H.P. TECHNICAL UNIVERSITY HAMIRPUR (HP)

Syllabus

[Effective from the Session: 2012-13]

B. Tech. (Electronics & Communication Engineering)

Group A contain: Civil Engineering (CE)
Information Technology (IT)
Electronics and Communication Engg. (ECE)
Computer Science and Engg. (CSE)

Group A

1st Semester – Scheme and Distribution of Marks

Course No.	Subject	L	T	P/D	Hrs	Theory		Practical		Total
						End Semester	Sessional	End Semester	Sessional	
NS-101	Engineering Mathematics – I	3	1	0	4	100	50			150
NS-102	Engineering Physics-I	3	1	0	4	100	50			150
NS-103	Engineering Chemistry	3	1	0	4	100	50			150
HS-102	Communication and Professional Skills in English	3	1	0	4	100	50			150
BE-102	Basic Mechanical Engineering	3	1	0	4	100	50			150
BE-104	Principles of Computer Programming & C^{++}	3	1	0	4	100	50			150
(Practicals / Drawing / Design)										
NS-103 (P)	Engineering Chemistry Laboratory	0	0	2	2			25	25	50
HS-102 (P)	Communication and Professional Skills Lab-I	0	0	2	2			25	25	50
BE-104 (P)	Computer Programming Laboratory	0	0	2	2			25	25	50
WS-101	Workshop Practice-I	0	0	3	3			25	25	50
Total					**33**	**600**	**300**	**100**	**100**	**1100**

Group A

2nd Semester– Scheme and Distribution of Marks

Course No.	Subject	L	T	P/D	Hours	Theory		Practical		Total
						End Semester	Sessional	End Semester	Sessional	
NS-104	Engineering Mathematics-II	3	1	0	4	100	50			150
NS-105	Engineering Physics-II	3	1	0	4	100	50			150
HS-101	Disaster Management and Environmental Science	3	1	0	4	100	50			150
BE-101	Basic Electrical and Electronics Engineering	3	1	0	4	100	50			150
BE-103	Engineering Drawing and Graphics	1	0	5	6	100	50			150
BE-105	Engineering Mechanics	3	1	0	4	100	50			150
(Practicals / Drawing / Design)										
NS-105 (P)	Engineering Physics Lab	0	0	2	2			25	25	50
BE-101a (P)	Basic Electrical Engineering Lab	0	0	2	2			25	25	50
BE-102b (P)	Basic Electronics Engineering Lab	0	0	2	2			25	25	50
WS-102	Workshop Practice-II	0	0	3	3			25	25	50
Total					**35**	**600**	**300**	**100**	**100**	**1100**

Electronics and Communication Engg. (ECE)

3rd Semester – Scheme and Distribution of Marks

Course No.	Subject	L	T	P/D	Hours	Theory		Practical		Total
						End Semester	Sessional	End Semester	Sessional	
HS-203	Human Values and Professional Ethics	2	0	2	4	100	50			150
NS-206	Engineering Mathematics-III	3	1	0	4	100	50			150
EC-211	Digital Electronics Engineering	3	1	0	4	100	50			150
EC-212	Analog Electronics Engineering	3	1	0	4	100	50			150
EC -213	Circuit Theory & Network Analysis & synthesis	3	1	0	4	100	50			150
EC -214	Communication Theory	3	1	0	4	100	50			150
(Practicals / Drawing / Design)										
EC-211(P)	Digital Electronics Lab	0	0	2	2			25	25	50
EC-212(P)	Analog Electronics Lab	0	0	2	2			25	25	50
EC-213(P)	Electronics Simulation Lab	0	0	2	2			25	25	50
HS-202 (P)	Communication Skills Lab-II	0	0	2	2			25	25	50
WS-200	Vocational Project / Training	0	0	0	0			25	25	50
Total					**32**		**300**	**125**	**125**	**1150**

Electronics and Communication Engg. (ECE)

4th Semester – Scheme and Distribution of Marks

Course No.	Subject	L	T	P/D	Hours	Theory		Practical		Total
						End Semester	Sessional	End Semester	Sessional	
HS-201	Engineering Economics	3	1	0	4	100	50			150
NS-207	Numerical Methods for Engineers	3	1	0	4	100	50			150
EC-221	Communication System-I	3	1	0	4	100	50			150
EC -222	Electronic Measurement and Measuring Instruments	3	1	0	4	100	50			150
EC -223	Electronic Device Modelling	3	1	0	4	100	50			150
EC -224	Pulse Shaping and Wave Generation	3	1	0	4	100	50			150
(Practicals / Drawing / Design)										
EC-221(P)	Communication system Lab -I	0	0	2	2			25	25	50
EC-222(P)	Electronic Measurement and Measuring Instrument Lab	0	0	2	2			25	25	50
EC-223(P)	PCB and Electronic Workshop	0	0	2	2			25	25	50
EC-224(P)	MATLAB	0	0	2	2			25	25	50
ECA-201	Extra Curricular Activity	0	0	2	2			25	25	50
Total					**34**	**600**	**300**	**125**	**125**	**1150**

Field Visit shall be compulsory to all students of 2nd year once in a year during or after 4thsemester.Survey camp of minimum four (4) weeks duration shall be conducted after 4th Semester for Civil Engineering students. For students of other branches community project at this level will be conducted be included.The Evaluation of same shall be done during 5th Semester

Electronics and Communication Engg. (ECE)

5th Semester – Scheme and Distribution of Marks

Course No.	Subject	L	T	P/D	Hours	Theory		Practical		Total
						End Semester	Sessional	End Semester	Sessional	
EC-300	Open Elective	3	0	0	3	100	50			150
EC-311	Microprocessor Theory and Applications	3	1	0	4	100	50			150
EC-312	Communication System-II	3	1	0	4	100	50			150
EC-313	Power Electronics & its Application	3	1	0	4	100	50			150
EC-314	Electromagnetic Field Theory	3	1	0	4	100	50			150
EC-315	Linear Integrated Circuit and Design	3	1	0	4	100	50			150
(Practicals / Drawing / Design)										
EC-311(P)	Microprocessor Lab	0	0	3	3			25	25	50
EC-312(P)	Communication System Lab-II	0	0	3	3			25	25	50
EC-313(P)	Power Electronics Lab	0	0	2	2			25	25	50
HS-300	Community Project/ Survey Camp	0	0	0	0			25	25	50
Total					**31**	**600**	**300**	**100**	**100**	**1100**

Open Elective to be opted from list below but one which is not offered by his Department

Sr. No.	Open Elective	Sub. Code
1.	Energy Assessment and Auditing	EE-300 (a)
2.	Total Quality Management	HU-300 (b)
3.	Optimization methods for Engineering System	ME-300 (c)
4.	Remote Sensing & GIS	CE-300 (d)
5.	Operating Systems	CS-311

Electronics and Communication Engg. (ECE)

6th Semester – Scheme and Distribution of Marks

Course No.	Subject	L	T	P/D	Hours	Theory		Practical		Total
						End Semester	Sessional	End Semester	Sessional	
HS-301	Principles of Management and Critical Thinking	3	0	2	5	100	50			150
EC-321	Microcontroller and Embedded Systems	3	1	0	4	100	50			150
EC-322	Control Systems	3	1	0	4	100	50			150
EC-323	Antenna and Wave Propagation	3	1	0	4	100	50			150
EC-324	Optical Communication	3	1	0	4	100	50			150
EC-325	Microwave and Radar Engineering	3	1	0	4	100	50			150
(Practicals / Drawing / Design)										
EC-321(P)	Microcontroller Lab	0	0	2	2			25	25	50
EC-322(P)	Control Engineering Lab	0	0	2	2			25	25	50
EC-326(P)	Microwave and Optical Communication Lab	0	0	2	2			25	25	50
Total					**31**	**600**	**300**	**75**	**75**	**1050**

$$ - Industrial Training of 8 weeks duration after 6th Semester

Electronics and Communication Engg. (ECE)

7th Semester – Scheme and Distribution of Marks

Course No.	Subject	L	T	P/D	Hours	Theory		Practical		Total
						End Semester	Sessional	End Semester	Sessional	
EC-411	Elective-I	3	1	0	4	100	50			150
EC -412	Digital System Design using HDL	3	1	0	4	100	50			150
EC -413	Digital Signal Processing	3	1	0	4	100	50			150
EC -414	Wireless & Mobile Communication	3	1	0	4	100	50			150
EC -415	CMOS & VLSI Design	3	1	0	4	100	50			150
(Practicals / Drawing / Design)										
EC-416(P)	VLSI & HDL Lab	0	0	3	3			25	25	50
EC-413(P)	DSP Lab	0	0	2	2			25	25	50
EC-414(P)	Wireless Communication Lab	0	0	2	2			25	25	50
EC-496	Industrial Training Viva $$	0	0	0	0			25	25	50
EC-497	Seminar	0	0	2	2				50	50
EC-498	Project-I	0	0	6	6			50	50	100
Total					**35**	**500**	**250**	**150**	**200**	**1100**

During winter break there shall be a field visit compulsory to all students of 7th semester, 4th year.

Elective-I

EC-411(a) –Microelectronics technology

EC-411(b) –Biomedical Electronics

EC-411(c)-Peripheral System Design & Interfacing

EC-411(d) -Computer Architecture Organization

Electronics and Communication Engg. (ECE)

8th Semester – Scheme and Distribution of Marks

Course No.	Subject	L	T	P/D	Hours	Theory		Practical		Total
						End Semester	Sessional	End Semester	Sessional	
EC-421	Elective-II	3	1	0	4	100	50			150
EC-422	Information Theory and Coding	3	1	0	4	100	50			150
EC-423	Principle of Soft Computing	3	1	0	4	100	50			150
EC-424	Computer Networks & Data communication	3	1	0	4	100	50			150
(Practicals / Drawing / Design)										
EC-423(P)	Soft computing Lab	0	0	2	2			25	25	50
EC-424(P)	Data Communication Lab	0	0	2	2			25	25	50
EC-499	Project-II	0	0	6	6			150	150	300
GP-400	General Proficiency	0	0	0	0			100		100
Total					**26**	**400**	**200**	**300**	**200**	**1100**

Elective-II
EC-421 (a) –TV Engineering
EC-421 (b) –Modelling & Simulation of Communication system
EC-421 (c) –Digital Image Processing
EC-421 (d) –Satellite Communication

Semester-I
Engineering Mathematics-I (NS-101)

Course Code	**NS-101**	**Credits- 04**	**L - 3, T- 1, P - 0**
Name of Course	**Engineering mathematics-I**		
Lectures to be delivered	**52 (L-39, T-13 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

Section-A

1. MATRICES

Matrices, Related matrices, Complex matrices (Hermitian and skew-Hermitian matrices, Unitary matrix), Consistency of linear system of equations, Rank of a matrix, Normal form of a matrix, Vectors, Linear dependence, Consistency of a linear system of equations, System of linear homogeneous equations, Linear and orthogonal transformations, Characteristic equation, Eigen values, Eigen vectors, Properties of Eigen values, Cayley-Hamilton theorem, Quadratic forms and its reduction to canonical form.

Section-B

2. DIFFERENTIAL CALCULUS

Indeterminate forms, Taylor's and Maclaurin's series, Partial Differentiation and its geometrical interpretation, Homogeneous functions, Euler's theorem and its extension, Total differentials, Composite function, Jacobian, Maxima and minima of functions of two variables, Method of undetermined multipliers.

Section-C

3. INTEGRAL CALCULUS

Reduction formulas, Quadrature, Rectification, Surface and Volume of revolution for simple curves, Double integrals and their applications, Change of order of integration, Change of variables, Triple integrals and their applications, Change of variable, Beta and Gamma functions and their relationship.

Section-D

4. COMPLEX NUMBERS

Applications of De Moivre's theorem, Root of a complex number, Exponential, Circular, Hyperbolic and Logarithmic functions of a complex variable, Inverse Hyperbolic functions, Real and imaginary parts of Circular and Hyperbolic functions, Summation of the series-'C+iS' method.

Text BOOKS

1. Advanced Engineering Mathematics: by Erwin Kreyszig, John Wiley and Sons, NC, New York.
2. Advanced Engineering Mathematics: by R. K. Jain & S. R. K Iyengar, Narosa Pub. House.

REFERENCE BOOKS

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill
2. Differential & Integral Calculus: by N. Piskunov, MIR Publications.
3. Calculus and Analytic Geometry, by Thomes, G.B, Finney, R.L. Ninth Edition, Peason Education.
4. Advanced Engineering Mathematics, by Peter. V. O‟ Nil, Wordsworth Publishing Company.
5. Advanced Engineering Mathematics, by Jain, R.K and Lyengar, S.R.K., Narosa Publishing Company.
6. Higher Engineering Mathematics, by Grewal, B.S., Khanna Publishers, New Delhi.
7. Engineering Mathematics, by Taneja, H.C., Volume-I & Volume-II, I.K. Publisher.

Engineering Physics-I (NS-102)

Course Code	**NS-102**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Engineering Physics-I**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Interference-Coherent Sources, Two Beam Interference by Division of Wavefront- Fresnel Biprism Interference by Division of Amplitude - Newton's Rings, Michelson Interferometer.

Diffraction-Fraunhoffer Diffraction, Diffraction Through Single Slit, Plane Transmission Grating, Fresnel Diffraction, Fresnel Half Period Zone, The Zone Plate.

Polarization- Production of Polarized Light, Malus's Law, Double Refraction, Interference of polarized Light: Quarter Wave Plate And Half Wave Plate.

Section B

Particle Properties of Waves: Electromagnetic Waves, Maxwell Equations, Blackbody radiations, Photoelectric Effect, Compton Effect, Pair Production,

Waves Properties of Particles: De Broglie waves, Phase velocity, group velocity and Particle velocity. Relation between phase velocity and group velocity. Relation between group velocity and particle velocity. Particle Diffraction, Heisenberg's uncertainty principle and its physical significance (no derivation). Application of uncertainty principle (Non-existence of electron in the nucleus).

Section C

Quantum Mechanics: Postulates of quantum mechanics, The Wave Euation. Properties and Physical significance of a wave function. Probability density and Normalisation of wave function. , Schrodinger's equation: Time- Dependent form, Expectation Values, Operators, Schrodinger's equation: Steady-Stateform Eigen values and eigen function, Application of Schrödinger wave equation –Particle in a box, FinitePotential well, Tunnel Effect, Harmonic oscillator.

Section D

Nuclear Structure: Composition of nucleus, Nuclear Properties, Stable Nuclei, binding energy, Liquid Drop Model, Nuclear Forces.

Nuclear Reactions: Cross-section, Nuclear fission, moderators, nuclear reactors, Nuclear fusion in Stars, Fusion Reactors

Elementary Particles: Leptons,Hadrons, Elementary particle quantum numbers, Quarks, Field Bosons,

Cosmology: The Big Bang Theory, Evolution of Stars.

Text Books:

1. A.Ghatak: Optics,Tata Mcgraw Hill, 3rd edition.
2. Arthur Beiser, Concepts of Modern Physics ,6th Edition, Tata Mcgraw Hill-2009

Reference Books:

1. David J Griffith , Introduction to Electrodynamics, Pearson Prentice Hall.
2. Halliday, Resnick and Walker- Principles of Physics, Wiley India 9th Edition-2012

ENGINEERING CHEMISTRY (NS – 103)

Course Code	**NS-103**	**Credits- 04**	**L-03, T-01, P-0**
Name of Course	**Engineering Chemistry**		
Lectures to be delivered	**55 (L-42, T-13 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %)			**MM: 50.**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

SECTION –A

Electrochemistry: Electrical Conductance, Types of Electrolyte, Specific Conductance, Equivalent Conductance, Molar Conductance, Ionic Conductance (Kohlrausch Law), Factors Affecting Conductance, Transport Number, Interionic Attraction Theory of Conductance, Hydration of ions, Electrochemical Cell ,Electrode Potential, Standard Electrode Potential, Galvanic Cells, EMF of the Cell & Free Energy Change, Nernst Equation, Reference Electrodes (S.H.E,Calomel Electrode, Silver-Silver Electrode, Eletrochemical Series, Glass Electrode, Concentration Cell, types & applications of Concentration Cell, Batteries(primary cell, Secondary storage cell, Metal- Air Batteries), Fuel cell, hydrogen-oxygen fuel cell.

Phase Rule: Introduction, One Component System (water system, sulpher system) Two components System (lead-silver & Zinc- magnesium system), thermal Analysis.

SECTION – B

Water Treatment: Introduction, Sources of water, Impurities, Hardness Analysis, Oxidations, (BOD & COD), Boiler Corrosion Sewage & Treatment.

Corrosion and its Controls: Introduction, Types of corrosions, Electrochemical Theory, Pitting, Water Line, Differential Aerations corrosions, Stress Corrosions, Factors affecting Corrosions, Preventive measures.

SECTION – C

Instrumental Methods of Analysis

Introduction to spectroscopy; UV-Visible spectroscopy- Absorption laws ,Instrumentation, formation of absorption bands, Theory of electronic spectroscopy, Chromophore and auxochrome concept, fluorescence & phosphorescence, application of UV-Visible spectroscopy ; IR spectroscopy- Principle, theory of molecular vibrations, important features of IR spectroscopy and applications; NMR-Principle, relaxation processes, Instrumentation, Shielding-desheilding effects, spin coupling, coupling constant, applications of NMR.

Fuel and Combustion: Introduction, class of fuels (Solid, Liquid and Gases) Coal and its origin, Analysis of Coals, Petroleum fuels, Cracking, Reforming, Octane no, Cetane no, Gaseseous fuel – Water gas, producer gas, bio gas, coal gas and oil gases

SECTION – D

Polymers Classification of polymers, types of polymerizations, plastics, some important commercial thermoplastics (polythene, polypropylene, polystyrene, polyvinylchloride, Teflon, plexiglass, polyurethanes), thermosetting (Bakelite, epoxy resin, Urea formaldehyde) Elastomers- synthetic rubbers, synthetic fibers.

Composite Materials

Introduction, Classification, Constituents of composites, Fiber reinforced composites, unidirectional fibre reinforced composites, short fibre reinforced composites, particle reinforced composites, important types of particulate composites, Failures of fiber reinforced composites, Advantages and applications of composites.

Text BOOKS:

1. Engineering Chemistry by Dr Ramesh Thakur and Dr.Subba Ramesh, Wiley India publisher
2. A Text Book of Engineering Chemistry by ShashiChawla, DhanpatRai& Sons.

REFERENCE BOOKS:

1. Engineering Chemistry by P C Jain & Monika Jain
2. Fundamental of organic spectroscopy by Y. R. Sharma
3. Spectroscopic methods by Williams and Fleming

Communication & Professional Skills in English (HS-102)

Course Code	***HS-102***	***Credits-3***	***L-3, T-1, P-0***
Name of the Course	***Communication & Professional Skills in English***		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment *(based on Sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)*			***Max Marks: 50***

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E.

Section A

Essentials of communication:

The process of communication: communication competence, types and channels of communication – verbal and non-verbal, Importance of listening skills in communication: types of listening, barriers to listening, Barriers to communication and removal of these barriers, personal SWOT Analysis, Analyzing audience, role of emotions and body language in communication.

Section B

Written communication:

Enriching vocabulary, using vocabulary in different context, Essentials of strong writing skills, language and style of writing, characteristics of a good technical style, logical reasoning, Paragraph writing, Developing perspective: goals, objectives and principles of critical thinking.

Section C

Reading Comprehension:

Importance of reading: Eye movement, fixations, regression, visual wandering, right approach to reading, SQ3R method of reading, Precis writing, Comprehension, Essay writing.

Section D

Technical Communication:

Report writing: Importance, structure, drafting of reports, Business Writing: Sales letters, claim and adjustment letters, inviting/sending quotations, Tenders, Memorandum, Job Application letter, Preparing a personal resume, notices, agenda and minutes of meeting.

TEXT BOOKS:

1. An Introduction to Professional English and Soft Skills: by Bikram K. Das, Kalyani Samantray, Cambridge Press.
2. Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan

REFERENCE BOOKS:

1. Communication Skills, Sanjay Kumar and PushpLata, Oxford University Press.
2. Chrissie Wright (Ed.); Handbook of Practical Communication Skills; JAICO Books
3. Effective Communication and soft Skills, NitinBhatnagar and MamtaBhatnagar, Pearson Publication.
4. Communicative English for Engineers and professionals, NitinBhatnagar and MamtaBhatnagar, Pearson Publication.
5. Communication Skills and soft skills- An integrated approach, Kumar, Pearson Publication
6. Communication Skills for Engineers, Mishra, Pearson Publication
7. K.K.Sinha, Business Communication, Galgotia Publishing Company, New Delhi, 1999.
8. R.K.Bansal& J.B. Harrison, spoken English for India, Orient Longman.

Recommended Readings:

1. Business @ The Speed of thought, Bill Gates.
2. My Experiments with Truth, M.K.Ghandhi
3. Wings of Fire, A.P.J. Kalam
4. An Autobiography, JwaharLal Nehru.

