prerequisites:
BA 109: Mathematics I
BA 108 : Mathematics II

Aim:
To study fundamental concepts of prabablity theory and be able to analyse and solve practical problems of communication and signal processing

Objective:
- **To make the students familiar with probabilistic models of data ,distribution functions and their application to problems of probability.**
- **The student will learn Random Variable and Processes and response of systems with stochastic input.**

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, Cyclostationary Processes, Bandlimited 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, "Introduction to Probability with Statistical Applications," Birkhauser, 2007.
R5. T. T. Soong, "Funadamentals of Probability and Statistics for Engineers," Wiley, 2004.
R6. L. B. Koralov 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.

Paper Code: EC-302 **L T C**
Paper ID:101302 **3 1 4**

Paper: Digital Signal Processing & Applications

Prerequisites:
EC112: Signals and Systems
Aim:
To provide in depth knowledge of various digital signal processing techniques and design of digital filters

Objective:

- **To learn the concept of DFT FFT algorithms .**
- **Design of digital filters using different approximations.DSP processor and architecture.**

	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

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
Design of IIR filter, Butterworth, chebyshev and elliptic approximation, transformation methods, LP,BP, HP BS filters. [T1 R1 R2]

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 – 3rd Edition.
T2. Openheing & Schafer, "Digital Signal Processing" PHI – 1997.
Reference Books:
R1. S. K. Mitra, "Digital Signal Processing" (PHI) – 2nd Edition.
R2. Johny Johnson, "Introduction to Digital Signal Processing" PHI – 1992.

Paper Code : EC-304 **L T C**
Paper ID : 101304 3 1 4

Paper : **Computer Networking**

Pre-requisites
IT-105 Introduction to Computers

AIM
To understand basic concepts related to data communication using computer networks.

Objectives

- To understand network models.
- To get the knowledge of different layers of ISO/OSI and TCP/IP network models.

	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	

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 :

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

References:

1. W. Stallings, “Data and Computer Communications”, Pearson Education, 8th Ed, 2007.
2. D. E. Comer., “Computer Networks & Internets”, Pearson Education, 4th Ed, 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 1st Ed, 2007.

Paper Code:EC 306: **L T C**
Paper ID :101306 **3 1 4**

Paper: Information Theory and Coding

Prerequisites:
EC204: Communication Systems II

Aim:
To understand the concept of information and study various types of coding schemes & their application to communication.

Objective:
- **The student will learn about mathematical model of information,entropy and various types of channel and their capacity.**
- **The students will be able to apply and compare the performance of different codes to information**

Unit I
Definitions, Uniquely Decodable Codes, Instantaneous Codes, Krafts 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 T2 R1]

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 Z4, Galois Rings over Z4, Cyclic Codes over Z4. 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

Aim
To help the student to develop an understanding of the telecommunication network

Objectives

- **to understand the basic telephony structure**
- **to understand the advance hardware requirement for data communication**

INSTRUCTIONS TO PAPER SETTERS:

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.

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 singing; 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, AALApplications

Frame relay: Concept, basic operation

FDDI: specifications, frame format, design issues

TEXT BOOK

[T1]. Bellamy John, "Digital Telephony", John Wily & 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" Wiely, 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

To understand optical fiber communication and fiber based networking

Objectives

- **To introduce basic characteristics and operation of optical fiber and optoelectronic devices**
- **To study the application of optical fibers in communication and networks.**

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 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[T1R1]

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", 3rd ed. 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**

Aim
To help the student to develop an understanding of the mobile and wireless network

Objectives

- **to understand the protocols for mobile communication**

INSTRUCTIONS TO PAPER SETTERS:

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.

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 modelcharacteristics,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, Earlang 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.