BASIC MECHANICAL ENGINEERING (BE-102)

Course Code	**BE-102**	L-3, T-1, P-0	
Name of the Course	**Basic Mechanical Engineering**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	Max. Time = 3 hrs.	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max. Marks: 50**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus, and each question will carry 20% of the total marks of the semester end examination for the course.
   Note: The paper setter will be required to mention a note in the question paper that use of steam table, graphical plots are permitted.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section-A

Basic concept: Dimensions and units, thermodynamic systems, thermodynamic properties and process, thermodynamic equilibrium, energy-kinetic, potential and internal, heat and work, zeroth law, concept of temperature, definition of ideal gas, laws and properties of ideal gas.
First law of Thermodynamics: First law for control mass (closed system), internal energy as a property, enthalpy, specific heats, non-flow processes of ideal gases, cyclic process, first law for control volume (open system), applications of steady flow energy equation to engineering devices.

Section-B

Second law of Thermodynamics: Limitations of first law of thermodynamics, Kelvin- Planck and Clausius statements, their equivalence, application of statements of second law to heat engine, heat pump and refrigerator, reversible processes, reversible cycles, and carnot cycle, corollaries of the second law, thermodynamics temperature scale, Clausius inequality, entropy, principle of increase of entropy, availability and irreversibility.
Properties of Steam: Phase transformation, phase diagram, condition of steam- saturated steam, dry-saturated steam, wet steam, superheated steam, dryness fraction, property of steam, steam tables, use of Mollier charts , process of vapors and various process.

Section-C

Gas Power Cycles: Carnot, Diesel, Otto, Dual combustion, working of 2-stroke and 4-stroke engine, Air standard thermal efficiency, Concepts of mean effective pressure, indicated power and brake powerfor reciprocating engines.

Section-D

Introduction of Psychometry: The Gibbs Dalton law, Psychometric terms, Introduction of Psychometry Chart.

Introduction to Heat Transfer: Mechanisms – Conduction, Convection and Radiation, Introduction to Fourier's Law of heat conduction, Newton's law of cooling, Stefan-Boltzmann law.

Introduction to Fluid Mechanics: Fluid, properties of fluid, viscosity, Newton's law of viscosity, surface tension, types of fluid, buoyancy.

TEXT BOOKS:

1. Basic Mechanical Engineering by Basant Aggarwal and CM Aggarwal Wiley India.
2. Fundamentals of Mechanical Sciences: Engineering Thermodynamics and Fluid Mechanics by Mukherjee and Paul, PHI Learning.

REFERENCE BOOKS:

1. Thermodynamics – An Engineering Approach (SI Units) – Yunus. A. Cengel, Michael A. Boles, TMH New Delhi
2. Fundamentals of Thermodynamics –Sonntag, Borgnakke Van Wylen – Wiley India.
3. Engineering Thermodynamics by P.K. Nag, TMH, New Delhi
4. Thermodynamics by C.P. Arora, TMH, New Delhi
5. Fundamentals of Mechanical Engineering, 2nd Edition by G.S. Sawhney, PHI Learning Private Limited.

Principle of Computer Programming & C++ (BE-104)

Course Code	**BE-104**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	***Principle of Computer Programming & C++***		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

SECTION-A

Introduction to Computer:-Definition, Characteristics..Generation of Computers, Capabilities and Limitations.Introduction to Operating System.Basic Components of a Computer System-Control Unit, ALU, Input/output functions and characteristics. Memory Introduction, Classifications- Volatile Memory and Non- Volatile , Memory, ROM, RAM.

Input, Output and storage Units:-Computer Keyboard, Pointing Devices: Mouse, Trackball, Touch Panel, and Joystick, Light Pen, Scanners, Various types of Monitors.

Hard Copy Devices:- Impact and Non- Impact Printers- Daisy Wheel, Dot Matrix, Line Printer, Chain Printer. Non Impact Printers- DeskJet, Laser Printer, Virus : General introduction of virus and anti-virus .

SECTION-B

High Level Language and Low Level Language, Software and its different types- System Software, Application software.Compiler, Interpreter and Assembler. Introduction to algorithm and Flow chart: - Representation of an algorithm, flowchart symbols and flow chart, rules, advantage and limitations of flowchart and pseudo code. Testing and Debugging:-Definition of testing and debugging , types of program errors.

DOS : Internal and External Commands , Difference between External and Internal Commands.

SECTION-C

Introduction to C++ : Starting with C++, Features of C++ Procedure-oriented programming OOP vs. procedure-oriented programming Compiling, linking and running a C++ program.

Object-Oriented Programming Concepts: Abstraction , Inheritance, Polymorphism, Data Binding , Encapsulation., Classes and Objects Concept of a class ,Defining a class, Creating an object , Object Scope.

The Basics of C++ : Basic Data Types, User-defined Data Types, Variable Declarations, Variable Names Constants and its types , Character Constants , String Constants, Standard input and standard output Formatted input –cin and Formatted output – cout.

Working with Operators and Expressions: Operators, Arithmetic Operators, Relational Operators, Assignment Operator, Logical Operators, Increment and Decrement Operators (++ and --), 'Operate-Assign' Operators (+=, =, ...).

SECTION-D

Controlling the Program Flow: Decision control : if, if – else, if - else if . Loop Control : while, do – while, for, break,continue Case Control switch, goto.

Functions/Procedures: function,Returning values from functions,Arguments Passed by ValuePassing Addresses of Arguments,Concept of variable scope and scope rules,Global variables

Pointers and Arrays: Pointers,Pointer Initialization,Pointer Operators ,The & (and) Operator Understanding Arrays, Initializing Arrays.

Files: reading, writing text and binary files, pointers, character pointers, pointers to arrays, arrays ofpointer to structures.

TEXT BOOKS:

1. Fundamentals of Computers by Rajaraman, V., PHI Publication
2. Object oriented programming in C^{++} by Rajesh K. Shukla, Wiley India.

REFERENCE BOOKS

1. The C++ programming language ,Bjarne Stroustrup ,Addison Wesley , 2000.
2. Basic Computer Engineering, Kogent learning solution Inc. Dreamtech Press.
3. Object oriented programming Principles and Fundamental, Gim Keogh and Mario Giannini, John Wiley.
4. Object oriented programming in turbo C^{++} ,Robbet Lofre, 4 Ed Pearson Publication.
5. Programming with C^{++}, D. Ravichandern, Tata Mcgraw Hill 1996.
6. Object oriented programming in C++, Nicolai M Josuetis, John Wiley.

Engineering Chemistry Lab (NS-103(P))

Course Code	**NS-103(P)**	**Credits-2**	**L-0, T-0, P-2**
Name of the Course	**Engineering Chemistry Lab**		
Lectures to be Delivered	**26 hours of Lab. work (2 hrs. per week)**		
Semester End Examination	**Max Marks: 25**	**Min Pass Marks: 10**	**Maximum Time: 3 hrs**
Continuous Assessment	**Lab work 30% Lab Record 25%** **Viva/ Hands on 25% Attendance 20%**		**Max Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

Performing a practical exercises assigned by the examiner.

Viva-voce examination

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

NOTE: At least 10 to 12 experiments to be performed.

List of Experiments

1. To determine the surface tension of the given liquid by drop number method by using stalgmometer and identify the given liquid.
2. To determine the insoluble, soluble and total solids in given sample of sewage.
3. To determine the solid carbon, volatile matter, ash content and percentage of moisture in given sample of coal by proximate analysis method and classify the coal.
4. To determine the total alkalinity in a given sample of water using a standard acid.
5. To determine the percentage of Chlorine in a given sample of $CaOCl_2$ which has been dissolved in one litre of solution..
6. To determine the surface tension of the two given unknown liquids by using Stalgmometer and identify the given liquid.
7. To determine the coefficient of viscosity of the given unknown liquids by using Ostwald's Viscometer and identify the given liquid.
8. To determine the coefficient of viscosity of the given lubricating oil using Red Wood Viscometer
9. To determine the coefficient of viscosity of the given lubricating oil using Seybolt Viscometer.
10. To determine the flash point and fire point of given sample of oil using Pens key Marten's apparatus.
11. To determine the amount of Chlorine in given sample of water approximate N/20 sodium Thiosulphate solution.
12. To determine the maximum wavelength of solution of cobalt chloride
13. To determine the Beer's Law and apply it to find the concentration of given unknown solution by spectra-photometer.
14. To determine the chemical oxygen demand of waste water.
15. To determine the half-life period of given radioactive sample using GM counter.

Communication & Professional Skills Lab-I (HS-102(P))

Course Code	HS-102 (P)	Credits-2	L-0, T-0, P-2
Lectures to be Delivered	26 hours of Lab. work (2 hrs. per week)		
Semester End Examination	Max Marks: 25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30% Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks: 25

Instructions for paper setter / candidates:

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner .

(ii) Viva-voce examination

Note: Each practical should be performed twice for effectiveness.

List of Practicals:

1. Word processing a document.
2. Power point presentations.
3. Resume / Biodata preparation
4. Report writing.
5. Preparing notice, agenda and minutes of meeting.
6. Preparation of Quotation and tender document
7. Note making based reading comprehension
8. Précis Writing

Recommended books:

1. English Conversation Practice by Grant Taylor
2. Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan
3. Chrissie Wright (Ed.); Handbook of Practical Communication Skills; JAICO Books.
4. Veena Kumar, The Sounds of English, Makaav Educational Software, New Delhi.

Computer Programming Laboratory (BE-104(P))

Course Code	**BE-104 (P)**		**L-0, T-0, P-2**
Name of the Course	**Computer Programming Laboratory**		
Lectures to be Delivered	**26 Hrs. of Lab work (2hrs. each per week)**		
Semester End Examination	**Max Marks: 25**	**Min Pass Marks: 10**	**Maximum Time: 3 hrs**
Continuous Assessment	**Lab work 30% Lab Record 25%, Viva 25% Attendance 20%**		**Max Marks: 25**

1. Write a Program to find the sum, difference, product and quotient of two integers.
2. Write a program C++ Program to output an integer, a floating point number and a character.
3. Write a program to switch between different cases.
4. Write a program to count the number of words and characters in a sentence.
5. Program to find the roots of a quadratic equation.
6.
   - Create a class rational which represent a numerical value by two double values numerator and Denominator include the following public members functions
   - Constructor with no argument(default)
   - Constructor with two arguments
   - Void reduce ()that reduce the rational number by eliminating the highest common factor between the numerator and the denominator
   - Overload + operator to add two rational numbers
   - Overload >> operator to enable input through cin.
   - Overload << operator to enable input through cout.

7. Write a program to convert days into years and weeks.
8. Write a program to convert temperatures from Celsius to Fahrenheit and vice versa.
9. Write a program to find the sum of either of the diagonals of a 4 x 4 matrix.
10. Write a program to enter a sentence and output the number of uppercase & lowercase consonants, uppercase & lowercase vowels in sentence.
11. Write a program to enter 10 integers in a single-dimension array and then print out the array in ascending order.
12. Write a program to find the sum of each row & column of a matrix of size n x m and if matrix is square, find the sum of the diagonals also.
13. Write a program to display fibonacci series upto n terms.
14. Write a program for payroll system using inheritance.
15. To calculate the total mark of a student using the concept of virtual base class.
16. Program for Write File Operation Using C++ Programming.
17. Write a program that creates a binary file by reading the data for the student for the terminal .The data of each student consist of roll number, name (a string of thirty or lesser number of characters) and marks.
18. Write a program to read a number and display its square, square root, cube and cube root. Use a virtual function to display any one of the above.
19. Write a program to read two matrix and find their product use operator overloading so that the statement for multiplying the matrix may be written as Z=x*y where x,y,z are matrices.

WORKSHOP PRACTICE-I (WS-101)

Course Code	**WS– 101**	**L-0, T-0, P-3**	
Name of the Course	**Workshop Practice –I**		
Lectures to be delivered	**39 hours of Lab sessions in each semester**		
Semester End Examination	**Max. Marks: 25**		**Min. Pass Marks: 10**
Continuous Assessment	**Lab work 30%, Viva 25%,**	**Lab record 25%, Attendance 20%**	**Max. Marks: 25**

INSTRUCTIONS:

Laboratory examination will consist of two parts:
(i) Performing a practical exercises assigned by the examiner .
(ii) Viva-voce examination
Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments: -

Fitting Shop: -
Introduction to the tools used in Fitting Shop and various processes in Fitting shop.
1. To make a square piece of mild steel.
2. To make V-matching joint of mild steel.
3. To make a V-notch.

Machine Shop: -
Introduction to various machine tools and machine parts, such as Lathes, drilling machine, grinders etc. Cutting tools and operations.
1. Facing and turning on mild steel rod on Lathe Machine.
2. To make a groove on lathe machine.
3. Taper turning operation on Lathe Machine.

Carpentry and Pattern making Shop: -
Carpentry and Pattern Making Various types of timber and practice boards, defects in timber, seasoning of wood, tools, operations and joints. Introduction to the tools used in carpentry shop.
1. To make the 'T' lap joint.
2. To make 'T' Dove-tail joint.
3. To make Mortise &Tennon joint.

Welding Shop: -
Introduction to different welding methods, welding equipment, electrodes, welding joints, awareness of welding defects.

1. To make a lap joint.
2. To make a T joint.
3. To make a V-butt joint.

Smithy and Forging: -
Introduction to forging tools, equipments, and operations, Forgability of metals.
1. To make a ring of mild steel by cold forging process.
2. To make S-hook by hot forging process.
3. To make chisel by hot forging process.

Foundry Shop: -

Introduction to moulding materials, moulds, use of cores, melting furnaces, tools and equipment used in Foundry.

1. Make a single piece pattern mould.
2. To make spilt pattern mould.
3. To make mould and core and assemble it.

Electrical and Electronics Shop: -

Demonstration of tools, Introduction to electric wiring, Exercises preparation of PCBs, involving soldering of electrical & electronic application.

1. Fault rectification, disassembly and assembly of (any two) electrical appliances viz. electric iron, electric mixer, ceiling and table fan, tube light, blower and water heater.
2. Demonstration and use of flowing electronic instruments: multimeter, voltmeter, ammeter, energy meter, CRO.

Suggested Reading: -

1. Workshop Technology by Chapman.
2. Manufacturing Processes by Begman.
3. Manufacturing Materials and processes by JS Campbell
4. Workshop Practice-I, Mechanical Workshop Practice, 2nd Edition by John, PHI Learning Private Limited.

Semester-II
Engineering Mathematics-II (NS-104)

Course Code	**NS-104**		**L - 3, T- 1, P - 0**
Name of Course	**Engineering mathematics-II**		
Lectures to be delivered	**52 (L-39, T-13 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

Section-A

INFINITE SERIES: Convergence and divergence of infinite series, Geometric series test, Positive term series, p-series test, [Comparison test, D'Alembert's ratio test, Cauchy's root test (Radical test), Integral test, Raabe's test, Logarithmic test, Gauss's test] (without proofs), Alternating series and Leibnitz's rule, Power series, Radius and interval of convergence, absolute convergence and Conditional convergence.

Section-B

FOURIER SERIES: Euler's formula, Conditions for a Fourier expansion, Dirichlet's conditions, Functions having points of discontinuity, Change of interval, Odd and even periodic functions, Expansion of odd and even periodic functions, Half-range series, Typical wave-forms, Parseval's formula.

Section-C

LINEAR DIFFERENTIAL EQUATIONS: Brief review of first order ordinary differential equations, Exact equations, Equations reducible to exact equations, Equations of the first order and higher degree, Clairaut's equation, Linear differential equations with constant co-efficients, Complimentary functions and particular integral, Method of variation of parameters, Equations reducible to linear equations with constant co-efficients (Cauchy's and Legendre's linear equations).

Section-D

VECTOR CALCULUS: Curves in space, curvature and torsion, Scalar and vector point functions, Differentiation of vectors, Vector operator Del, gradient, divergence and curl with their physical interpretations, Formulae involving gradient, divergence and curl, Line, surface and volume integrals, Green's Theorems, Stokes and GaussTheorems and their verifications and applications. Scalar potential, solenoidal and irrotational fields.

TEXT BOOKS

1. Advanced Engineering Mathematics by ErwinKreyszig, John Wiley and Sons, N.C., New York.
2. Advanced Engineering Mathematics by R. K. Jain & S. R. K Iyengar, Narosa Publishing House.

REFERENCE BOOKS

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill
2. Higher Engineering Mathematics byB S Grewal,Khanna Publishers, New Delhi.
3. Differential & Integral Calculus: by N. Piskunov, MIR Publications.
4. Calculus and Analytic Geometry by Thomes, G.B, Finney, R.L. Ninth Edition, Pearson Education.
5. Advanced Engineering Mathematics byPeter. V. ONil, Wordsworth Publishing Company.
6. Vector Calculus by C. E. Weatherburn. John Wiley and Sons, NC, New York.
7. Differential Equations by Shepley L. Ross, John Wiley & Sons, New York.

Engineering Physics– II(NS – 105)

Course Code	***NS-105***		**L-3, T-1, P-0**
Name of the Course	***Engineering Physics– II***		
Lectures to be delivered	***52 (1Hr.each) (L = 39, T = 13 for each semester)***		
Semester End Examination	***Max. Time: 3 hrs.***	***Max. Marks: 100***	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max. Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION – A

Crystal Structure: Space lattice, Bravais lattice - unit cell, primitive cell. Lattice parameters. Crystal systems. Direction and planes in a crystal.Miller indices. Expression for inter-planar spacing.Co-ordination number. Atomic packing factor. Bragg's Law.Determination of crystal structure by Bragg's x-ray spectrometer. Crystal structures of NaCl, and diamond.

Free electron theory: Elements of classical free electron theory and its limitations. Quantum theory of free electrons, Fermi level, density of states, fermidirac distribution function, Thermionic emission, Richardson's equation.

(10 Lectures) & (Text Book-1)

SECTION – B

Band Theory of Solids: Origin of energy bands, Periodic Potential in a crystal, Wave function in a periodic potential, kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Effective mass of electron, Concept of negative effective mass and holes, Classification into metals, semiconductors and insulators, fermi energy and its variation with temperature.

(9 Lectures) & (Text Book-1)

SECTION – C

Dielectric and Magnetic Properties of Materials: Dielectric polarization, dielectric constant, types of polarization, electric field, electric displacement and dielectric polarization vector & relation between them, Gauss;s law in the presence of dielectric, Behavior of dielectric in alternating field- simple concepts, Atomic Magnetic Moments, Classification of magnetic materials, Dia, para, and ferromagnetic materials, domains, B-H graph in ferromagnetic materials Anti-ferromagnetism &ferrimagnetisms, . Soft and Hard magnetic materials. Ferrite and their applications.

Superconductivity: Temperature dependence of resistivity in superconducting materials. Effect of magnetic field (Meissner effect). Type I and Type II superconductors. BCS theory (qualitative), High temperature superconductors, Applications of superconductivity.

(12 Lectures) & (Text Book-1)

SECTION – D

Lasers: Spontaneous and stimulated emission, Einstein's Coefficients, Characteristics of Laser beam, Population inversion, Pumping Techniques, Components of a laser system, Ruby Laser and He-Ne Lasers

Fiber Optics: Basics of fiber optics, Total Internal Reflection, Acceptance angle, Numerical aperture, Single mode & Multimode fibres, Step index and Graded index fiber, pulse Dispersion in optical fibres, Attenuation in Optical Fibres, applications of optical fibres.

(8 Lectures) & (Text Book-2)

Text Books:

1. Rajnikant: Applied Solid State Physics, Wiley India Pvt Ltd.
2. A. Ghatak: Optics,Tata Mcgraw Hill, 3rd edition.

Reference Books:

1. Charles Kittel: Introduction to Solid State Physics, John Wiley & sons Inc.
2. S. O. Kasap, Principle of Electronic materials and Devices.

DISASTER MANAGEMENT AND ENVIRONMENTAL SCIENCE (HS-101)

Course Code	**Hs-101**	L-3, T-1, P-0	
Name of the Course	**Disaster Management and Environmental Science**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, P = 13 for each semester)**		
Semester End Examination	Max. Time = 3 hrs.	Max. Marks: 100	Min. Pass Marks: 40
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max. Marks: 50**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section-A

Principles of Disaster Management. Natural Disasters such as Earthquake, Floods, Fire, Landslides, Tornado, Cyclones, Tsunamis, Nuclear, Chemical, Terrorism, Extra Terrestrial and other natural calamities. Hazards, Risks and Vulnerabilities. Assessment of Disaster Vulnerability of a location and vulnerable groups, National policy on disaster Management,

Section-B

Prevention, Preparedness and Mitigation measures for various Disasters, Post Disaster Relief & Logistics Management, Emergency Support Functions and their coordination mechanism, Resource & Material Management, Management of Relief Camp, Information systems & decision making tools, Voluntary Agencies & Community Participation at various stages of disaster, management, Integration of Rural Development Programmes with disaster reduction and mitigation activities.

Section-C

Renewable and non-renewable resources, Role of individual in conservation of natural resources for sustainable life styles. Use and over exploitation of Forest resources, Deforestation, Timber extraction, Mining, Dams and their effects on forest and tribal people. Use and over exploitation of surface and ground water resources, Floods, Drought, Conflicts over water, Dams- benefits and problems. Causes, effects and control measures of Air pollution, Water pollution, soil pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Section-D

Global Environmental crisis, Current global environment issues, Global Warming, Greenhouse Effect, role of Carbon Dioxide and Methane, Ozone Problem, CFC's and Alternatives, Causes of Climate Change Energy Use: past, present and future, Role of Engineers.

TEXT BOOKS:

1. Disaster Management By G. K. Ghosh A.P.H. Publishing Corporation
2. Environmental Studies, R Rajgopalan, Oxford University Press

REFERENCE BOOKS:

1. Modern Encyclopaedia of Disaster and Hazard Management By B C Bose Rajat publications.
2. Disaster Management By R.B. Singh Rawat Publications.
3. Disaster Management By B Narayan A.P.H. Publishing Corporation.
4. Environmental Studies, Daniels, Wiley Publication
5. Environmental Studies, Basak, Pearson Publication

Basic Electrical & Electronics Engineering (BE-101)

Course Code	**BE-101**	**L-3, T-1, P-0**	
Name of the Course	**Basic Electrical & Electronics Engineering**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	Max. Marks: 100	Min. Pass Marks:40
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 50

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which willcover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus andeach question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION A

DC circuits:. Ohm's law , resistance, receptivity, series & parallel connections, star delta transformation, power dissipation in resistance, effect of temperature on resistance. Kirchhoff's laws Mesh laws; Mesh & Nodal analysis.

AC circuits: Generation of alternating voltage &currents, Sinusoidal signals, instantaneous and peak values, R.M.S. &Average value, phase angle, polar and rectangular, exponential and trigonometric representations of RL and C components,

Electrical Instruments and Devices: Voltmeter, Ammeter, Wattmeter, Energy meter, Inverters. Introduction to Domestic Electric Wiring

SECTION – B

Series and Parallel Circuits: A.C.Through resistance; inductance & capacitance. R-L; R-C & R-L-C series & parallel circuits, phasor diagrams. Power & power factor, series & parallel resonance. Problems by analytical as well as physical methods.

Three phase circuits: Three phase voltage & current generation, star & delta connections (balanced load), relationship between phase &line currents and voltages, phasor diagrams, measurement of power by two wattmeter methods.

A.C. And D.C. Machines: Principle, construction and working of transformer. Introduction to D.C and A.C. machines.

SECTION – C

Semiconductor Devices & Circuit: Classification of material; Energy band structure of conductors, insulators & semiconductor ;Classification of Semiconductor Mobility and conductivity, Intrinsic and extrinsic semiconductors and charge densities in semiconductors, current components insemiconductors, continuity equation. ; PN junction Characteristics& Analysis ;diode rating ; Types of diodes – Zener diodes, Photodiodes, Light emitting diodes (LED's), Varactor diodes and tunnel diodes. Rectifiers and filter circuit: Half wave, full wave and Bridge rectifier circuits and their analysis, L, C and Pi filters, Basic regulator supply using zener diode.

Transistors: Construction and characteristics of bipolar junction, transistors (BJT's)-Comm. Base, Comm. emitter, Comm. Collector configuration.

SECTION – D

Field Effect Transistor: Construction and characteristics of JFET.MOSFET construction and characteristics.

Integrated Circuits: Classification Of ICs; Monolithic ICs; OP Amp: Characterstics of Ideal OPAmp& application

Electronic Instruments: Role and importance of general purpose test Instruments, Electronic Millimeter, Cathode Ray Oscilloscope, Measurement of amplitude, Frequency and phase using CRO.

TEXT BOOKS:

1. Basic Electrical & Electronics Engineering –V Jegathesan , K Vinoth Kumar & R Saravanakumar, Wiley India
2. Basic Electrical & Electronics Engineering- B.L.Thereja

REFERENCE BOOKS:

1. Electronics devices and circuit theory by Robert Boylestad.
2. Electronics Devices and circuits by Millman&Halkias, TMH.
3. Basic Electronics by Debashis De, Pearson Education, 2010.
4. Electronics devices and circuit by Bhargava and Kulshtreshta, TTTI Series.
5. Fundamentals of Electrical & Electronics Engg., 2nd Edition by Smarajit Ghosh, PHI Learning Private Limited.

ENGINEERING MECHANICS (BE-105)

Course Code	BE – 105	L-3, T-1, P-0	
Name of the Course	Engineering Mechanics		
Lectures to be delivered	52 (1 Hr Each) (L = 39, T = 13, P=0 for each semester)		
Semester End Examination	Max. Time = 3 hrs.	Max. Marks: 100	Min. Pass Marks: 40
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 50

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus, and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section-A

Force, Moment, Center of gravity & Moment of Inertia: Idealization of Mechanics, Concept of Rigid Body and Elastic Body, Laws of Mechanics, Forces & System of Forces, Composition, Resolution & resultant of Forces, Laws of Forces, Lami's Theorem, Moment & Couples, Varignon's Theorem, Free Body Diagram, Centre of Gravity of a Lamina, Centroids of various Geometric Shapes, Moment of Inertia, Radius of Gyration, Parallel and Perpendicular Axis Theorem.

Frames and Trusses: Introduction, Perfect Frame, Redundant Frame, Reactions of Supports, Plane Trusses, Space Trusses, Method of Joints, Method of Section, Graphical Method- Maxwell Diagram.

Section-B

Simple Stresses and Strains: Stress & strain; Types of stresses and strains Elastic limit; Hooks law; Stress – strain diagram for ductile and brittle material, Factor of safety; Poisson's ratio; Elastic constants; Young's modulus, Shear modulus & Bulk modulus. Relationship between elastic constants. Thermal Stress & Strain.

Shear Force and Bending Moment: Concept of beams - statically determinate and indeterminate beams, Concept and definition of shear force and bending moment, Sign conventions, Types of load – concentrated, uniformly distributed, uniformly varying, Types of beams: Cantilever beam, simply supported beam, overhanging beam; Shear force and bending moment diagrams for the above beams subjected to different loadings and couples. Point of contra flexure, Relationship between load, Shear force and bending moment.

Section-C

Bending Stresses in Beams: Bending Stresses in Beams with derivation of Bending equation and its application to beams of circular, rectangular I & T Section, Composite beams.

Shearing Stresses in Beams: Shearing stress at a section in a loaded beam, Shear stress distribution over different sections.

Section-D

Torsion of Circular Shaft: Introduction, Theory of Pure torsion - Derivation of torsion equation, assumptions made in theory of pure torsion, Maximum torque transmitted by Solid and hollow shafts, Polar modulus, Torsion rigidity, Power transmitted by a shaft, Comparison of hollow and solid shaft subjected to pure torsion,Close coiled helical spring subjected to axial load and torque.

Introduction to Friction: Definition, Principles of friction, Friction between solid bodies, Coefficient of friction, Kinetic friction force, Definition & Determination of angle of friction, Laws of friction , Procedure for friction analysis, Equilibrium of rigid bodies subjected to frictional force of resistance, Friction at the ends of ladder, Wedge friction, Remedial measures in overcoming friction.

TEXT BOOKS:

1. Engineering Mechanics-Nelson, McGraw Hill
2. Engineering Mechanics: Statics, Meriam, JohnWiley

REFERENCE BOOKS:

1. Mechanics of Materials-E.J. Hearn, Elsevier
2. Engineering Mechanics-Bhavikatti, New Age International
3. Engineering Mechanics- JagatBabu, Pearson
4. Engineering Mechanics, P.N. Chandramouli, PHI Learning Private Limited.
5. Engineering Mechanics, V. Jayakumar & M. Kumar, PHI Learning Private Limited.

ENGINEERING DRAWING AND GRAPHICS (BE-103)

Course Code	**BE-103**	L-1, T-0, P-5	
Name of the Course	**Engineering Drawing and Graphics**		
Lectures to be delivered	**78 (1 Hr Each) (L = 13, P = 65 for each semester)**		
Semester End Examination	Max. Time = 3 hrs.	Max. Marks: 100	Min. Pass Marks: 40
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max. Marks: 50**

INSTRUCTIONS:

1. **For Institutes:** There will be two sessions per week. 1st session will consist of one lecture and two hours of practice session. 2nd session will consist of three hours of practice session.

2. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

3. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section-A

Drawing Techniques and Scales: Various type of lines, principal of dimensioning, size and location as per IS code of practice (SP-46) for general Engg. Drawing. Practice of drawing, various types of lines and dimensioning exercises. Drawing exercises pertaining to symbols.Conventions and Exercise of lettering techniques.Free hand printing of letters and numerals in 3, 5, 8 and 12 mm sizes, vertical and inclined at 75 degree.Instrumental lettering in single stroke.Linear scale, Diagonal scale &vernier scale.

Points, Lines and Planes: Projection of Points, Lines and Planes: Concept of horizontal and vertical planes. First and third angle projections: projections of point and lines, true length of lines and their horizontal and vertical traces, projection of planes and their traces. Auxiliary planes.

Section-B

Projections of Solids: Right regular solids of revolution and polyhedrons etc. and their auxiliary views.

Sectioning of Solids: Principal of sanctioning, types of sanctioning and their practice on projection of solids, sectioning by auxiliary planes.

Section-C

Development of Surfaces: Development of surfaces of cylinders, cones, pyramid, prism etc. exercises involving development of unique surfaces like Y-piece, hopper, tray, truncated pieces etc.

Intersection of Surfaces: Intersection of cylinders, cones and prisms with their axes being vertical, horizontal or inclines. Exercise on intersection of solids-cylinder and cylinder, cylinder and cone, prism and prism.

Section-D

Isometric Projection: Concept of isometric views: isometric scale and exercise on isometric views. Practice of Orthographic projections.

Simple Trusses: Graphical Method.

TEXT BOOKS:

1. Engineering Drawing & Engg. Graphics byP. S. Gill, Kataria and Sons Millennium Edition.

2. Engineering Drawing Plane and Solid Geometry byN.D. Bhatt and V. M. Panchal, 44th Edition, 2002, Charotar Publishing House.

REFERENCE BOOKS:

1. Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill.

Engineering Physics Lab (NS-105(P))

Course Code	**NS-105(P)**		**L-0, T-0, P-2**
Name of the Course	**Engineering Physics Lab**		
Lectures to be Delivered	**26 hours of Lab. work (2 hrs. per week)**		
Semester End Examination	**Max Marks: 25**	**Min Pass Marks: 10**	**Maximum Time: 3 hrs**
Continuous Assessment	**Lab work 30%, Lab Record 25% Viva/ Hands on 25%, Attendance 20%**		**Max Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

Performing a practical exercises assigned by the examiner .

Viva-voce examination

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments

1. To find the refractive index of a prism by using spectrometer.
2. To find the wavelength of sodium light by Newton's rings experiment.
3. To find the wavelength of sodium light by Michelson interferometer.
4. To study the laser beam characterstics like, wavelength using diffraction grating aperture & divergence.
5. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
6. To find the value of e/m for electrons by Helical method.
7. To compare the capacitances of two capacitors by De'sauty Bridge.
8. To find the value of Planck's constant by using a photoelectric cell.
9. To calculate the hysteresis loss by tracing a B-H curve for a given sample
10. To determine the Hall co-efficient
11. To determine the band gap of an intrinsic semiconductor by four probe method.
12. To find the velocity of ultrasound in liquid.
13. To find out polarizability of a dielectric substance.
14. To determine the numerical Aperture of an optical fibre.
15. To determine the attenuation & propagation losses in optical fibres.

Note: Each student is required to perform at least ten experiments.

Books:

1. Practical Physics-S.L.Gupta&V.Kumar.
2. Advanced Practical Physics Vol. I & II – S.P. Singh

BASIC ELECTRICAL ENGINEERING LAB (BE– 101a(P))

Course Code	**BE– 101a(P)**		L-0, T-0, P-2
Name of the Course	**Basic Electrical Engineering Lab**		
Lectures to be Delivered	26 hours of Lab. work (2 hrs. per week)		
Semester End Examination	Max Marks: 25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work30%, Lab Record 25% Viva/ Hands on 25%, Attendance 20%		Max Marks: 25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:
1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. To verify KCL and KVL.
2. To study various types of Electrical Meters.
3. To perform open circuit and short circuit test of Transformer.
4. Measurement of power by Three Voltmeter/Three Ammeter method.
5. Measurement of power in 3-phase system by two wattmeter method.
6. To perform direct load test of transformer and plot efficiency v/s load characteristics.
7. To perform direct load test of the DC shunt generator and plot load v/s current curve.
8. To study frequency response of series RLC circuit and determine resonance frequency and Q factor for various values of R,L,C.
9. To study frequency response of parallel RLC circuit and determine resonance frequency and Q factor for various values of R,L,C.

Note: All the practicals of Electrical should also be performed on breadboard.

BASIC ELECTRONICS ENGINEERING LAB (BE– 101b(P)

Course Code	**BE– 101b(P)**	Credits-2	L-0, T-0, P-2
Name of the Course	**Basic Electronics Engineering Lab.**		
Lectures to be Delivered	26 hours of Lab. work (2 hrs. per week)		
Semester End Examination	Max Marks: 25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks: 25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. Familiarization with electronic components, and general purpose Laboratory equipment.
2. Use of CRO and function generator and calculation of amplitude, frequency, time period of different types of ac signals.
3. Verification of Junction Diode and Zener Diode characteristic and determination of static and dynamic resistance at the operating point
4. Verification of input and output characteristics of a Bipolar Junction Transistor and determination of the operating point on load line.
5. Verification of input and output characteristics of a Field Effect Transistor and determination of the operating point on load line.
6. Verification of Series and Parallel Resonance theory.
7. Operation of diode as different form of rectifier and effect of different types of passive filters on the output.
8. Determination of frequency response of a RC coupled amplifier and determination of bandwidth and signal handling capacity.
9. Use of OP-AMP as an inverting and non-inverting amplifier for different gains.
10. Verification of Uni-junction Transistor characteristics and relaxation oscillator
11. Rectifiers- Half wave , Full wave & Bridge rectifiers

Note: All the practicals should be performed on breadboard.

WORKSHOP PRACTICE-II (WS-102)

Course Code	**WS– 102**	**L-0, T-0, P-3**	
Name of the Course	**Workshop Practice -II**		
Lectures to be delivered	**39 hours of Lab sessions in each semester**		
Semester End Examination		**Max. Marks: 25**	**Min. Pass Marks: 10**
Continuous Assessment	**Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%**		**Max. Marks: 25**

INSTRUCTIONS:

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner .

(ii) Viva-voce examination

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments: -

Fitting Shop: -

1. Drilling and Tapping in a M.S. piece.
2. To make a male-female joint (Taper type) of mild steel.

Machine Shop: -

1. To perform boring operation on lathe machine.
2. To perform knurling and threading operation on lathe machine.
3. Step turning operation on a lathe machine.

Carpentry and Pattern making Shop: -

1. To make a single piece pattern of connecting rod.
2. To make a self-cod pattern.
3. To make a split pattern.

Welding Shop: -

1. To make a V butt joint in horizontal position.
2. To make a V butt joint in vertical position.
3. To perform Gas welding operation.

Smithy and Forging: -

1. To make a cube from a circular bar.
2. To make a tong using hot forging operations.
3. To perform drawing down operation.

Foundry Shop: -

1. To make a mould and perform casting operation.
2. Study of casting defects and its remedies.

Sheet Metal Working Shop: -

Blanking and piercing die construction, press work materials, strip layout, bending dies, forming dies, drawing operations, single and double action draw dies.

1. To make a Ring by Piercing.
2. To make a square shaped object by Bending and Forming Operation.
3. To Draw a Wire.

Suggested Reading: -

1. Workshop Technology by Chapman
2. Manufacturing Processes by Begman
3. Manufacturing Materials and Processes by J. S. Campbell

Semester-III
HUMAN VALUES AND PROFESSIONAL ETHICS-III (HS-203)

Course Code	**HS-203**	**L-02, T-0, P-02**	
Name of Course	**Human Values and Professional Ethics**		
Lectures to be delivered	**52 (L-26, P-26 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continuous Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of six sections A, B, C, D, E & F. Section F will be compulsory, it will consist of a single question with 10-15 subparts of short answer type, which will cover the entire syllabus. Section A, B, C, D & E will have two questions from the respective sections of the syllabus. Each section will have a weightage of 15% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt six questions in all selecting one question from each of the sections A, B, C, D & E of the question paper and all the subparts of the questions in Section E.

OBJECTIVES:

a. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

b. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.

c. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much needed orientation input in Value Education to the young enquiring minds.

COURSE METHODOLOGY:

- The methodology of this course is universally adaptable, involving a systematic and rational study of the human being vis-à-vis the rest of existence.
- It is free from any dogma or value prescriptions.
- It is a process of self-investigation and self-exploration, and not of giving sermons.
- Whatever is found as truth or reality is stated as proposal and the students are facilitated to verify it in their own right based on their Natural Acceptance and Experiential Validation.
- This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and within the student himself/herself finally.
- This self-exploration also enables them to evaluate their pre-conditionings and present beliefs.

Content

SECTION A: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration

3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in **harmony** at various levels

SECTION B: Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - *Sukh* and *Suvidha*
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure *Sanyam* and *Swasthya*

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

SECTION C: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

13. Understanding harmony in the Family- the basic unit of human interaction
14. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
    Trust (*Vishwas)* and Respect (*Samman)* as the foundational values of relationship
15. Understanding the meaning of *Vishwas*; Difference between intention and competence
16. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* as comprehensive Human Goals
18. Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj)*, Universal Order (*Sarvabhaum Vyawastha)*- from family to world family!
    - Practice Exercises and Case Studies will be taken up in Practice Sessions.

SECTION D: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
22. Holistic perception of harmony at all levels of existence
    - Practice Exercises and Case Studies will be taken up in Practice Sessions.

SECTION E: Implications of the above Holistic Understanding of Harmony on Professional Ethics

23. Natural acceptance of human values
24. Definitiveness of Ethical Human Conduct
25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
26. Competence in professional ethics:

a) Ability to utilize the professional competence for augmenting universal human order,
b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems,
c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

27. Case studies of typical holistic technologies, management models and production systems
28. Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b) At the level of society: as mutually enriching institutions and organizations

TEXT BOOK:

1. R R Gaur, R Sangal, G P Bhagaria, 2009, *A Foundation Course in Value Education.*

REFERENCE BOOKS:

1. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
3. A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
6. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
7. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.
9. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers* , Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd.
11. Values and Ethics in Business & Professional, Samita Manna & Suparna Chakraborti, PHI Learning Private Limited.

RELEVANT CDS, MOVIES, DOCUMENTARIES & OTHER LITERATURE:

1. Value Education website, *http://www.uptu.ac.in*
2. Story of Stuff, *http://www.storyofstuff.com*
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*

ENGINEERING MATHEMATICS-III (NS-206)

Course Code	**NS-206**	**L-03, T-01, P-0**	
Name of Course	**Engineering Mathematics-III**		
Lectures to be delivered	**52 (L-39, T-13 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on Sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Section-A

1. PARTIAL DIFFERENTIAL EQUATIONS

Formation and solutions of partial differential equations, Lagrange's linear equation of the first order, non linear equations of first order, charpit method, Homogenous linear partial differential equation with constant coefficients, rules for complementary function and particular integral, non-homogenous linear partial differential equations, Method of separation of variables, Solution of wave equations, Heat flow equations, Laplace's equations and their applications to engineering problems.

Section-B

2. SPECIAL FUNCTIONS:

Power series solution of differential equations, Frobenius method, Bessel's equation, Bessel functions of the first and second kind, Recurrence relations of Bessel functions, Generating functions, Orthogonality of Bessel functions, Legendre's equation, Legendre polynomial, Recurrence relations of Legendre's functions, Rodrigue's formula, Orthogonality of Legendre polynomials, Error function and its properties.

Section-C

3. INTEGRAL TRANSFORMS

Laplace Transforms of standard functions and their properties, Inverse Laplace Transforms, General Properties of inverse Laplace transforms and Convolution Theorem, Laplace Transforms of periodic functions, Laplace transform of Bessel functions and Error function, Dirac-delta Function, Heaviside's Unit Function, Applications to linear simultaneous differential equations. Fourier Integral, Fourier Transform, Fourier sine and cosine transforms, finite Fourier transform, Convolution theorem for Fourier Transform and Parseval's Identity for Fourier Transform.

Section-D

4. FUNCTIONS OF COMPLEX VARIABLE

Limit and derivative of complex functions, Cauchy-Riemann equations, Analytic functions, Entire functions and its applications, Conformal mapping and standard transformations, Complex integration, Cauchy's theorem and Cauchy's integral formula (without proof), Series of complex terms, Taylor's series and Laurent's series (without proof), Zeros of analytic functions, isolated singularity, removable singularity, Poles, essential singularity, Residue, Residue theorem and their applications

TEXT BOOKS

1. Advanced Engineering Mathematics: by Erwin Kreyszig . John Wiley and Sons, NC, New York.
2. Partial Differential Equation for Engineers and Scientists: by J.N. Sharma and Kehar Singh Narosa Publishing House, New Delhi/ Alpha Science Int. Ltd, UK.
3. Advanced Engineering Mathematics: by R. K. Jain & S. R. K Iyengar, Narosa Pub. House.
4. Complex Variables Theory and Applications: by HS Kasana, PHI Learning Private Limited New Delhi, (2008).