Paper: Embedded System Design

Paper Code: IT-417	**L**	**T/P**	**C**
	3	**1**	**4**

Paper ID: 15417

PREREQUISITES:
ECE-303 MICROPROCESSORS AND INTERFACING, IT-105 : INTRODUCTION TO COMPUTERS

AIM
To introduce to the functional building blocks of an embedded system for developing a real time system application.

OBJECTIVES
i. Introduce to features that build an embedded system.
ii. To help the understanding of the interaction that the various components within an embedded system have with each other.
iii. Techniques of inter facing between processors & peripheral device related to embedded processing.
iv. To enable writing of efficient programs on any dedicated processor.
v. To present in lucid manner the basic concepts of systems programming like operating system, assembler compliers etc and to understand the management task needed for developing embedded system.

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, I^2C 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

Aim :
To study about satellite communication,orbital mechanics,satellite modulation and access techniques.

Objective :
- **The course will make students understand orbital mechanic,placement of sattellite & their types.**
- **The students will be able to solve link design problems and learn aceess techniques and coding.**

.
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 **L T C**
Paper ID : 101405 **3 1 4**

Paper: Measurement & Instrumentation

Prerequisite:
EC107: Network Analysis

Aim:
To study construction and working of different types of instruments and their application.

Objective:
- **To learn about the basics of instrumentation.types of instrument on the basis of their construiction.**
- **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

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 – synchoroscopes.
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

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	L T C
Paper ID : 101411	3 1 4

Paper : C:\Documents and Settings\faculty\Local Settings\Temp\syllabus_ETC.htm - TOP#TOP

Neural Networks and applications

Pre-requisites:
BA-108 Mathematics-II

Aim: To understand the basic mathematical modeling of the Human brain and various learning algorithms.

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

	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

Unit–I:Introduction to Neural Networks
Introduction, 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 Function, ANN Architectures, Learning Strategy: Supervised, Unsupervised, Reinforcement Learning Rules.

Unit–II:Feed Forward Neural Networks
Introduction, Perceptrons, Limitations of the Perceptron Model, Multilayer Feed forward Neural Networks , Back propagation (BP) 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 Proceesing.

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

Paper Code: EC 413 **L T/P C**
Paper ID: 101413 **Paper: Software Engineering** **3 1 4**
Pre-requisites

- Basic knowledge of computers and at least one programming language

Aim

- *To help students to gain skills that will enable them to develop software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain and to foster an understanding of why these skills are important.*

Objectives

- *To understand the various phases of Software Development Life Cycle*

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*

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 AllocationModel, 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, Calender 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** **L T C**
Paper ID : 101417 **3 1 4**

Paper:Reliability Engineering

Prerequisites:

EC309: Stochastic Systems & Processes

Aim:

To study the concept of reliability& maintanibility of different types of systems and learn various techniques of reliability analysis

Objective:

- **The student will able to analyse various types of systems for reliability(Delta star method,Bayes theorem method etc)**
- **The student will learn about redundancy techniques for reliability optimization &the concept of maintenance .**

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 Distributes, 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. [T1 T2]

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. Reliability Evaluation of Engg. System – R. Billinton, R. N. Allan, Plenum Press
T2. Reliability Evaluation of Power System – R. Billinton, R. N. Allan, Plenum Press

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

Aim:
To study about various types of radars their applications and different navigation systems.

Objective:
- **The students will be familiarised with the concept of Radar,radar mathematics and it's types.**
- **Different navigation systems their antenna systems and applications.**

	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

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

Paper Code : EC-421 L T C
Paper : RADIO AND TELEVISION ENGINEERING 3 1 4

PREREQISITES:

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

AIM
Television Technology has now become a vital tool to the information revolution that is sweeping across the countries of the world. The syllabus aims at a comprehensive coverage of Television Systems with all the new developments in Television Engineering

OBJECTIVES
• 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 PAL system.
• To study the advanced topics in Television systems and Video Engineering

	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

UNIT I FUNDAMENTALS OF TELEVISION [10 Hours]
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 [15 hours]

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 [5 Hours]