REFERENCE BOOKS

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill.
2. Elements of Partial Differential Equations: by Ian N. Sneddon, McGraw-Hill, Singapore.
3. Differential & Integral Calculus: by N. Piskunov, MIR Publications.
4. Calculus and Analytic Geometry, by Thomes, G.B, Finney, R.L. Ninth Edition, Peason Education.
5. Advanced Engineering Mathematics,by Peter. V. O. Nil, Wordsworth Publishing Company.
6. Advanced Engineering Mathematics, by Jain, R.K and Lyengar, S.R.K., Narosa Publishing Company.
7. Higher Engineering Mathematics, by Grewal, B.S., Khanna Publishers, New Delhi.
8. Engineering Mathematics, by Taneja, H.C., Volume-I & Volume-II, I.K. Publisher.
9. Differential Equations: by Shepley L. Ross, John Wiley & Sons, New York.

SEMESTER-III

Digital Electronics Engineering EC-211

Course Code :	**EC-211**	**L-3, T-1, P-0**	
Name of the Course	**Digital Electronics Engineering**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

NUMBER SYSTEM & CODES:

Introduction to Number system: Binary, Octal, Hexadecimal number systems and their inter-conversion, Binary Arithmetic (Addition, Subtraction, Multiplication and Division),Floating Point numbers & Arithmetic Diminished radix and radix compliments, BCD codes, 8421 code, Excess-3 code, Gray code, Error detection and correction: Parity code Hamming code.

LOGIC GATES, BOOLEAN ALGEBRA& SIMPLIFICATION TECHNIQUES:

Positive & negative Logic; Logic Gates Tristate Logic gates Schmitt gates ; special output gates; Fan out of logic gates; buffer & transceivers ; IEEE/ANSI standards symbols Introduction to Boolean algebra ; Postulates of Boolean Algebra; Theorems of Boolean algebra ;

SECTION – B

BOOLEAN ALGEBRA SIMPLIFICATION TECHNIQUES:

Sum of products and Product of Sums Simplification, NAND and NOR implementation, incompletely specified functions, Ex-OR functions, The map method, Two, Three, Four and Five variable maps,The tabulation method, Determination of Prime implicants, Selection of Essential Prime implicants,

LOGIC FAMILIES:

Classsification of digital IC's ; Significance & types ; Characteristics Parameters ; TTL Logic ;ECL CMOS Logic Family; NMOS & PMOS Logic; Interfacing of different logic families ;

SECTION – C

Combinational Logic Circuits:

Implementing combinational logic ;Arithmetic circuits: half Adder ,full adder ,half subtractor, full subtract; BCD Adder; Multiplexer ;Encoder ; Demultiplexer & Decoder

Flip Flops:
Introduction, S-R Flip -flops, Level & edge Triggered flip flops; JK flip-flop, D flip-flop, T flip-flop, master slave flip-flop , Flip Flop timing parameters & application ;

Counters:
Ripple counter; Synchronous Counter; Modulus of a counter; Binary ripple counter ;UP & down; Decade & binary counter ; Shift register ; shift register counter,:

SECTION – D

Data conversions Circuits:
Digital to analogue Converter(Simple Resistive divider network ; binary lader network); D/A converter: specification &Types ;A/D Converter: Specification & Types

SEMICONDUCTOR MEMORIES: Introduction, Memory organization, Classification and characteristics of memories, Sequential memories, ROMs, R/W memories. Content addressable memories, Programmable logic arrays, Charged-Coupled device memory

Text Book:
1 Digital electronics (Principle & Integrated circuits)- Anil K Maini- Wiley India edition
2 M. Morris Mano, Digital Design, Prentice Hall of India.

Reference books:
1. Digital principle and applications Malvino and Leach- (TMH)
2. Digital Electronics, Kharate- (Oxford University Press)

ANALOG ELECTRONICS ENGINEERING EC-212

Course Code	**EC – 212**	**L-3, T-1, P-0**	
Name of the Course	**ANALOG ELECTRONICS ENGINEERING**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

.**LOW FREQUENCY TRANSISTOR AMPLIFIER**:- Equivalent circuit of BJT using h-parameter for CB, CE and CC & configuration, calculation of transistor parameter for CB, CE & CC using h-parameters, comparison of transistor amplifier configuration.

MULTISTAGE AMPLIFIER: General cascaded system, RC coupled amplifier and its frequency response, merits and demerits, Transformer coupled Amplifier ; cascode Amplifiers , Darlington compound configuration, multistage frequency effect..

SECTION – B

HIGH FREQUENCY RESPONSE OF TRANSISTOR AMP: High Freq. Model for CE amplifiers , approximate CE high freq. Model with resistive load , CE short circuit gain . HF Current gain with resistive load.

LARGE SIGNAL AMPLIFIER: Analysis and design of Class A , B , AB amplifiers , Push pull amplifiers , transformer less output stages, distortion calculations, high power amplifiers.

SECTION – C

TUNED AMPLIFIER: General behavior of tuned amplifiers, resonance-series and parallel resonant circuit, calculations of circuit impedance at resonance. Variation of impedance with frequency, Q-factor of a circuit & coil, Band width of series & parallel resonant circuit, advantages and disadvantages of tuned amplifiers. Single tuned amplifiers, voltage gain & frequency response of single tuned amplifiers, double tuned amplifiers. Analysis & design of class C amplifiers.

FEEDBACK AMPLIFIER: Feedback concept, characteristics of negative and positive feedback. Effect of negative and positive feedback on input impedance, output impedance, gain, and noise and frequency response.

SECTION – D

OSCILLATORS Classification of Oscillators, frequency and frequency stability of oscillatory circuits,Tuned based Oscillators, Hartley Oscillator, Colpitts Oscillators Clapp Oscillator, Crystal Oscillator, Phase Shift Oscillator, Wein Bridge Oscillator

REGULATED POWER SUPPLIES

Unregulated power supplies, Zener diode voltage regulators, and transistor series and shunt regulators. OPAMP voltage regulators, IC voltage regulators. Introduction to SMPS

TEXT BOOKS

1. Electronic Devices & circuit by Anil K Maini & Varsha Agarwal
2. Electronic Devices & circuit theory by R. Boylestad.

REFERENCE BOOKS

1. Electronic Devices & circuit-II by A.P. Godre & U.A. Bakshi.
2. Electronic Devices & Circuit by G.K. Mithal
3. Integrated devices & circuits by Millman & Halkias.

CIRCUIT THEORY & NETWORK ANALYSIS & SYNTHESIS EC-213

Course Code	**EC-213**	L-3, T-1, P-0	
Name of the Course	CIRCUIT THEORY& NETWORK ANALYSIS & SYNTHESIS		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

Circuit analysis (ac and dc):
Kirchoff's law, loop variable analysis, node variable analysis, reference directions for current and voltage. Active element conventions, dot convention for coupled circuits. Linearity, superposition, The venin's and Norton's maximum power for ac source and dependent source.

Linear graphs:
Introductory definitions, the incidence matrix A, the loop matrix B, relationship between sub matrix of A and B. Cut-sets and cut-set matrix. Fundamental cut-sets and fundamental tie sets, A and B matrices, loop, node node pair equations duality.

SECTION- B

Laplace transforms:
Properties of laplace transforms, basic theorems, laplace transform of gate function, impulse function and periodic functions, convolution integral, inverse laplace transform, application of laplace transforms to solution of network problems.

Transient and frequency analysis:
Transient response of R-L, R-C, R-L-C circuits(series combinations only) for d.c and sinusoidal excitations-intial conditions-Solutions using laplace transform methods of solutions, transfer function, concept of poles and zeros. Concept of frequency response of a system.

SECTION-C

Two port networks:
Concept of two port networks, driving point and transfer functions., open circuit and short circuit parameters, transmission and inverse transmission parameters, hybrid parameters, inter-relationship of different parameters, interconnection of two port networks, T and pi representation, terminated two port system

SECTION – D

Fundamentals of network synthesis:
Realizability concept, Hurwitz property, positive realness, properties of positive real functions, testing positive real functions, synthesis of R-L, R-C and L-C driving point functions-Foster and Cauer forms**..**

Text Books:

1. Network analysis and synthesis", Franklin F. Kuc PHL.
2. Network Analysis", . M.E. Vanvalkenberg PHL third edition.

Reference Books:

1. Circuits and Networks- Analysis and Synthesis: A.Sudhakar and S.P.Shyam Mohan.
2 Networks and Systems, . D.Roy Choudhury: New Age International Pubs
3 Engineering Circuit Analysis', Wiliam Hayt and Jack kemmerly TMH

COMMUNICATION THEORY EC- 214

Course Code	**EC– 214**	L-3, T-1, P-0	
Name of the Course	COMMUNICATION THEORY		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time:3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

Introduction: Communication, signals and their classifications, elements of communication system, primary communication Resources ,Sources of Information communication Networks, Shannon's information capacity theorem ,communication channels, limitations and resources of communication systems

Fourier Analysis: Fourier series, fourier transform, properties of fourier transform, interplay between time domain and frequency domain descriptions, dirac delta function, fourier transform of periodic signals, sampling theorem, numerical computation of fourier transform, relationship between fourier and laplace transform.

SECTION – B

Filtering and signal distortion: Time response , frequency response, linear distortion and equalization, ideal low pass filter, band-pass transmission, phase delay and group delay, non linear distortion

Spectral Density and Correlation: Energy spectral density, correlation of energy signals, power spectral density, correlation of power signals, spectral characteristics of periodic signals, spectral characteristics of random signals and noise, noise- equivalent bandwidth.

SECTION – C

NOISE: Sources of Noise-Shot Noise-Resistor Noise-Calculation of Noise in Linear systems-Noise bandwidth-Available Power-Noise temperature-Noise in two port networks-Noise figure-Measurement of Noise figure-Signal in presence of noise-Narrow Band noise ; representation of narrowband noise in terms of: i)In phase & quadrature components ii) Envelope & phase components

Probability theory and random processes: Probability theory, random variables, Gaussian distriburtion, transformation of random variables, random processes, stationary, mean, correlation, and covariance functions, Ergodic process , random process transmission through linear filters, power spectral density, cross-correlation functions, cross-spectral densities, Gaussian process, narrow band random process

SECTION – D

INFORMATION THEORY: Introduction; uncertainty , Information & Entropy; Source coding theorem; Data compaction ; Discrete memoryless channels Mutual Information; channel capacity ; channel coding theorem ;differential entropy & mutual Information for continuous ensembles ; information capacity theorem ;Information capacity of colored Noise channel ; Rate distortion Theory ; Data compression BW S/N Trade-off., comparison of existing system.

Text Books:

1 Signals and Systems : S. Haykin : John Wiley
2 An introduction to Analog & Digital Communications: Simon Haykin : John Wiley

Reference Books:

1. Communication Systems : G.Kennedy 3/e, TMH
2. Principles of Communication Systems: Taub & Schilling. TMH
3. Communication Systems: B.P.Lathi..
4 Information and Transmission : Schwartz.
5. Elements of Communication Theory : J.C.Hancock.
6. Signal and Systems, Rawat, (Oxford University Press)

DIGITAL ELECTRONICS LAB EC – 211(P)

Course Code	**EC – 211(P)**	L-0, T-0, P-2	
Name of the Course	**DIGITAL ELECTRONICS LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:
1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. To verify the truth table of logic gates realize AND, OR, NOT gates

2. To realize AND, OR gates using diodes and resistors

3. Implementation of X-OR and X-NOR using NAND and NOR

4. Design of adder, subtractor, BCD adder using IC 7483

5. Implementation of logic equations using MUX, DEMUX

6. Design of encoders and decoders

7. Conversion of flip flops

8. Design of counters and registers

9. Application of logic design- sequence detector

10.Design a half/full adder circuit using FF for 2 bits

11. Design a half/full sub tractor circuit using FF for 2 bits

12. Design BCD to seven-segment display using 7447 IC

Note: All the practicals should be performed on breadboard & PSpice Simulator.

Analog Electronics Lab EC – 212(P)

Course Code	**EC – 212(P)**	L-0, T-0, P-2	
Name of the Course	**Analog Electronics Lab**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

List of Experiments:

1 Find out h-parameters of BJT

2 Design and implement CE-BJT amplifier and verify various parameters

3. To study the phase shift oscillator and find its frequency.

4. To study the frequency of a given crystal oscillator and measure the output.

5 To study the two stage RC coupled transistor amplifier.

6. To study voltage gain and frequency response of FET audio power amplifier.

7. To study WEIN-BRIDGE oscillator and determine its frequency.

8. To study power gain and frequency response of a transistor audio amplifier.

9. To study CLASS-B push pull amplifier at audio frequency.

10. To study series and parallel resonance.

11. To study the HARTLEY and COLPITS oscillator.

12,To find the Efficiency of Class-A or Class AB Amplifier.

13. To Frequency response of Single Tuned Amplifier.

14.To Plot Frequency response of a BJT amplifier with and without feedback.

Note: All the practicals should be performed on breadboard & PSpice Simulator

ELECTRONIC SIMULATION LAB EC-213(P)

Course Code	**EC – 213(P)**	L-0, T-0, P-2	
Name of the Course	**DIGITAL ELECTRONICS LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. Familiarization with electronic circuit simulation tool.

Designing with electronic circuit simulation tool.

2. Design a full wave rectifier.
3. Design a full wave bridge rectifier.
4. Design a Voltage regulator using Zener diode.
5. Design a common emitter single stage amplifier.
6. Verify the operations of OR, AND, NOT, NOR, NAND and XOR gates.
7. Design a ring counter and twisted ring counter.
8. Design a mod – 8 up and down counter.
9. Design a square wave generator using IC555 timer.
10. Design a biased diode clipper

Note: All the practicals should be performed on Orcad Software (Latest Version)

Communication & Professional Skills Lab-II (HS-202(P))

Course Code	HS-202 (P)	L-0, T-0, P-2	
Lectures to be Delivered	26 hours of Lab. work (2 hrs. per week)		
Semester End Examination	Max Marks: 50	Min Pass Marks: 20	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30% Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks: 50

Instructions for paper setter / candidates:

Laboratory examination will consist of two parts:

(iii) Performing a practical exercises assigned by the examiner (25 marks).

(iv) Viva-voce examination (25 marks)

Note: Each practical should be performed twice for effectiveness.

List of Practicals:

1. Phonetics: Organs of speech, speech sounds, symbols, articulation of speech sounds- stress and intonation.
2. SWOT analysis (Personal / Organisation)
3. Group discussion
4. Debate
5. Vocabulary improvement programs
6. Technical write up based on critical thinking (On subject allocated by coordinator)
7. Telephonic etiquettes: Preparing, Controlling and Follow up.

RECOMMENDED BOOKS:

1. Developing Communication Skills: by Krishan Mohan & Meera Bannerji
2. Group Discussions by Sudha Publications And Ramesh Publishing House, New Delhi
3. Vocabulary Improvement: Words Made Easy: by Diana Bonet
4. Word Power Made Easy: by Norman Lewis

SEMESTER-IV

ENGINEERING ECONOMICS (HS-201)

Course Code	**HS-201**	L-3, T-0, P-0	
Name of the Course	**Engineering Economics**		
Lectures to be delivered	**39 (1 Hr Each) (L = 39 for each semester)**		
Semester End Examination	Max. Time = 3 hrs.	Max. Marks: 100	Min. Pass Marks: 40
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max. Marks: 50**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Section-A

Economics: Definition, nature and scope of economics, need &significance of economics in Engineering, Economic Systems- Meaning of capitalism, socialism and mixed economy

Demand: Meaning, determinants of demand, demand curve, law of demand, exception to the law of demand, increase &decrease in demand, contraction &extension of demand, Elasticity of demand, Methods of measuring Elasticity of demand

Supply: Law of supply, extension &contraction of supply, increase & decrease in Supply, Elasticity of supply

Section-B

Cost of Production: Concept, types, Relation between average & marginal cost.

Theory of Production: Laws of returns- Law of variable proportions and law of returns to Scale, Break Even Analysis.

Price & Output Determination: Price determination under perfect competition, monopoly, monopolistic competition &oligopoly.

Section-C

Monetary policy- Meaning, objectives, methods, Fiscal policy- Meaning &Objectives of fiscal policy In a developing country like India, Functions of Reserve Bank of India and commercial banks.

Economics & Business Environment- Business/Trade Cycles- Meaning, Characteristics & classification, Inflation Effect, Foreign capital &economic development, Engineering Economics Analysis, Economics Analysis in the public and regulated sectors.

Section D

Indian Economy: - Characteristics of Indian economy, Planning in India, Development &Growth in India. Overall Economic policy since independence, Input & output analysis, Problem of unemployment in India. Concept of sustainable development &inclusive growth in India. Policy of globalizations, liberisation & privatization. Analysis of state &union budgets.

TEXT BOOKS:

1. Modern Micro Economics by Koutsoyannisa, MC Millen
2. Principles of Engineering Economics Analysis by John A. White, Kenneth E. Case and David B. Pratt Wiley India

REFERENCE BOOKS:

1. Business Economics by K. P. M. Sundharam, Sultan Chand &Sons
2. Elementary Economics Theory by K.K Dewett & J. D. Verma, S.Chand Publication

NUMERICAL METHODS FOR ENGINEERS (NS-207)

Course Code	**NS-207**	**L-03, T-01, P-0**		
Name of Course	**Numerical Methods for Engineers**			
Lectures to be delivered	**52 (L-39, P-13 for each semester)**			
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**	
Continuous Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.				**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

SECTION –A

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS: Bisection method, Method of false position, secant method, Iteration method, Newton-Raphson method and Generalized Newton-Raphson method, Rate of convergence and condition of convergence, solution of simultaneous equations by Iteration method and Newton-Raphson method

SOLUTION OF SIMULTANEOUS ALGEBRAIC EQUATIONS: Partial and Complete Pivoting, Gauss Elimination method, Gauss Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation method and LU-decomposition method.

SECTION-B

FINITE DIFFERENCE AND INTERPOLATION: Errors and approximation analysis, Interpolation, Various difference operators and relation between them, Newton's forward and backward interpolation formulae, Central difference Interpolation formula, Gauss's forward and backward interpolation formulae, Stirling formula, Bessel formula, Lagrange's interpolation formula of unequal intervals, Newton's divided difference formulae.

SECTION-C

NUMERICAL DIFFERENTIATION AND INTEGRATION: Numerical differentiation: Derivatives using Newton forward, backward and central difference formulas, Derivatives using Gauss forward and backward formulas, Derivatives using Bessel formula, Derivatives using Newton divided difference formulas, Maxima and minima of tabulated functions.

NUMERICAL INTEGRATION: Newton-Cotes Quadrature formula, Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules, Boole's and Weddle's rules, Errors and accuracy of these formulae (Trapezoidal rule, Simpson's $1/3^{rd}$ rule) Romberg's integration.

SECTION-D

NUMERICAL SOLUTIONS OF ORDINARY EQUATIONS: Picard method, Taylor's series method, Euler's method, Runge's method, Runge-Kutta method, Predictor- Corrector Methods: Milne's method and Adams-Bashforth method.

NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL: Finite difference approximations of partial derivatives, solution of Laplace equation (Standard five-point formula and Diagonal five-point formula), Solution of Poisson equation.

TEXT BOOKS:

1. Numerical methods for Scientific & Engg. Computations: M. K. Jain, S. R. K. Iyengar & R. K. Jain; Wiley Eastern Ltd.
2. Introductory Methods of Numerical Analysis Engineers & Sciences: S. S. Sastry, PHI Learning Private Limited New Delhi, (2009).

REFERENCE BOOKS:

1. Numerical Methods in Engineers & Sciences : J.N Sharma : Narosa Publishers.
2. Numerical Methods in Engg. & Sciences : B.S.Grewal : Khanna Publishers.
3. Computer Oriented Numerical methods: U. Rajaraman Orebtuce; Hall of India.
4. Introduction to Numerical Analysis: C. E. Froberg; Addison Wesley.

Communication System-I EC-221

Course Code	**EC – 221**	L-3, T-1, P-0	
Name of the Course	COMMUNICATION SYSTEM-I		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Base Band Signals and Systems.

Introduction, Definition of Communication, Communication System Block Diagram, Need for Wireless Communication, Need of Modulation, General Definition of Modulation, Basic Transmission signals.

AM Transmission and Reception

i) **Amplitude Modulation: -** Theory, power & current calculation, AM modulation of a complex wave.

ii) AM Transmission:- Introduction, Generation of Amplitude Modulation, Low Level and High Level Basic Principle of AM Generation; Square Law Diode Modulation, Amplitude Modulation in Amplifier Circuits, , Suppressed Carrier AM Generation (Balanced Modulator), .

iii) AM Reception:-, Super heterodyne Receiver, Basic Elements of AM Super-heterodyne Receiver, Image Frequency Rejection, **,** , Tuning Range, Tracking, Sensitivity and Gain, Image Rejection, Adjacent Channel Selectivity, Automatic Gain Control

AM Detector: Square Law Detector, Envelope or Diode Detector, AM Detector with AGC, AM receiver using a Phase Locked Loop (PLL), AM receiver characteristics.

SECTION – B

Angle Modulation

Angle Modulation - Frequency modulation, Sinusoidal FM, Frequency spectrum for sinusoidal FM, Average power in sinusoidal FM, Non-sinusoidal modulation-deviation ratio, Measurement of modulation index for sinusoidal FM. Phase modulation- Equivalence between PM and FM, Sinusoidal Phase Modulation.

Angle modulator Circuits

Varactor Diode Modulators, Transistors Modulators, FM Transmitters Direct & Indirect Methods, FM Broadcast,

Angle modulation detectors

Foster-Seeley discriminator, Ratio Detector, Quadrature Detector, PLL Demodulator, Automatic Frequency Control, Amplitude Limiters, Pre-emphasis and De-emphasis, FM Broadcast Receivers, FM Stereo Receivers

SECTION – C

SSB Transmission: Introduction, Advantage of SSB Transmission, Generation of SSB, The Filter method, The Phase – shift Method, The Third Method, AM Compatible SSB Modulation, Pilot Carrier SSB, Independent Side-band systems (ISB), Vestigial Side-band (CSSB) Receiver, ISB/Suppressed Carrier Receiver.

Pulse Modulation Transmission and Reception:
Introduction, Pulse amplitude Modulation (PAM), Natural PAM Frequency spectra for PAM, PAM Time Multiplexing Flat-top PAM, PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation (PTM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), PPM Demodulator.

SECTION – D

Telephone Systems
Standard Telephone Set, Basic Call Procedures, Call progress Tones & Signals DTMF, Cordless Telephones, Electronic Telephones, Paging systems. The telephone circuit – Local subscriber loop, Channel noise and Noise weighting, Power measurement, Private-line circuits,Voice-frequency circuit arrangements. The public telephone network - Instruments, Local loops, Trunk circuits and exchanges, Local central office Exchanges, Automated central office switches and Exchanges.

Text Books:
1 Communication Systems 4/e, Simon Haykin: John Wiley
2. Advanced Electronic Communications Systems: Wayne Tomasi 6/e,PHI.
.
References:
1 Communication Systems Engineering John G. Proakis& Masoud Salehi 6/e,Pearson Education
2. Communication Systems George Kennedy 3/e, TMH.
3. Digital and Analog Communication Systems Leon W. Couch II : 6/e , Pearson Education.
4. Electronic Communication: Dennis Roody & John Coolen: 4/e PHI

Electronic Measurement & Measuring Instruments EC 222

Course Code	**EC-222**	L-3, T-1, P-0	
Name of the Course	Electronic Measurement & Measuring Instruments		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

UNITS STANDARDS & ERRORS S.I units, Absolute standards (International, Primary. Secondary & Working Standards), True Value, Errors (Gross, Systematic, Random); Static Characteristic of Instruments (Accuracy, Precision, Sensitivity, Resolution & threshold).

Bridges: Wheat stone bridge; Kelvin's bridge method,.

AC Bridges inductance Comparison Bridge, capacitance Comparison Bridge, Maxwell's , Hay's, Anderson, Owens, De-Sauty's , Schering & Weins bridges, Meggar , Shielding & earthing.

SECTION – B

INSTRUMENTS FOR GENERATION AND ANALYSIS OF WAVEFORMS: Signal generators, function generator, wave analyzer, harmonic distortion analyzer, spectrum analyzer, spectrum analysis.

INSTRUMENT TRANSFORMER: Current and potential transformers, constructional features, ratio and phase angle error.

SECTION – C

TRANSDUCERS: Principles of operation, strain gauge, LVDT, thermocouple ,RTD , piezo-electric crystal and photoelectric transducers.

ELECTRONIC INSTRUMENTS: Electronic voltmeter, Transistor voltmeter, Electronic Multimeter,

OSCILLOSCOPES AND RECORDERS

Simple CRO Block dia, CRT features - Dual Beam-Dual Trace-Sampling Oscilloscope-Recorders-XY Recorder-Magnetic Recorders- Display Devices (LED, LCD, Alphanumeric displays)

SECTION – D

Data Acquisition system
TELEMETERY: Introduction, Types of Telementary Systems and applications.

COMPUTER CONTROLLED TEST SYSTEMS
Testing an Audio Amplifier-Testing a Radio Receiver-Instruments used in Computer Controlled Instrumentation- Microprocessor based System and Measurement

TEXT BOOKS

1 Instrumentation for Engineering Measurements -2nd Edition ,James W. waley , William F. Riley, KennethG .Mcconnell
2 Electronic Instrumentation H. S. Kalsi Tata McGraw Hill Publishing Company Ltd., 1995

REFERENCE BOOKS

1. Measurement Systems Application and Design, . Earnest .O Doeblin McGraw Hill International editions,4th edition, 1990.
2. A Course in Electrical and Electronic Measurements and Instrumentation", A.K.Sawhney Dhanapat Rai & Sons, 2000.
3. Digital Instrumentation", A.J.Bouwens McGraw Hill, 1986.
4. Intelligent Instrumentation" Geroge C. Barney ,IEEE, 1992.
5 Modern Electronic Instrumentation and MeasurementTechniques Albert.D. Helfrick and William. D. Cooper Pearson education

Electronic Device Modelling EC-223

Course Code	**EC – 223**	L-3, T-1, P-0	
Name of the Course	Electronic Device Modelling		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

Semiconductor types, Law of Mass action, Drift and diffusion carriers, Hall Effect, , piecewise linear diode characteristics, diode specification , diode resistance, diode junction capacitance , diode equivalent circuits, Load line analysis of diode circuit Diode as a switch, Transistor as a switch,

Transistor Biasing and Thermal Stablization Operating point:

Operating point; Biasing circuit: fixed bias circuit; Emitter bias; voltage divider bias ;collector to base bias ; Bias stabilization; Bias compensation; Thermal runaway ;Operating point consideration in thermal runaway ; transistor switch Biasing JFETs: common source ,common drain &common gate configuration ;UJT: construction ,operational principle , current controllable device

SECTION – B

MULTIVIBRATORS

Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors

OPTO Electronic devices:

Photo sensors ;Photo conductor Photodiodes ;photo transistor ;LED;LCDOLEDs ; digital light processing technology ;Plasma display panels ;field emission displays ;electronic ink displays ;optocouplers

SECTION – C

Introduction: The switching circuit, classification of switching circuits.

Combinational logic design:Combinational circuit design using Multiplexer, ROM, PAL, PLA.

Design and analysis of sequential circuits

Design of a clocked flip-flop – Flip-flop conversion -Practical clocking aspects concerning flip-flops. General model of sequential networks - State diagrams – Analysis and design of Synchronous sequential Finite Sate Machine – Exact State reduction – State reduction with don't cares -Minimization and design of the next state decoder

.

SECTION – D

Counters: Design of single mode counters and multimode counters – Ripple Counters – Ring Counters – Shift registers counter design.

Asynchronous sequential logic: Analysis and Design – Race conditions and Cycles – Hazards in combinational circuits – Hazard free realization.

Practical design aspects:Timing and triggering considerations in the design of synchronous circuits Set up time - Hold time Clock skew - Static timing analysis - Dynamic analysis.

Text Books:

1. Electronic Devices & circuits-Anil K Maini , Varsha Aggarwal Wiley India
2 Digital Design M. Mano 3rd Ed., Prentice Hall, India.

Reference Books:

1. Digital Systems - Principles and Applications, Tocci, R. J. and Widner, N. S.Prentice Hall,7thEd.
2. Principles and Practices, . Wakerly J F, Digital Design: Prentice-Hall, 2nd Ed.
3. Design of Logic Systems, . Lewin D. & Protheroe D. Chapman & Hall, University and Professional Division, 1992, II Ed.
4. Switching and finite automata theory – ZVI Kohavi. Cambridge University Press

PULSE SHAPING & WAVE GENERATION EC – 224

Course Code	**EC – 224**	L-3, T-1, P-0	
Name of the Course	PULSE SHAPING & WAVE GENERATION		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION –A

LINEAR WAVESHAPING

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

TIME BASE GENERATORS

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

SECTION B

NON-LINEAR WAVE SHAPING

Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

SAMPLING GATES

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

SECTION-C

Elements of signal theory: Signals as functions- Signal taxonomy- basic operations on signals- Some signal models - impulse function, step functions and other singularity functions.

Systems : Time-domain representation and analysis of LTI and LSI systems – Convolution - Convolution sum, convolution integral and their evaluation - Causality and stability considerations.

SECTION-D

Laplace transform: Region of convergence – Analysis of continuous time systems – Transfer function – Frequency response from pole – zero plot

Z-transform: Region of convergence – Properties of ROC and Z transform - Analysis of LSI systems - Transfer function- Frequency response from pole – zero plot

TEXT BOOKS:

1. Electronic Devices & circuits-Anil K Maini , Varsha Aggarwal Wiley India
2 Communication Systems 4/e, Simon Haykin: John Wiley

REFERENCES

1. Pulse and Digital Circuits – A. Anand Kumar, PHI.
2. Wave Generation and Shaping L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.
4 Pulse, Digital and Switching Waveforms J. Millman and H. Taub, McGraw-Hill, 1991.
5 Signals & systems -2nd edition Simon Haykin ,Barry Van Veen

Communication system Lab-I EC-221(P)

Course Code	**EC – 221(P)**	L-0, T-0, P-2	
Name of the Course	**Communication system Lab-I**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
2. Frequency modulation using voltage controlled oscillator.
3. Generation of DSB-SC signal using balanced modulator.
4. To generate a FM Signal and measure Depth of modulation.
5. To Study Super heterodyne AM receiver and measurement of receiver parameters viz. sensitivity, selectivity & fidelity.
6. Familiarization of PLL, measurement of lock and capture range, frequency demodulation, frequency multiplier using PLL.
7. Sampling Theorem & Reconstruction of Signal from its lsamples using Natural Sampling, Flat Top Sampling & Sample & Hold Circuits.
8. To study the circuit of PAM modulator & Demodulator
9. To study the circuit of PWM modulator & Demodulator
10. To study the circuit of PPM modulator & Demodulator

SOFTWARE

1. Amplitude Modulation using PSpice
2. Frequency Modulation using PSpice
3. PAM modulation using PSpice
4. PAM demodulation using PSpice
5. pre emphasis and de emphasis using PSpice
6. Amplitude Modulation using MATLAB
7. Frequency Modulation using MATLAB

Electronic Measurement & measuring Instruments Lab EC-222(P)

Course Code	**EC – 222(P)**	L-0, T-0, P-2	
Name of the Course	**Electronic Measurement & measuring Instruments Lab**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. Determination of Temp.-Resistance & Temp.—Voltage characteristics of the Thermistor.

2. Determination of Temp.-Resistance & Temp.—Voltage characteristics of the RTD (pt-100).

3. Determination of Temp. using Thermocouple with compensation & without compensation . Plot the graph for Actual Temp. vs %Error.

4. Determination of characteristics between strain applied & the voltage output, as well as the signal conditioned voltage of a cantilever strain gauge.

5. To study the characteristics of a LVDT with respect to secondary output voltage & Signal conditioned output voltage. Calibrate the LVDT & plot the graph between displacement & O/P voltage

6. To study the response of optical sensor by varying the distance from light source.

7. Measurement of unknown resistance using kelvin's double bridge.

8. Measurement of unknown capacitance using schering's bridge.

9 Measurement of unknown inductance using anderson's bridge.

10 Speed measurement of DC motor with Photoelectric Pickup

PCB & ELECTRONIC WORKSHOP LAB EC-223(P)

Course Code	**EC – 223(P)**	L-0, T-0, P-2	
Name of the Course	**PCB & ELECTRONIC WORKSHOP LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. Soldering shop: Fabrication of DC regulated power supply
2. PCB Lab: (a) Artwork & printing of a simple PCB.

(b) Etching & drilling of PCB.

3 Testing of regulated power supply fabricated

1. Introduction & Hands on experience to use circuit creation & simulation software like PSPICE or ORCAD etc.
2. Design a full wave centre tapped rectifier & study the effect of capacitive filter & its output on a virtual oscilloscope.
3. Design a RLC resonance circuit & verify the transient & phase response for different values of R,L &C.
4. Design a circuit for a fixed power supply.
5. Design a half adder using discrete components & verify the timing diagrams.
6. Convert the power supply circuit into PCB & simulates its 2D & 3D view.
7. PCB printing using screen printing or any other technique.
8. Etching of the above PCB.
9. UV exposure & Drilling of PCB.
10. Coating of etched PCB to protect it from oxidation.
11. Fabrication & placing of components as per above power supply circuit.
12. Testing of above circuit

Study of Indian standards in Electronic Industry.

Manufacturing, practices in Electronic Industry.

Reference material :-

PCB Design : Boshar TMH Pub.

Integrated circuit Fabrication Technology Elliot (TMH).

MAT LAB EC-224(P)

Course Code	**EC – 224(P)**	L-0, T-0, P-2	
Name of the Course	**MAT LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. Roots of a quadratic equation.
2. Guessing a number.
3. Units conversion.
4. Factorial Program
5. Simulation of an RC circuit.
6. I-V characteristic of a MOSFET.
7. Finding average with a dynamic array.
8. Solving a System of Linear Equations
9. Writing a binary file.
10. Reading a binary file.
11. Plotting one and two-dimensional graphs using various MATLAB 2-D Plot types.
12. Using functions in MATLAB environment.
13. The teacher concerned will give at least 10 more exercises to solve non-trivial problems
14. using MATLAB environment.

Books:

a. MAT LAB An introduction with applications –Amos Gilat , Wiley India Edition
b. MATLAB, The Language of Computing; The Maths work Inc
c Programming in MATLAB, Marc E. Herniter, Thomson ASIA Ptc Ltd. Singapore (2001).

5th Sem Elective
ENERGY ASSESSMENT AND AUDITING - EE-300(a)

Course Code	**EE-300(a)**	**L - 3, T- 0, P – 0**	
Name of Course	**Energy Assessment and Auditing**		
Lectures to be delivered	**39 (L-39 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

SECTION A

Energy Scenario: Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, re-structuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

Basics of Energy and its various forms: Electricity basics- DC & AC currents, electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

SECTION B

Energy Management & Audit: Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments.

Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

SECTION C

Energy Action Planning: Key elements, force field analysis, Energy policy purpose, perspective, contents, formulation, ratification, Organizing - location of energy management, top management support, managerial function, roles and responsibilities of energy manager, accountability. Motivating-motivation of employees: Information system-designing barriers, strategies; Marketing and communicating-training and planning.

Financial Management: Investment-need, appraisal and criteria, financial analysis techniques-simple pay back period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts and role of ESCOs.

SECTION D

Project Management: Definition and scope of project, technical design, financing, contracting, implementation and performance monitoring. Implementation plan for top management, Planning Budget, Procurement Procedures, Construction, Measurement & Verification.

Energy Monitoring, Targeting and Global environmental concerns: Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques -energy consumption, production, cumulative sum of differences (CUSUM). United Nations Framework Convention on Climate Change (UNFCC), sustainable development, Kyoto Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), Prototype Carbon fund (PCF).

TEXT BOOKS:

1. L.C. Witte, P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
2. O. Callaghn, P.W. "Design and Management for Energy Conservation", Pergamon Press, Oxford.

REFERENCE BOOKS:

1. I.G.C. Dryden, "The Efficient Use of Energy" Butterworths, London.
2. W.C. turner, "Energy Management Hand book" Wiley, New York.
3. W.R. Murphy and G. Mc KAY "Energy Management" Butterworths, London.
4. Handbook of Energy Audits by Albert Thuman – Fairman Press Inc.
5. Energy basis for man and nature by Howard T.Odum & Elisbeth. C. Odum.

TOTAL QUALITY MANAGEMENT - HU-300(b)

Course Code	**HU-300(b)**	**L - 3, T- 0, P – 0**		
Name of Course	**Total Quality Management**			
Lectures to be delivered	**39 (L-39 for each semester)**			
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**	
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.				**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

SECTION A

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

Quality Control and Improvement Tools: Check Sheet, Histogram, Pareto Chart, Cause and Effect diagram, Scatter diagram, Control chart, Graph, Affinity diagram, Tree diagram, Matrix diagram, Process decision program chart, Arrow diagram, Acceptance Sampling, Process capability studies, Zero defect program (POKA-YOKE).

SECTION B

TQM PRINCIPLES: Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal – Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

SECTION C

TQM TOOLS & TECHNIQUES: The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types. Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

SECTION D

Quality Management System & Quality Audit: Quality Systems, Quality management principles, ISO-9000:2000, ISO 9001 : 2000, ISO 14000, Future of quality system audit, Audit objectives, types of quality audit, Quality Auditor, Audit performance. Case studies of TQM implementation in manufacturing and service sectors including IT.

TEXT BOOKS:

1. Dale H. Besterfiled, et at., "Total Quality Management", Pearson Education Asia, 3rd Edition, Indian Reprint.
2. Ross, J.E.: Total Quality Management, Vanity Books International.

REFERENCE BOOKS:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", South-Western (Thomson Learning).
2. Oakland, J.S., "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India)Pvt. Ltd.
4. Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd.
5. Goetsch, D.L. & Davis,S. : Introduction to Total Quality, Prentice Hall.
6. Juran, J.M. & Gryna, F.M. : Quality Planning and Analysis, Tata McGraw Hill Publishing Co. Ltd., New Delhi
7. Charantimath, P.M. : Total Quality Management, Pearson Education.

OPTIMIZATION METHODS FOR ENGINEERING SYSTEMS - ME-300(c)

Course Code	**ME-300(c)**	**L - 3, T- 0, P – 0**	
Name of Course	**Optimization Methods For Engineering Systems**		
Lectures to be delivered	**39 (L-39 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

SECTION A

Introduction: Engineering Application; Statement of the Optimal Problem; Classification; Optimization Techniques;

Classical Method: Single Variable Optimization; Multivariable Optimization Without any Constraints with Equality and Inequality Constraints.

SECTION B

One-Dimensional Minimization Method: Unimodal Function; Elimination Method – Dichotomous Search, Fibonocci and Golden Method; Interpolation Method – Quadratic and Cubic Interpolation Method.

Unconstrained Minimization Method: Univariate, Conjugate Directions, Gradient And Variable Metric Method.

SECTION C

Constrained Minimization Method: Characteristics of a constrained problem; Direct Method of feasible directions; Indirect Method of interior and exterior penalty functions.

Geometric Programming: Formulation and Solutions of Unconstrained and Constrained geometric programming problem.

SECTION D

Dynamic Programming: Concept of Sub-optimization and the principal of optimality: Calculus, Tabular and Computational Method in Dynamic Programming: An Introduction to Continuous Dynamic Programming.

Integer Programming: Gomory's Cutting Plane Method for Integer Linear Programming; Formulation & Solution of Integer Polynomial and Non- Linear problems.

TEXT BOOKS:

1. Optimization (Theory & Application)- S.S. Rao, Wiley Eastern Ltd, New Delhi.
2. Optimization Concepts and Applications in Engineering – Ashok D.Belegundu and Tirupathi R Chandrupatla – Pearson Education 1999, First India Reprint 2002.

REFERENCE BOOKS:

1. Optimization: Theory and Practice, C.S.G. Beveridge and R.S. Schechter, McGraw Hill, New York.
2. Kalyanamoy Deb, "Optimization for Engineering design algorithms and Examples", Prentice Hall of India Pvt. Ltd. 2006.
3. Rao, Singaresu, S., "Engineering Optimization – Theory & Practice", New Age International (P) Limited, New Delhi, 2000.
4. Johnson Ray, C., "Optimum design of mechanical elements", Wiley, John & Sons, 1990.
5. Goldberg, D.E., "Genetic algorithms in search, optimization and machine", Barnen, Addison-Wesley, New York, 1989.

REMOTE SENSING AND GIS- CE-300(d)

Course Code	**CE-300(d)**	**L - 3, T- 0, P – 0**	
Name of Course	**Remote Sensing and GIS**		
Lectures to be delivered	**39 (L-39 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

SECTION A

EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL: Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

PLATFORMS AND SENSORS: Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

SECTION B

IMAGE INTERPRETATION AND ANALYSIS: Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image Classification – Supervised and unsupervised.

SECTION C

GEOGRAPHIC INFORMATION SYSTEM: Introduction – Maps – Definitions – Map Projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

SECTION D

DATA ENTRY, STORAGE AND ANALYSIS: Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data Analysis – Modeling in GIS Highway alignment studies – Land Information System.

TEXT BOOKS:

1. Lillesand, T.M., Kiefer, R.W. and J.W. Chipman. (2004). Remote Sensing and Image Interpretation. V Edn. John Willey and Sons (Asia) Pvt. Ltd., New Delhi.
2. Anji Reddy, M. (2001). Textbook of Remote Sensing and Geographical Information System. Second edn. BS Publications, Hyderabad.