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 – Sterio sound in TV – 3D TV ,LCD, LED Television

TEXT BOOKS

T1. R.R.Gulati, " Monochrome Television Practice, Principles, Technology and servcing , Second edition, New age International Publishes, 2004 (Unit I,II,IV and V)
T2. R.R.Gulati "Monochrome and colour television ", New age Internationl 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 Code:EC 408 **L T C**
Paper ID : 101408 **3 1 4**

Paper: Power Electronics

Prerequisites:
EC104 : Analog Electronics I
EC211: Analog Electronics II

Aim:
To study about high power semiconductor devices and their application

Objective:
- **To study high power application of semiconductor devices**
- **Student will be able to understand and analyse the functioning of inverters,SCR's Choppers & regulators etc.**

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 principal (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
Paper Id : 101406 **L T C**
Paper: IC DESIGN **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

Aim
To understand the design of Integrated Circuits

Objectives
- **To get the Knowledge about the design methodologies and VHDL Verilog Implementation of VLSI circuits.**
- **To study the synthesis and complexity levels**

	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	

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
Physcial 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. ***Weste*** *Eshraghian Principles of CMOS* ***VLSI*** *design*
R2. Contemporary Logic Design : Randy H. Katz, University of California, Berkeley

ıper Code: EC 426 **L T C**
ıper ID: 101426 **3 1 4**

ıper: Object Oriented Programming Using Java

·e-requisites:
` 207: Object Oriented Programming Using C++

im:
To understand implementation of Object Oriented Programming concepts in Java

)bjectives:
To Provide a basic course to understand java as technology
Development of GUI based and client/server applications in java
Understanding of commonly used API's of Java

INSTRUCTIONS TO PAPER SETTERS:
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 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 notify all.

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 .

Paper Code : EC-420 L T C
Paper ID: **101420** 3 1 4

Paper : **Fuzzy Logic and Systems**

Pre-requisites:

IT-407 Artificial Intelligence

Aim:
To understand the Fuzzy logic and operations.

Objectives:

i) To understand Fuzzy arithmetic and relations.
ii) To Design fuzzy Systems

	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	

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 **L T C**
Paper ID: 101418 **3 1 4**

Paper: Digital Image Processing and Applications

Prerequisites:
EC302: Digital Signal Processing

Aim:
To understand the concept of digital image as a two dimentional signal and study various mathematical operations performed on digital images.

Objective:
- **To make the students analyse Image signal in frequency domain, and perform various operations such as transformation ,compression ,Restoration and coding.**

	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	

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: chair 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 Learniy (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 L T C
Paper ID:101422 **3** **1** **4**

Paper: Linear and Nonlinear Optimization Techniques

Prerequisites:
IT 201:Computational Techniques

Aim:
To learn linear & nonlinear optimization techniques and programming

Objective:
- **The course will make the student solve Engineering optimisation problems.**
- **The student will learn a variety of techniques to solve linear & nonlinear problems**.

	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

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- Marquartd, 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** L T C
Paper ID:101424 3 1 4

Paper : C:\Documents and Settings\faculty\Local Settings\Temp\syllabus_ETC.htm - TOP#TOP**Advances In Wireless Communication.**

Prerequisites:
EC312:Mobile Communication

Aim:
To study and compare the performance of various modulation and access techniques in Advance radio systems

Objective:

- **The student will learn about radio propagation characteristics ,fading,modulation,access techniques(TDMA/FDMA/CDMA) and wireless standards.**

	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	

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

Paper Code: EC412 **L T C**
PaperID:101412 **3 1 4**

Paper :Multimedia communications

Prerequisite:
IT 105:Introduction to Computers
EC 204:Communication Systems II

Aim:
To have a knowledge of different Multimedia and application

Objective:
- **To understand various types of Multimedia Systems**
- **To have a knowledge of compression Techniques and standards**

	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	

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 Graw Hill