REFERENCE BOOKS:

1. Lo. C.P. and A.K.W. Yeung (2002). Concepts and Techniques of Geographic Information Systems. Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Peter A. Burrough, Rachael A. McDonnell (2000), Principles of GIS. Oxford University Press.
3. Ian Heywood (2000), An Introduction to GIS, Pearson Education Asia.

SEMESTER-V
Open Elective
OPERATING SYSTEMS- CS-311

Course Code	**CS-311**	**L - 3, T- 1, P – 0**	
Name of Course	**Operating Systems**		
Lectures to be delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

SECTION A

Introduction to System Software: Overview of all system software's: Compiler, Assembler, Linker, Loader, Operating system, I/O manager

Fundamentals of Operating System: OS services and Components, Multitasking, Multiprogramming, Multiprocessing, Time Sharing, Buffering, Spooling, Distributed OS

SECTION B

Process and Thread Management: Concept of process and threads, Process states, Process management, Context switching, Interaction between processes and OS Multithreading
Example OS : Linux

Concurrency Control: Concurrency and Race Conditions, Mutual exclusion requirements, Software and hardware solutions, Semaphores, Monitors, Classical IPC problems and solutions, Deadlock, Characterization, Detection, Recovery, Avoidance and Prevention

SECTION C

Memory Management: Memory partitioning, Swapping, Paging, Segmentation, Virtual, memory, Overlays, Demand paging, Performance of Demand paging, Virtual memory concepts, Page replacement algorithms, Allocation algorithms, Example OS : Linux

I/O Systems: Secondary-Storage Structure, Disk structure, Disk scheduling, Disk management, Swap-space management, Disk reliability, Stable storage implementation, Introduction to clock, Clock hardware, Clock software

SECTION D

File systems: File concept, File support, Access methods, Allocation methods, Directory Systems, File protection, Free space management, Example OS : Linux

Protection & Security: Protection, Goals of protection, Domain of protection, Access matrix, Implementation of access matrix, Revocation of access rights, Security, The security problem, Authentication, One-Time passwords, Threats, Example OS: Linux **Case Study:** Android OS

TEXT BOOKS:

1. Operating System Concepts by Silberschatz and Galvin, Wiley.
2. Operating Systems Achyut S. Godbole Tata McGraw Hill.
3. Operating system By Doeppnar, Wiley India .

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, by William Stallings, Prentice Hall.
2. Modern Operating Systems by Andrew S Tanenbaum, Prentice Hall India.
3. Operating Systems by Gary Nutt, Nabendu Chaki, Sarmishtha Neogy, Pearson
4. Operating Systems Design & Implementation Andrew S. Tanenbam, Albert S. Woodhull Pearson
5. Operating Systems D. M. Dhardhere Tata McGraw Hill

SEMESTER-V

MICROPROCESSOR THEORY & APPLICATIONS EC-311

Course Code	**EC-311**	L-3, T-1, P-0	
Name of the Course	MICROPROCESSOR THEORY & APPLICATIONS		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

Introduction:

Evolution of microprocessor, General Architecture Basic 8085 microprocessor architecture and its functional blocks, 8085 microprocessor IC pin outs and signals, address, data and control buses, 8085features Addressing Modes:- Direct addressing, indirect addressing, indexed, register direct, register indirect, implicit addressing mode, Timing diagrams. Typical instruction set of 8085, data manipulation, data transfer, status management instructions.

SECTION – B

Programming: Development of Assembly language program. Interrupts & data transfer: Interrupt system of 8085 Stack and subroutine Types of memory and memory interfacing Decoding techniques – absolute and partial

Mapping techniques – I / O mapped I /O and memory mapped I / O ,Serial I/O lines of 8085 and the implementation asynchronous serial data communication using SOD and SID..

SECTION – C

Peripheral devices & applications of microprocessor: Description of 8251, 8255, 8253, 8257, 8259, 8279. Cycle stealing and burst mode of DMA controller. Synchronous and asynchronous data transfer using 8251

SECTION – D

8086 and 8088 Microprocessors:

Architecture and organization of 8086/8088 microprocessors family, bus interface unit,
8086/8088 hardware pin signals, timing diagram of 8086 family microprocessors,
simplified read/ write bus cycles, 8086 minimum and maximum modes of operation,
8086/8088 memory addressing, address decoding, memory system design of 8086 family, timing considerations for memory interfacing, input/output port addressing and decoding, introduction to 8087 floating point coprocessor and its connection to host 8086. “Introduction to Modern Microprocessor”.

Text Books -

1. Microprocessor & Architecture, programming and application by Gaonkar.
2. Microprocessors and Digital Systems, D.V.HALL, McGraw Hill
3. Microprocessor and Microcontrollers, Senthil, Saravanam (Oxford University Press)

Reference Books:

1 An introduction to microprocessor – A.P. Mathur.
2 The 8086 Microprocessor –Kenneth J Ayala
3. Fundamentals of microprocessor & microcomputers – B.Ram

Communication Systems-II EC-312

Course Code	EC-312	L-3, T-1, P-0	
Name of the Course	Communication Systems -II		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Basic signal processing operations in Digital communication

Analog Pulse Modulation: Sampling theorem for base-band and pass-band signals, quadrature sampling of band pass signal Reconstruction of message from its samples, signal distortion in samplingPulse Amplitude modulation: generation and demodulation, PAM/TDM system,.

Digital Pulse modulation: Quantization, PCM, DPCM, Delta modulation, Adaptive delta modulation-Design of typical systems and performance analysis.

Section B

Signal space concepts: Geometric structure of the signal space, vector representation, distance, norm and inner product, orthogonality, Gram-Schmidt orthogonalization procedure. Matched filter receiver, Inter symbol interference, Pulse Shaping, Nyquist criterion for zero ISI, Eye diagram, Equalizer, Scrambling and descrambling.

Section C

Review of Gaussian random process, Optimum threshold detection, Optimum Receiver for AWGN channel, Matched filter and Correlation receivers, Decision Procedure: Maximum aposteriori probability detector- Maximum likelihood detector, Error probability performance of binary signaling.

Digital band pass modulation schemes: ASK, FSK, PSK, MSK – Digital M-ary modulation schemes – signal space representation

Section D

Detection of signals in Gaussian noise - Coherent & non-coherent detection – Differential modulation schemes – Error performance of binary and M-ary modulation schemes – Probability of error of binary DPSK – Performance of M-ary signaling schemes in AWGN channels - Power spectra of digitally modulated signals, Performance comparison of digital modulation schemes.

Text Books:

1, DigitalCommunications , . Simon Haykin John Wiley & Sons, Indian edition.
2. Communication System Engineering, John G Proakis and M. Salehi, 2/e, Pearson Education

Reference Books:

1. Digital Communication: Fundamentals and Applications, B. Sklar and P.K. Ray, 2/e, Pearson Education, 2003.
2. Principles of Communications, R.E. Ziemer and W.H. Tranter, JAICO Publishing House, 2001.
3. Modern Digital and Analog Communication, B.P. Lathi, 3/e, Oxford University Press, 1998.
4. Digital Communications, John G. Proakis, McGraw Hill, 2001.

POWER ELECTRONICS AND ITS APPLICATION EC-313

Course Code	EC-313	L-3, T-1, P-0	
Name of the Course	POWER ELECTRONICS AND ITS APPLICATION		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

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SECTION – A

Introduction, Power Electronics versus Linear Electronics

Overview of Power Semiconductor Switches

Diode, Thyristor, Desired characteristics in controllable switches, bipolar junction transistor and monolithic Darlington's, metal oxide semiconductor, field effect transistor, gate turn off thyristors, insulated gate bipolar transistors, MOS-controlled thyristor, comparison of controllable switches, drive and Snubber circuit ,SCR , , switching characteristics, methods of improving di/dt and dv/dt ratings,Gate Trigger & commutation circuits ,Series & parallel connection , Diac , Triac

SECTION – B

Controlled Rectifier: Single-phase half wave and full wave converter with resistive , RL & R-L-E, Freewheeling diode, three phase rectifiers, Bridge rectifiers -half controlled and fully controlled.

dc-dc switch-mode converter

Introduction , control of dc-dc converters, step-down(Buck) converter, step-up(boost) converter, buck-boost converter, Cuk dc-dc converter, full bridge dc-dc converter, dc-dc converter comparison

SECTION – C

Switch Mode dc-ac Invverters: .

Basic concept of switch mode inverters, single phase inverters, three phase inverters, Effect of blanking time on output voltage in PWM Inverters, other Inverters switching schem

Power Supply Application :

Switching dc Power Supply

Linear Power supplies , overview of switching power supplies, dc-dc converter with electrical isolation , control of switch mode dc power supply, power supply protection, Electrical isolation in Feedback loop, Designing to meet the power supply specifications

Power Conditioners and Uninterruptible Power supplies

Introduction, power line disturbances, power conditioners, uninterruptible power supplies(UPS)

SECTION – D

DC& AC Motor Drives

Basic characteristics of DC Motors, Single phase & three phase drive Close loop control of DC drives Induction Motor drives ,closed loop control of induction motor, Synchronous Motor Drives , Stepper motor control

Applications

Space Heating & Air Conditioning , High Frquency Fluorescent Lighting Induction Heating, effect of frequencies and Power requirements, Dielectric heating and applications.

Text Book:

1 Power Electronics: Converters , application and design' by Mohan ,Undeland , Riobbins ; John Wiley

Reference books:

1.Power Electronics - P.C.Sen, Tata McGraw Hill Publishing Co., Ltd.,1987.
2. Power Electronics and Control - S.K.Dutta, Prentice Hall of India Pvt. Ltd.,1986
3 Power Electronics Circuits Devices & application-Muhammad H. Rashid – Pearson Education

ELECTROMAGNETIC FIELD THEORY EC – 314

Course Code	**EC –314**	L-3, T-1, P-0	
Name of the Course	ELECTROMAGNETIC FIELD THEORY		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions I section E. Use of non-programmable calculators is allowed.

Section A

INTRODUCTION: The Co-ordinate Systems; Rectangular, Cylindrical, and Spherical Co-ordinate System. Co-ordinate transformation. Gradient of a Scalar field, Divergence of a Vector field and Curl of a Vector field. Their Physical interpretation.. Divergence Theorem, Stokes' Theorem. Useful Vector identifies

Electrostatics : The experimental law of Coulomb, Electric field intensity. Field due to a line charge, Sheet Charge and Continuous Volume Charge distribution. Electric Flux and Flux Density; Gauss's law. Application of Gauss's law. Energy and Potential . The Potential Gradient. The Electric dipole. The Equipotential surfaces. Energy stored in an electrostatic field. Boundary Conditions. Capacitors and Capacitances. Poisson's and Laplace's equations. Solutions of Simple Boundary value problems. Method of Images..

Section B

Steady Electric Currents: Current densities , Resistance of a Conductor; The Equation of Continuity . Joules law. Boundary Conditions for Current densities. The EMF.

Magnetostatics : The Biot-Savart law. Amperes' Force Law . Torque exerted on a current carrying loop by a magnetic field. Gauss's law for magnetic fields. Magnetic Vector Potential . Magnetic Field Intensity and Ampere's Circuital law. Boundary conditions. MagneticMaterials . Energy in magnetic field . Magnetic circuits. Application to cathode Ray Oscilloscope..

Section C

TIME VARYING FIELDS: Equation of continuity for time varying fields, inconsistency of amperes law, displacement current, Maxwell field equation in differential & integral form and their interpretation, uniform plane wave and relation between E and H in uniform plane wave, Intrinsic impedance, boundary conditions.

Poynting's Theorem , Time – Harmonic EM Fields . Plane wave Propagation :Helmholtz wave Equation. Plane wave solution. Plane wave propagation in lossless and lossy dielectric medium and conducting medium . Plane wave in good conductor, surface resistance , depth of penetration. Polarization of EM wave - Linear, Circular and Elliptical polarization. Normal and Oblique incidence of linearly Polarized waveat the plane boundary of a perfect conductor, Dielectric – Dielectric Interface

Section D

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TRANSMISSION LINE THEORY: The TEM wave and the transmission line limit - Transmission Lines: The high-frequency circuit.. LCR ladder model for transmission lines. The transmission line equation. Analogy with wave

equationequation of transmission line terminated with any load impedance, infinite transmission line, characteristic impedance, open & short circuited line, Reflection coefficient, standing wave ratio and its relation with reflection coefficient,impedance matching, stub matching, smith chart.

Text Books :

1. Engineering Electromagnetic: Haytl TMH.
2 Electro-magnetic Waves and Radiating System : Jordan & Balmain, PHI

Reference Books :

1. Electro-Magnetic: Krauss JDF; Mc Graw Hill
2. Electromagnetic waves & radio system by Jorden R.F
3. Elements of Engineering Electromagnetics", Nannapaneni Narayana Rao, PHI
4. Elements of Electromagnetic by Mathew N. O. Sadiku, (Oxford University Press.)

Linear Integrated Circuit and Design EC – 315

Course Code	**EC– 315**	L-3, T-1, P-0	
Name of the Course	Linear Integrated Circuit and Design		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Direct coupled & differential Amplifier

Problem associated with DC Amplifier ;Drift & label shifting ;Differential Amplifier;Analysis of differential Amplifier (DM operation, CM operation, CMRR)Design of basic differential Amplifier

Operational Amplifier Fundamentals

Basic Op Amp Configurations, Simplified Op Amp Circuits , Small signal analysis of 741, Ideal Op Amp Circuits Analysis, Diagram, Input Bias and Offset Currents, Low-Input-Bias-Current Op Amps, Input Offset Voltage, Low-Input-Offset-Voltage Op Amps, Input Offset-Error Compensation, Maximum Ratings. Open-Loop Response , Closed-Loop Response ,Input and Output Impedances ,Transient Response ,The Stability Problem, Stability in Constant-GBP Op Amps Circuits, Internal Frequency Compensation, External Frequency Compensation. CMRR , power bandwidth of Op amps , Slew rate and methods of improving slew rate, concept of virtual ground.

Section B

Linear Applications of OP-AMP

Current shunt feedback (Inverting Amplifier), Current Series feedback (Non-Inverting Amplifier) Summing Amplifier, Averaging Amplifier, Difference Amplifier,, Instrumentation Applications, Integrator/Differentiator using OP-AMP , Current-to-Voltage Converters, Voltage-to-Currents Converters, Grounded load V/I Converter, V-F and F-V Converters. Sample-and-Hold Amplifiers

Section C.

Active Filter

The Transfer function, First-Order Active Filters, Audio Filter Applications, Standard Second- Order Responses, KRC Filters, Butterworth Filter , Chebyshev filter Multiple-Feedback Filters, Filter approximations, Cascade design, Direct design,

Non Linear Applications of OP-AMP

Voltage Comparators, Comparator Application, Schmitt Triggers,Precision Rectifier,Peak Detectors Mono-shot Multi-vibrator Astable Multi-vibrator Triangular /saw-tooth waveform Generator

Section D

Data Converters and Regulators

Analog Switches,A-D Conversion Techniques,D-A Conversion Techniques Integrated ICs employing above techniques and their applications,Functional block diagram of Voltage Regulators ,Fixed voltage Regulators(78XX and 79XX),Variable Voltage Regulators (LM317 and CA723)

Waveform Generators and synthesizers

Oscillators using OP-AMP (RC –Phase shift and Wien Bridge oscillators),Monolithic Timer – NE555 Phase-Locked Loops, Monolithic PLLs

Text Books:

1. Linear integrated circuits(Analysis, Design & Application) : B. Somanathan Nair –Wiley India
2. OP-AMP and Linear IC's', Ramakant A.Gayakwad Prentice Hall / Pearson Education,1994.

Reference Books:

1. Operational Amplifiers and Linear Integrated circuits, Robert Coughlin and F Driscoll,sixth edition, Pearson Education Asia, 2001
2. Linear Integrated Circuits", D.Roy Choudhry, Shail Jain, New Age International Pvt.Ltd., 2000.
3. Op Amps and Linear Integrated circuits, James M. Fiore, First reprint, Thomson Asia Pte. Ltd.
4. Operational Amplifier and LICs' Bell (Oxford University Press)

MICROPROCESSOR LAB (EC – 311(P))

Course Code	**EC – 311(P)**	L-0, T-0, P-3	
Name of the Course	**MICROPROCESSOR LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

8085 Based

1 Addition and subtraction of two 8-bit numbers with programs based on different addressing modes of 8085A.
2 Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations.)
3 Addition and subtraction of two 16-bit BCD numbers. (using DAA instruction.)
4 Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
5 Division of two 8-bit numbers using the method of successive subtraction and shift & subtract.
6 Block transfer and block exchange of data bytes.
7 Finding the smallest and largest element in a block of data.
8 Arranging the elements of a block of data in ascending and descending order.
9 Converting 2 digit numbers to their equivalents.
a) BCD to HEX and b) HEX to BCD
10 Generating delays of different time intervals using delay subroutines and measurement of delay period on CRO using SOD pin of 8085A.
11 Generation of Fibonacci Series.

Application Based (Max 2)

1 Program controlled data transfer using 8255 PPI.
A) To INPUT data bytes from peripheral port and to store them in memory.
B) To OUTPUT data bytes from memory to peripheral port.
2 Study of interrupts by enabling them in main line program and then executing different subroutines when TRAP, RST 7.5, RST 6.5 & RST 5.5 are activated.
3 Interfacing 7 segment LED display using 8255A – in static and dynamic mode.
4 Interfacing ADC 0808/0809.
5 Interfacing DAC 0808.
6 Interfacing stepper motor with microprocessor using 8255A – in Half and Full excitation.
7 Interfacing of 8253 / 8254.

Communication System Lab-II EC-312(P)

Course Code	**EC – 312(P)**	L-0, T-0, P-3	
Name of the Course	**Communication System Lab-II**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:
1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. To study Time division multiplexing.
2. To study pulse code modulation and demodulation.
3. To study the different channel coding and decoding technique. .
4. Study of delta modulation and demodulation and observe effect of slope overload.
5. Study of pulse data coding techniques for NRZ formats.
6. Study of Data decoding techniques
7. Study of Manchester for NRZ formats. coding and Decoding.
8. Study of Amplitude shift keying modulator and demodulator.
9. Study of Frequency shift keying modulator and demodulator.
10. Study of Phase shift keying modulator and demodulator
11 Study of single bit error detection and correction using Hamming code.
12 Linear block codes-generation and detection
13 Experimentally compare different forms of BPSK, QPSK and analyze their spectrum with spectrum analyzer.

Note: All the practicals should also be performed on Kits and MAT LAB or PSpice.

POWER ELECTRONICS LAB (EC – 313(P))

Course Code	**EC – 222(P)**	L-0, T-0, P-2	
Name of the Course	**Electronic Measurement & measuring Instruments Lab**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:
1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. To draw the characteristics of SCR.
2. To draw the characteristics of DIAC.
3. To draw the characteristics of TRIAC.
4. To vary the speed of a dc motor with the help of an SCR.
5. Study of 1- phase AC to DC controlled converter(half controlled and full controlled).
6. .To control the firing angle of thyristor by varying
   i) dc bias alone
   ii) dc bias with superimposed ac.
7. To vary the firing angle of an SCR using a phase shift circuit and a peaking transformer.
8. To vary the frequency of an inverter circuit
9. To determine frequency of a relaxation oscillator for various values of C.
10. To obtain the average current of an SCR as a function of resistance**.**
11. Study of a Triac based single phase ac regulator and determination of Thyristor switching characteristics and pulse transformer characteristics
12. To Study of Thyristor based dc to dc converter (dc chopper).
13. To study MOSFET based dc to dc converter (buck, boost and buck-boost types with non-isolated output voltage.)
14. Study of switching characteristics of MOSFET and IGBT

SEMESTER-VI

PRINCIPLES OF MANAGEMENT AND CRITICAL THINKING (HS-301)

Course Code	**HS-301**	**L - 3, T- 0, P - 2**	
Name of Course	**Principles of Management and Critical Thinking**		
Lectures to be delivered	**65 (L-39, P-26 for each semester)**		
Semester End Examination	**MM: 100**	**Min. Marks; 40**	**Time Allowed: 3 Hrs.**
Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.			**MM: 50.**

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Course Objectives:

- To understand the roles and functions of managers at various (entry, middle and the top) levels
- To explain the relationships between organizational mission, goals, and objectives
- To comprehend the significance and necessity of managing stakeholders
- To conceptualize how internal and external environment shape organizations and their responses
- To demonstrate empirical understanding of various organizational processes and behaviours and the theories associated with them
- To demonstrate critical thinking skills in identifying ethical, global, and diversity issues in planning, organizing, controlling and leading functions of management
- To understand organizational design and structural issues

Learning Outcomes: On completion of this course the students should be able to:

- Describe the functions of management.
- Outline the historical theories relating to modern management.
- Explain the role of management within a business setting.
- Describe human resource planning and staffing processes needed to achieve optimal performance
- Prepare a business forecast and budget.
- Illustrate how business ethics and social responsibility apply to organizations.
- Describe formal and informal organizational communication processes and how to influence employees

SECTION A

Historical Perspectives of Management: **(6 Hours)**

- The behavioural approach to management
- The management science approach
- The contingency approach
- The system approach

Principles of Planning **(5 Hours)**

- Defining planning, Purposes of planning,
- Advantages and potential disadvantages of planning,
- Management by objectives, Planning tools,
- Strategic planning, Forecasting and budgeting

SECTION B

The Management Task **(4 Hours)**

- The Role of management,
- Defining management,
- The management process, management functions,
- Management goal attainment,
- Management and organizational resources

Fundamentals of Organizing **(5 Hours)**

- The definition of organizing
- The organizing process
- The organizing subsystem
- Classical organizing theory

SECTION C

Leadership and Effective Communication **(3 Hours)**

- Defining leadership; leader vs. manager,
- Leadership behaviours, Transformational Leadership,
- Coaching, Entrepreneurial leadership

Controlling for Productivity (**4 Hours)**

- Defining production and productivity,
- Quality and productivity, Operations management,
- Operations control, Using control tools to control organizations

SECTION D

Managerial Ethics and Social Responsibility **(6 Hours)**

- Fundamentals of social responsibility,
- Areas of corporate social responsibility,
- Social responsiveness and decision making,
- Influencing individuals performing social responsibility activities,
- A definition of ethics, Creating an ethical workplace

Making Good Business Decision **(6 Hours)**

- Types of decisions, Elements of the decision situation,
- The decision making process, Decision making conditions,
- Decision making tools, Processes for making group decisions

TEXT BOOKS:

1. Charles W. L. Hill and Steven McShane (2006) Principles of Management. McGraw-Hill/Irwin; 1st Edition. ISBN-10: 0073530123, ISBN-13: 978-0073530123
2. Moore & Parker, Critical Thinking, 9th ed. (McGraw-Hill, 2008) ISBN-13: 9780073386676

REFERENCE BOOKS:

1. Gary Dessler (2003). Management: Principles and Practices for Tomorrow's Leaders, Prentice Hall; 3rd Edition. ISBN-10: 0131009923, ISBN-13: 978-0131009929
2. Ellen A. Benowitz (2001). Principles of Management. Cliffs Notes. ISBN-10: 076456384X, ISBN-13: 978-0764563843
3. Griffin, Ricky W., Management seventh edition, Houghton Mifflin Company
4. Fisher, Alec. The Logic of Real Arguments (Second Edition). Cambridge: Cambridge University Press, 2004.

PRACTICAL CLASS DISCUSSION TOPICS

Some Basics: Issues, Claims, Arguments- Types & Structures, Clarity- Vagueness, Ambiguity, Credibility, Rhetoric, & Fallacies, Formal Deductive Logic, Deductive Arguments: Truth-Functional Logic

(a) Symbolization; (b) Truth Tables; (c) Long Truth Table Test; (d) Short Truth Table Test;
(e) Deductions w/Inference Rules; (f) Deductions w/Equivalence Rules

Left brain /right brain exercise, Truth and Knowledge, Good and Bad Reasoning, Inductive and Deductive Reasoning, Fallacious Reasoning, Psychological Impediments to Cogent Reasoning Truth, Belief, and the Leader/Follower Relationship.

MICROCONTROLLERS & EMBEDDED SYSTEMS EC-321

Course Code	EC-321	L-3, T-1, P-0	
Name of the Course	MICROCONTROLLERS & EMBEDDED SYSTEMS		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed

SECTION – A

Comparison of microprocessor and microcontroller. Architecture and pin functions of 8051 chip controller. CPU timing and machine cycles. Internal memory organization. Program counter and stack. Input/output prots. Counters and timers. Serial data input and output interrupts. Power saving modes.Hours

SECTION – B

Programming with 8051:

Instruction set, addressing modes. Immediate, registers, direct and indirect data movement and exchange instructions. Push and pop op-codes. Arithmetic and logic instructions, bit level operations, jump and call instructions, input/output port programming, programming timers, asynchronous serial data communications and hardware interrupt service routines interfacing of LCD display hex keyboard ADC0808. DAC0808 and stepper motor with 8051.

SECTION – C

Comparative study of salient features of 8051 and its derivatives like 89C51,89C52, 89C2051 and 89C2052. Current processor and controller survey. (cost, availability, popularity) 32-bit RISC Based ARM Architecture: Important features, Instruction set, Programming Examples, Core based Embedded Systems, Soft and Hard Cores, Xilinx FPGA architectures, 8-bit Pico blaze Microcontroller Core, 32-bit Micro blaze Soft Core, Power PC

SECTION – D

Introduction to Embedded systems : Embedded system examples, Parts of Embedded System-Processor, Power supply, clock, memory interface, interrupt, I/O ports, Buffers, Programmable Devices, ASIC,etc. interfacing with memory and I/O devices. Memory Technologies – EPROM, Flash, OTP, SRAM,DRAM, SDRAM etc

Embedded System Design: Embedded System product Development Life cycle (EDLC), Hardware development cycles- Specifications, Component selection, Schematic Design, PCB layout, fabrication and assembly. Product enclosure Design and Development.

Text Books:-

1 The 8051 Micro controller Architecture, programming &Applications : Kenneth J. Ayala.
2 An Embedded System Primer, Simon, David E., Pearson Education, (2005) 4th ed.
3 The Art of Programming Embedded Systems, Jack G. Ganssle, Academic press.
4 The 8051 microcontroller & embedded system, using assembly and C, .Mazidi & Mazidi 2nd edi, pearson edu.

Reference Books :

1. Crisp, introduction to microprocessor & microcontrollers, 2e Elsevier, 2007.
2 ARM system-on-chip architecture, 2e pearson education.

CONTROL SYSTEMS EC-322

Course Code	EC-322	L-3, T-1, P-0	
Name of the Course	Control Systems		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1 The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2 Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

General schematic diagram of control systems - open loop and closed loop systems – concept of feedback - modeling of continuous time systems – Review of Laplace transform - transfer function - block diagrams – signal flow graph - mason's gain formula - block diagram reduction using direct techniques and signal flow graphs - examples - derivation of transfer function of simple systems from physical relations - low pass RC filter - RLC series network - spring mass damper

Section B

Analysis of continuous time systems - time domain solution of first order systems – time constant - time domain solution of second order systems - determination of response for standard inputs using transfer functions - steady state error - concept of stability - Routh- Hurwitz techniques construction of bode diagrams - phase margin - gain margin - construction of root locus - polar plots and theory of nyquist criterion - theory of lag, lead and lag-lead compensators

Section C

Basic elements of a discrete time control system - sampling - sample and hold - Examples of sampled data systems – pulse transfer function - Review of Z-transforms - system function - mapping between s plane and z plane - analysis of discrete time systems –- examples - stability - Jury's criterion - bilinear transformation – stability analysis after bilinear transformation - Routh-Hurwitz techniques - construction of bode diagrams - phase margin - gain margin - digital redesign of continuous time systems

Section D

Introduction to the state variable concept - state space models - phase variable and diagonal forms from time domain - diagonalization - solution of state equations - homogenous and nonhomogenous cases - properties of state transition matrix - state space representation of discrete time systems - solution techniques - relation between transfer function and state space models for continuous and discrete cases - relation between poles and Eigen values – Controllability and observability

Text Books:

1 Control system Engineering 5th edition- Norman S.Nise Wiley India edition
2 Control systems Engineering. Dr Rajeev Gupta Wiley India

Reference Books:

1 Modern Control Engineering" Ogata K.,, Prentice Hall India,1994
2 Modern Control Systems", Dorf R.C. & Bishop R.H., Nineth Edition, Wesley,2001
3 Digital Control Systems", Second Edition Kuo B.C.,, Oxford University Press, 1992
4 Discrete Time Control Systems",1 Ogata K., Pearson Education, 2001
5 Control System Engineering", . Nagarath I.J. & Gopal M., Wiley Eastern Ltd,1995

ANTENNA & WAVE PROPAGATION EC-323

Course Code	EC-323	Credits-4	L-3, T-1, P-0
Name of the Course	ANTENNA & WAVE PROPAGATION		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

Antennas Basics

Introduction, Basic Antenna Parameters, Patterns, Beam Area (or Beam Solid Angle)ΩA, Radiation Intensity, Beam Efficiency, Directivity D and Gain G, Directivity and Resolution, Antenna Apertures, Effective Height, The radio Communication link, Fields from Oscillating Dipole, Single-to-NoiseRatio(SNR), Antenna Temperature, Antenna Impedance, Retarded Potential, Far Field due to an alternating current element, Power radiated by a current element, Field variation due to sinusoidal current distribution.

Point Sources and Their Arrays

Introduction, Point Source ,Power Theorem and its Application to an Isotropic Source, Radiation Intensity, Arrays of Two Isotropic Point Sources, Nonisotropic but Similar Point Sources and the Principle of Pattern Multiplication,Pattern Synthesis by Pattern Multiplication, Linear Arrays of n Isotropic Point Sources of Equal Amplitude and Spacing, Linear Broadside Arrays with Nonuniform Amplitude Distributions. General Considerations.

SECTION – B

Electric Dipoles, Thin Liner Antennas and Arrays of Dipoles and Apertures

The Short Electric Dipole, The Fields of a Short Dipole, Radiation Resistance of Short Electric Dipole, Thin Linear Antenna, Radiation Resistance of λ/2 Antenna, Array of Two Driven λ/2 Elements: Broadside Case and End-Fire Case,Horizontal Antennas Above a Plane Ground, Vertical Antennas Above a Plane Ground, Yagi-Uda Antenna Design, Long-Wire Antennas, folded Dipole Antennas. The Loop Antenna. Design and its Characteristic Properties, Application of Loop Antennas, Far Field Patterns of Circular Loop Antennas with Uniform Current, Slot Antennas, Horn Antennas, Helical Antennas, The Log-Periodic Antenna

SECTION – C

Reflector Antennas

Flat Sheet Reflectors, Corner Reflectors, The Parabola-General Properties, A comparison Between Parabolic and Corner Reflectors, The Paraboloidal Reflector, Patterns of Large Circular Apertures with Uniform Illumination, Reflector Types(summarized), Feed Methods for Parabolic Reflectors,

Antenna Measurements

Introduction, Antenna Measurement ranges, Radiation pattern Measurements, Gain and Directivity Measurements, Impedance Measurement, current measurement

SECTION – D

Ground Wave Propagation

Plane Earth Reflection, Space Wave and Surface Wave,

Space Wave Propagation

Introduction, Field Strength Relation, Effects of Imperfect Earth, Effects of Curvature of Earth,

Sky wave Propagation

Introduction structural Details of the ionosphere, Wave Propagation Mechanism,Refraction and Reflection of Sky Waves by ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation Between MUF and the Skip Distance, Multi-Hop Propagation, Wave Characteristics

Text Books

1 Antenna Theory, Ballanis John Wiley & Sons, (2003) 2nd ed.

2 E.C., Electro Magnetic Waves and Radiating Systems, Jordan and Balmain PHI, 1968 Reprint (2003) 3rd ed

Reference Books

1. Antennas, Kraus and RonalatoryMarhefka, John D., Tata McGraw-Hill Book Company, (2002)
2nd ed.

2 Antennas and Radio Propagation, . Collins, R. E McGraw-Hill, (1987)

3 J. D. Kraus, "Antennas, "McGraw Hill.

4. Antennas Theory and Design, C.A. Balanis, Raw & Harper.

Optical Communication EC-324

Course Code	EC-324	L-3, T-1, P-0	
Name of the Course	Optical Communication		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

Overview of Optical fiber communication system

Evolution of fiber optic system, advantages/disadvantages of optical fiber communication, elements of an optical fiber transmission link

Optical Fiber : Structure, wave guiding and fabrication

Electromagnetic waves , polarization, diffraction, reflection and refraction, total internal reflection, waveguides, light propagation in optical fiber, types of optical fiber, single mode step index fibers, mode field diameter, cut off wavelength, single mode graded index fibers, fibers materials, fabrication of optical fibers, fiber optic cable construction,

SECTION – B

Linear and Non-Linear effect in Optical Fibers

Linear effect in optical fiber, Dispersion, Non-Linear effect in fiber , scattering effects, Kerr effects , comparisons of Kerr and scattering effect,

Optical Sources

Semiconductors fundamentals, Light emitting diodes, Laser, Optical transmitter , optical connector, optical Splices,

SECTION C

Optical Receiver

Photo diodes, types of Photo diodes, Photo detector noise, optical receivers,

Optical Transmission System:concept and components

Point to point links, power budgeting , rise time budgeting, multichannel concept, WDM components, system performance parameters,

Optical Amplifiers

Basic applications of optical amplifiers, types of optical amplifier, semiconductor optical amplifiers, rare earth doped fiber amplifier, System application

SECTION D

Basic Instrumentation For Optical Measurements

Attenuation Measurements, optical power measurement, dispersion measurement, fiber numerical aperture measurement, bandwidth and data rate, optical spectrum analyser. Wavelength meter , optical tweezers,

Optical Sensors

Classification of the fiber optic sensors,intrinsic sensors, extrinsic sensors, intensity modulated sensors, phase modulated or interferometric sensors, wavelength modulated sensors

Text Books:

1. Fibre Optic Communication –system & components-Vivekanand Mishra ,Sunita P,Ugale – wiley -India.
2. Optical Fiber Communication - Gred Keiser Mc- Graw Hill Publication
3. Optical Fiber Communication - John Senior Prentice Hall of India Publication

Reference Books:

1. Fiber Optic Communication - Djafar K. Mynbarv, Lowell L. Scheiner
2. Optical Fiber Communication - Selvarajan, Subartkar, T. Srinivas Tata Mc-Graw Hill Publication
3. Fundamentals of Fibre Optics in Telecommunication and sensor System, Pal B.P., New Age International
4. Fiber Optic Communication, Agrawal, 3rd edi, Wiley
5. Fibre optics and Optoelectronics by Khare,Oxford University Press

Microwave & Radar Engineering EC 325

Course Code	EC-325	L-3, T-1, P-0	
Name of the Course	Microwave & Radar Engineering		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed

SECTION A

BASIC CONCEPTS

Introduction. Maxwell's Equations. Constitutive Relations. Static Fields. Wave Equation. Energy and Power. Boundary Conditions. Plane Waves. Dielectric Interface. Reflection from a Conducting Plane. Potential Theory. Solutions for VectorPotential. Lorentz Reciprocity Theorem.

TRANSMISSION LINES THEORY AND WAVEGUIDES

The Quarter-Wave Transformer. Generator and Load Mismatches. Impedance Matching with Reactive Elements. Single-Stub, Double-Stub, and Triple-Stub Matching. Lossy Transmission Lines.TEM, TE, TM Waves. Parallel-Plate, Rectangular, Circular Waveguides. Coaxial Line. Surface Waves on a Grounded Dielectric Slab.Coupled Strip Lines. Microstrip Transmission Line. Wave Velocity and Dispersion

SECTION B.

ACTIVE AND PASSIVE MICROWAVE DEVICES

Diodes. Microwave Transistors. Hetero junction Bipolar Transistor. Microwave FET. Noise in Microwave Circuits. Terminations. Attenuators. Phase Shifters. Directional Couplers. Hybrid Junctions. Power Dividers. Circulators.

MICROWAVE SEMICINDUCTOR DEVICES

Point Contact Diodes. Schottky Barrier Diodes. . PIN Diodes. Varactor Diodes. Tunnel Diodes. Gunn Devices. IMPATT Diode. Parametric Devices. Detectors and Mixers.

SECTION C

MICROWAVE TUBES

Introduction. Electron Beams with DC conditions:Ion-Neutralized Beam, Beam with Axially Confined Flow. Brillouin Flow. Space-Charge Waves on Beams with Confined Flow. Space- Charge Waves on Unfocused Beams. AC Power Relations. Velocity Modulation. Two-Cavity Klystron. Excitation of Cylindrical Cavity. Reflex Klystron. Magnetron. O-Type and M-Type Traveling Wave Tubes. Gyrotrons. Other Microwave Tubes.

MICROWAVE MEASUREMENTS

VSWR. Frequency. Power. Noise. Q-Factor. Impedance. Attenuation. Dielectric Constant.

SECTION D

Introduction Nature of Radar, Maximum Unambiguous Range, Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications Prediction of Range Performance, Minimum Detectable Signal,Receiver Noise and SNR Transmitter Power, PRF and Range Ambiguities, Doppler Effect CW and Frequency Modulated Radar MTI and Pulse Doppler Radar

Text Books :

1. Microwave Engineering,- Pozar, 3rd edi, Wiley India Edition
2 Radar PrinciplesPeyton Z. Peebles –Wiley India Edition
3 Microwave devices and Radar Engg: M.Kulkarni, Umesh**.**

Reference Books:

1. Collin, Foundation of Microwave Engineering, 2nd edi, Wiley
2. Microwave engineering passive circuits - Peter A. Rizzi PHI Publication
3. Microwave Devices and circuits - Samuel Liao PHI Publication
4. Microwave, Gupta K.C., New Age International
5. Microwave Engineering and Applications - O.P. Gandhi Pargamon Press publication

MICROCONTROLLER LAB EC-321(P)

Course Code	**EC – 321(P)**	L-0, T-0, P-2	
Name of the Course	**MICROCONTROLLER LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

With 8051microcontroller

1. **S**tudy of different types of microcontrollers (8 bit /16 bit/32 bit 8051/PIC/AVR/ARM).
2. Write a 'C' language Programme (ALP) to generate 10 kHz square wave.
3. To study implementation & interfacing of Display devices Like LCD, LED Bar graph & seven segment display with Microcontroller 8051/AT89C51
4. To study implementation & interfacing of Different motors like stepper motor, DC motor & servo Motors.
5. Write a programme for temperature & pressure measurement.
6. Write a program to interface a graphical LCD with 89C51.
7. To study Programming and Transmission & reception of data through Serial port & study of Parallel printer port.

With PIC Microcontroller

8. To interface PWM based voltage regulator using PIC Microcontroller.
9. Study and analysis of interfacing of Graphical LCD using PIC controller
10. Study and interfacing of IR (RC5 protocol) and RF Communication using PIC Controller
11. Study of SD/MMC card Interface using microcontroller
12. Study of Accelerometer card interface.

Using ARM Processor.

Experiments are to be performed on Proteus VSM Platform (any 4)

To design and test circuits

To design and test circuits on

1.LED blinking,
2.7segments display,
3.16x2 multiple character LCD,
4.Run stepper motor/ DC motor,
5.Implement square wave,
6.Temperature display using
7.Demonstration of traffic lights,
8.Speed control of motor

Implementations these codes on Embedded development studio (IAR -8051/AVR/ARM)

Control Engineering Lab EC-322(P)

Course Code	**EC – 322(P)**	L-0, T-0, P-2	
Name of the Course	**Control Engineering Lab**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. DC SPEED CONTROL SYSTEM

(a) To study D.C. speed control system on open loop and close loop.

(b) To study of Transient performance, another time signal is added at the input of control Circuit.

2. DC MOTOR POSITION CONTROL

(a) To study of potentiometer displacement constant on D.C. motor position control.

(b) To study of D. C. position control through continuous command.

(c) To study of D.C. position control through step command.

(d) To study of D.C. position control through Dynamic response.

3. AC MOTOR POSITION CONTROL

(a) To study of A.C. motor position control through continuous command.

(b) To study of error detector on A.C. motor position control through step command.

(c) To study of A.C. position control through dynamic response.

4. MAGNETIC AMPLIFIER

(a) To study Input / Output characteristic of a magnetic amplifier in mode (i) Saturable Reactor, (ii) Self Saturable Reactor.

5. SYNCHRO TRANSMITTER / RECEIVER

(a) To study of Synchro Transmitter in term of Position v/s Phase and voltage magnitude with respect to Rotor Voltage Magnitude/Phase.

(b) To study of remote position indication system using Synchro-transmitter/receiver.

6. LEAD LAG COMPENSATOR

(a) To study the open loop response on compensator.

(b) Close loop transient response.

7. LINEAR SYSTEM SIMULATOR

(a) Open loop response

(i) Error detector with gain, (ii) Time constant, (iii) Integrator

(b) Close loop system

(I) First order system (II) Second order system (III) Third order system

1. Introduction to MATLAB (Control System Toolbox), Implement at least any two experiment in MATLAB.
2. Different Toolboxes in MATLAB, Introduction to Control Systems Toolbox.
3. Determine transpose, inverse values of given matrix.
4. Plot the pole-zero configuration in s-plane for the given transfer function.
5. Determine the transfer function for given closed loop system in block diagram representation.
6. Plot unit step response of given transfer function and find peak overshoot, peak time.
7. Plot unit step response and to find rise time and delay time.
8. Plot locus of given transfer function, locate closed loop poles for different values of k.
9. Plot root locus of given transfer function and to find out S, Wd, Wn at given root & to discuss stability.
10. Plot bode plot of given transfer function.

Microwave & Optical Communication Lab EC-326(P)

Course Code	**EC – 326(P)**	L-0, T-0, P-2	
Name of the Course	**Microwave & Optical Communication Lab**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

Optical Lab:

1. Designing of optical transmitter by using different sources such as LED, White Light Source, CW Laser, VCSEL Laser etc.
2. Designing of optical Receiver by using different photodiode such as APD, PIN etc.
3. Designing of optical communication system by using various optical fibers such as single mode, multimode etc.
4. Study of various optical amplifiers such as Semiconductor optical amplifier (SOA), Erbium doped Amplifier (EDFA), etc.
5. Study of dispersion and noise in optical communication system.
6. Study of dispersion minimizes techniques such as Dispersion Compensated Fiber (DCF), Pre and post etc in optical communication system.
7. Designing of Wavelength division Multiplexing (WDM) Networks.
8. Designing of Free Space Optics (FSO) and Optical Wireless Communication (OWC) transmission Links.
9. Designing of hybrid Networks such as Orthogonal Frequency Division Multiplexing Access (OFDMA), Optical Code division multiple Access (OCDMA) etc.

Note: - Computer simulation software such as **Opti System** offers an affordable alternative "hands-on" experience. Using simulation software, a student can create a model of an optical system, execute the model and view measures of the system's performance. The system components can include DFB laser diodes, high-speed modulators, hundreds of kilometers of fiber, APD receivers and other optical and electrical components. The student can view the optical signals in the time or frequency domain, measure optical power and signal-to-noise ratio and much more. Students can also view the effects of parameter variations or find the optimal value of a parameter.

Microwave Experiment:-

1. Measurement of attenuation by substitution method
2. Measurement of impendence using slotted wave guide
3. Measurement of scattering parameters
4. Measurement of frequency using slotted wave guide.
5. Measurement of impedance using reflectometer
6. Measurement of Wavelength using reflectometer
7. Measurement of power
8. Measurement of VSWR

SEMESTER-VII

DIGITAL SYSTEM DESIGN USING HDL EC-412

Course Code	EC-412	L-3, T-1, P-0	
Name of the Course	DIGITAL SYSTEM DESIGN USING HDL		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2 .Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

INTRODUCTION: Introduction to VHDL, data objects, classes and data types, Operators, Overloading, Logical operators. Types of delays Entity and Architecture declaration. Introduction to behavioral, data flow and structural models. Integrated design process and methodology

VHDL STATEMENTS: Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements.

Application of Functions and Procedures, Structural Modeling, component declaration, structural layout and generies. Attributes, package, IEEE std, logic library, file I/O ,test bench

SECTION – B

VHDL and Digital Circuit Primitive

Flip-Flop, Latch, three state buffer, Combinational gates, VHDL synthesis rules,

Basic Combinational Circuits

Selector, Encoder, Code converter, Equality checker, Comparator with single output, Comparator with multiple outputs

Basic Binary Arithmetic Circuits

Half adder and Full adder, Carry Ripple adder, Carry look ahead adder, Barrel shifter

Basic Sequential Circuit

Signal manipulator, Counter, Shift register, Parallel to serial converter, serial to parallel converter

SECTION C

Registers: General framework for designing registers, interrupt registers, DMA and Control registers, Configuration register, reading registers, Register block partitioning and synthesis, Testing registers, microprocessor registers.

Clock and Reset circuits

Clock buffer and clock tree, Clock tree generation, Reset circuitry, Clock skew and Fixes, Synchronization between clock domains, Gated clock

Dual-Port RAM, FIFO, and DRAM Modeling

Dual-Port RAM, Synchronous FIFO, Asynchronous FIFO, Dynamic Random Access Memory (DRAM)

SECTION D

Finite Impulse Response Filter ASIC Design

Design description, Design partition, Design verification, Design synthesis, Worst case timing analysis, best case timing analysis, Net list generation, Post lay out verification, Design management

Microprogram Controller Design

Micro program controller, Design description and partition, Design verification, Design synthesis, Post synthesis timing verification, Preparing release functional vectors

Programmable logic devices: ROM, PLAs, PALs, CPLDs and FPGA. Design implementation using CPLDs and FPGAs.

Text Books:

1. Digital Design and Modelling with VHDLand Synthesis: KC Chang; Wiley India Edition.
2.Digital System Design using VHDL": Charles.H.Roth; PWS (1998)

REFERENCE BOOKS:

1. IEEE Standard VHDL Language Reference Manual (1993).
2 VHDL-Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
3. VHDL – IV Edition: Perry TMH (2002)
4. Introduction to Digital Systems": Ercegovac. Lang & Moreno; John Wiley (1999).
5. Fundamentals of Digital Logic with VHDL Design: Brown and Vranesic; TMH (2000).
6. A VHDL Primmer": Bhasker; Prentice Hall 1995

DIGITAL SIGNAL PROCESSING EC-413

Course Code	EC-413	L-3, T-1, P-0	
Name of the Course	DIGITAL SIGNAL PROCESSING		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Discrete – time signal analysis and linear systems: Signal analysis – signal characteristics – typical discrete – time signals – operation on signals – properties of linear time – invariant digital systems – Fourier transform relationship – sampling analog signals and sampling rate conversion. Z-transform; Properties of Z-transform-inverse, Z-transform – analysis of discrete time systems, convolution

Section B

Discrete Fourier transform (DFT) and inverse Discrete time Fourier Transform: properties – circular convolution. Fast Fourier Transform (FFT): Decimation-in-time (DIT) algorithm-decimation-in-frequency algorithm-FFT, Radix-2 DIT and DIF implementation

Section C

Digital filters: FIR Filters: Impulse response, Transfer function, Linear phase properties, Design: window Method , frequency sampling design chebyshev approximation Method. IIR Filters: Impulse response, Transfer function, Pole-zero representation; Butterworth, Chebyshev, inverse Chebyshev and elliptic filter concepts, Approximation problem for IIR filter design: Impulse in variance method, Bilinear transform method, Matched z-transform method, Minimum mean squared error method; Frequency transformations; Realization structures: Direct form 1 and 2.

. **Section D**

Wavelet Transform

Short Time fourier Transform(STFT) , Wavelet Transform , Haar wavelet & multi resolution Analysis Dauvechies wavelets Application of wavelet transform

Digital Signal Processors: Architecture and types of instructions, Addressing schemes and Interface details of one of the latest, commonly used Digital Signal Processors (e.g. Digital Signal Processors manufactured by Texas Instruments or Analog Devices.

Text Books

1 Digital Signal Processing –Shaila D. Apte- 2nd Edition Wiley India edition
2 Digital Signal Processing: Principles, Algorithms and Applications," . John G. Proakis, Dimitris

Reference Books:

1 Digital Signal Processing: A Computer Based Approach, Mitra S. K" McGraw-Hill Publishing Company, 1998.
2. Fundamentals of Digital Signal Processing," . Lonnie C. Ludeman John Wiley& Sons,
3. Introduction to Digital Filtering," R. E. Bogner, A. G. Constantinidis, John Wiley & Sons,
4. Digital Signal Processing: A Practical Approach," 2nd edn. Emmanuel C. Ifeacher, Barry W. Jervis, Pearson Education, 2004.

Wireless and Mobile Communication EC-414

Course Code :	EC-414	L-3, T-1, P-0	
Name of the Course	Wireless and Mobile Communication		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

Fundamentals of Wireless communication

Wireless communication system, wireless media, frequency spectrum, technologies in digital wireless communication coding, wireless communication channel specification , types of wireless communication system

Basics of Wireless Network

Wireless Networks, Wireless switching technologies, wireless communication problems, wireless network reference model, wireless networking issues, wireless networking standards,

Wireless Personal Area Networks

Wireless personal area network (WPAN), Network architecture, WPAN components, WPAN technologies and protocols

SECTION – B

Wireless Local Area Networks

Network Components, Design requirements of WLAN, Network architecture, WLAN standards, WLAN protocols, IEEE 802.11p, WLAN applications

Wireless Wide Area Networks

Cellular Networks, Satellite Networks, WLAN versus WWAN

Wireless Ad hoc Networks

Wireless Ad hoc Networks, mobile ad hoc networks, wireless sensor network, wireless mesh network, vehicular ad hoc networks (VANETS)

SECTION C

Introduction and Cellular Concept

Existing technology, Evolution in wireless systems, A basic cellular system Trends in cellular system ,Frequency Reuse cell splitting – sectoring, channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Cellular System ,Co-Channel Interference , Improving Coverage and Capacity in Cellular systems, Trunking and Grade of service ,call blocking in cellular networks

WIRELESS COMMUNIACTION SYSTEMS GSM

GSM Services and features , GSM Architecture and interfaces, GSM Radio Sub System , GSM Channel Types , Traffic Channels, Control Channels, Example of a GSM call, Frame structure for GSM , Signal Processing in GSM,GPRS

SECTION D

WIRELESS COMMUNIACTION SYSTEMS CDMA IS95

.Fundamental concepts of spread spectrum systems - pseudo noise sequence - performance of direct sequence spread spectrum systems - analysis of direct sequence spread spectrum systems - frequency hopped spread spectrum systems - time hopped spread spectrum systems

Multipath Signal Propagation and RAKE receiver, Frame Quality and BER Requirements, IS95 System,, CDMA IS95 call processing, soft hand off and powercontrol in CDMA,Access and Paging Channel Capacity, Reverse and Forward Link Capacity of a CDMA System

TEXT BOOKS

1Wireless and Mobile Networks :concepts and Protocols"- Dr. Sunil Kumar S.Manvi , Mahabaleshwar S. Kakkasageri-Wiley India edition

2 Mobile communication Systems- Krzysztof Wesolowski , Wiley India Edition

Reference Books:

1Wireless Communications, Principles and Practice, . Rapport Thoedore S., PHI, 2003
2.., Modern Wireless Communications, Haykin, S. and Moher M Prentice Hall 2005.
3 Wireless Digital Communications, . Kamilo Feher, PHI, 1995
4, Mobile Cellular Telecommunication, . Lee W.C.Y. MGH, 2002
5. Digital Communications, Proakis J.G., Third Edition, MGH,2001

CMOS & VLSI Design EC-415

Course Code :	EC-415	L-3, T-1, P-0	
Name of the Course	CMOS & VLSI Design		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

VLSI Design flow, Design Hierarchy, Regularity, Modularity and Locality, VLSI design styles, Design quality, Packaging technology.MOS device design equations, second order effects, the complementary CMOS Inverter DC characteristics.

Section B

Circuit Characterization and Performance Estimation: Parasitic effect in Integrated Circuits ,Resistance estimation, capacitance estimation, Inductance. Switching characteristics, CMOS - Gate transistor sizing ,Power dissipation, CMOS Logic Structures, Clocking Strategies.

Section C

CMOS Process Enhancement & Layout Considerations: Interconnect, circuit elements, Stick diagram, Layout design rules, Latch up, latch up triggering, latch up prevention, Technology related CAD issues. Subsystem Design: Structured design of combinational logic-parity generator, Multiplexer, code converters .Clocked sequential circuits-two phase clocking, charge storage, dynamic register element, dynamic shift register. Subsystem design process, Design of ALU subsystem, Adders, Multipliers. Commonly used storage/ memory elements.

Section D

Field Programmable Devices: Definitions of Relevant Terminology, Evolution of Programmable Logic Devices, User-Programmable Switch Technologies, Computer Aided Design (CAD) Flow for FPDs, Programmable Logic, Programmable Logic Structures, Programmable Interconnect, Reprogrammable Gate Array, Commercially Available SPLDs, CPLDs and FPGAs, Gate Array Design,Sea-of-Gates.

TEXT BOOKS:

1 Basic VLSI Design, D.A. Pucknell, K. Eshraghian PHI, 3rd Ed.
2. Introduction to VLSI Circuits and Systems, John P. Uyemura John Wiley & Sons.

Reference Books:

1.System Modeling & Simulation – Frank L. Severance John Wiley & Sons
2.CMOS Analog Circuit Design , Allen Holberg, (Oxford University press)

VLSI & HDL LAB EC-416(P)

Course Code	**EC-416(P)**	L-0, T-0, P-2	
Name of the Course	**VLSI & HDL LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENT

Using FPGA (Spartan 3) & CPLD kits

1) Design of all logic Gate.
1) Design of Half-Adder, Full Adder, Half Subtractor, Full Subtractor
2) Design a parity generator
3) Design a 4 Bit comparator
4) Design a RS & JK Flip flop
5) Design a 4: 1 Multiplexer
6) Design a 4 Bit Up / Down Counter with Loadable Count
7) Design a 3: 8 decoder
8) Design an 8 bit shift register
9) Implement ADC & DAC interface with FPGA
10) Implement a serial communication interface with FPGA
11) Implement a Telephone keypad interface with FPGA
12) Implement a VGA interface with FPGA
13) Implement a 4 digit seven segment display
14) Implementation a serial comm., based wireless devices GSM, RFID, Bluetooth etc
15). Microcomputer programming. design programs for microcontrollers in assembly language, with the use of different addressing modes, subroutines and stack operations, and interrupts.

Examples:

i) Hexadecimal addition of two numbers.
ii) Splitting a byte into nibbles.
iii) Hexadecimal multiplication of two numbers.
iv) Display letter ‗A' on dot matrix display.
v) Check the number for being odd or even

Suitable software Microwind / Mentor graphics / Tanner / XILINK etc

VLSI

1 Design and implementation of 4 bit adder using VHDL
2 Design and implementation of 1 bit ALU using VHDL and implementing and verifying the design in XILINX CPLD9572
3 Design and simulation of NMOS inverter using PSPICE
4 Design and simulation of CMOS inverter using PSPICE
5 Design and simulation of two input CMOS NAND gate using PSPICE
6 Design and simulation of two input CMOS NOR gate using PSPICE
7 Layout design of CMOS inverter.
8 Layout design of two input CMOS NOR gate.
9 One bit mirror adder using SPICE

DSP Lab EC-413(P)

Course Code	**EC-413(P)**	L-0, T-0, P-2	
Name of the Course	**DSP Lab**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:
1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

Perform the experiments using DSP Hardware Processor using Programmes in C Language:

1. To understand sampling theorem & generation of waveforms like sine, square & Triangle.
2. To study Quantization technique.
3. To study PCM encoding & Hamming code generation.
4. To Study Digital modulation techniques ASK/FSK& PSK.
5. To study FIR Filter Implementation.
6. To study Auto correlation & Linear convolution.

Experiments to be performed on MATLAB:

1. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
2. To develop program for discrete convolution and discrete correlation.
3. To design analog filter (low-pass, high pass, band-pass, band-stop).
4. To design digital IIR filters (low-pass, high pass, band-pass, band-stop).
5. To design FIR filters using windows technique.

Wireless Communication Lab EC-414(P)

Course Code	**EC-414(P)**	L-0, T-0, P-2	
Name of the Course	**Wireless Communication Lab**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:
1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. To operate GSM using various command set.
2. To interface microcontroller with GSM modem.
3. To operate the Bluetooth modem using various command set.
4. To interface microcontroller with Bluetooth modem.
5. To operate Zig-Bee using various command set.
6. To interface microcontroller with Zig-Bee modem.
7. To design a GSM based/Bluetooth based project.
8. To design WSN ne using ZIG Bee.
9. Design & develop the program based on application of RFID.
10. To study Theoretical & Practical hardware Training on Bluetooth.
11. To study and implement GSM/GPRS data monitoring and control system.

ELECTIVE-1

MICRO ELECTRONICS TECHNOLOGY EC-411(a)

Course Code :	EC-411(a)	L-3, T-1, P-0	
Name of the Course	MICRO ELECTRONICS TECHNOLOGY		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

Clean room concept, Growth of Single crystal silicon - Czochralski and Float zone method, wafer processing, cleaning and etching.

Physical vapour deposition ; Vacuum evaporation sputtering.

Chemical vapour deposition - APCVD, Plasma CVD, MOCVD.

SECTION B

Epitaxial growth : Liquid phase epitaxy, vapour phase epitaxy, Molecular beam epitaxy; Hetero epitaxy.

Oxidation - Growth mechanism and Kinetics of oxidation, oxidation techniques and systems, oxide properties, oxide induced defects.

Diffusion - Fick's equations; Atomic Diffusion mechanisms, Measurement techniques, Diffusion in Polysilicon and SiO2, Diffusion Systems.

SECTION C

Ion Implantation : Range Theory, Equipments, Annealing, Shallow junction, High energy implantation.

Lithography: Optical lithography; optical mask printing and making techniques, electron lithography, X-ray lithography.

Plasma Deposition and Etching: Plasma properties, plasma assisted depositions of Polysilicon, silicon dioxide and silicon nitrides; Reactive plasma Etching techniques and equipment; specific etch processes.

SECTION D

Metallisation : Metallisation Application, Patterning Interconnects, Multilayer metallisation, Measurement.

VLSI Process Integration : Fundamental considerations of IC technology, NMOS and CMOS IC processing; MOSMemory IC processing, Bi CMOS processing.

TEXT BOOKS:

1 VLSI Technology: S.M. Sze, McGraw-Hill Int. Ed

2 VLSI Fabrication Principles, S.K. Ghandhi John Wiley Inc., New York, 1983.2.

References

1 Silicon VLSI Technology, James Plummer, M. Deal and P. Griffin Prentice Hall Electronics andVLSI series, 2000.

2 The Science and Engineering of Microelectronics, Stephen Campbell Oxford University Press,1996

3 Principles of Microelectronics Technology - D. Nagchowdhury Wheeler Publishing

Biomedical Electronics EC-411(b)

Course Code :	EC-411(b)	L-3, T-1, P-0	
Name of the Course	Biomedical Electronics		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

Basic Concepts of Medical Instrumentation

Generalized medical instrumentation system, Medical measurement constraints, Classifications of Biomedical Instruments, Interfering and modifying inputs, Commercial medical instrumentation development process, regulation of medical devices.

Basic Sensors and Principles

Displacement Measurements, Resistive sensors, bridge circuits, inductive sensors, capacitive sensors, piezoelectric sensors, temperature measurements, thermocouples, thermistors, radiation thermometry, fiber optic temperature sensors, optical measurements, radiation sensors

SECTION – B

The Origin of Biopotentials

Electrical activity of excitable cells, Functional organization of the peripheral nervous system, The electroneurogram(ENG), The electromyogram(EMG), The electrocardiogram(ECG), The electroretinogram (ERG), The electroencephalogram(EEG), The magnetoencephlogram (MEG)

Biopotential Electrode

The electrode electrolyte interface, Polarisation, Polarizable and non polarizable electrodes, Electrode behavior and circuit models, Electrodes skin interface and motion artifact, Body surface recording electrode, Internal electrodes, Micro-electrodes, Electrodes for electric simulation of tissue

Biopotential Amplifiers

Basic requirement, The electrocardiograph, Amplifiers for other biopotential signals, Example of biopotential pre-amplifier, other biopotential signal processor, Cardiac monitor, Biotelemetry

SECTION C

Blood Pressure and Sound

Direct measurements, Harmonic analysis of Blood pressure waveform, Bandwidth requirement for measuring blood pressure, Heart sound, Phonocardiography, Cardiac Catheterization

Measurement of Flow and Volume of Blood

Indicator dilution method that uses continuous infusion, Indicator dilution method that uses rapid injection, Electromagnetic flow meter, Ultrasonic flow meters

Measurement of Respiratory System

Modeling of respiratory system, Measurement of gas flow rate, Respiratory plethysmography

Chemical Biosensor

Blood gas and acid base physiology, Electrochemical sensors, Chemical fibrosensors, Ion selective field effect transistor(ISFET), Immunologically sensitive field effect transistor(IMFET), Blood glucose sensor

SECTION D

Clinical Laboratory Instrumentation

Spectrophotometry, Chromatology, Electrophoresis, Hematology

Medical Imaging System

Computed radiography, Computed tomography, Magnetic resonance imaging

Therapeutic and Prosthetic Devices

Cardiac pacemakers and other electric stimulators, Defibrillators and cardioverters, Hemodialysis, Lithotripsy, Ventilators, Infant Incubator, Drug delivery devices, Surgical instruments

Electrical Safety

Physiological effects of electricity, Important susceptibility parameters, Distribution of electric power, microshock and macroshock hazards, Basic approaches to protection against shock, Protection: power distribution, Protection: Equipment design

TEXT BOOKS

1 Medical Instrumentation: Application and Design by John G.Webster, 3e wiley

Reference Books: -

1 Hand Book of Biomedical instrumentation - R.S. Khandpur (TMH)
2 Biomedical Electronics - Cromwell.,PHI
3 Biomedical Instruments Theory and design by Walter Welko Witiz

Peripheral System Design & Interfacing EC-411(c)

Course Code :	EC-411(c)	L-3, T-1, P-0	
Name of the Course	**Peripheral System Design & Interfacing**		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Bus systems in microcomputers, Multi bus, EISA, PCI Bus, HP IB/GPIB Bus, Bus and their applications. Interface Standard I/O interfaces RS-232 C, RS-232 D Centronics interface, current loop interface, and RS-449 communication interface.

Section B

Design criterion with PCs **:**Application of PC buses (ISA, EISA, PCI, VESA-VL) and associated signals, Handshakes, I/O and Interrupt map, Programming methodology for input/output application, GPIB signals and GPIB programming techniques operating system calls.

Section C

Peripherals like CRT controller, Communication controllers, DMA controller, Programmable keyboard/Display interfaces and Associated circuitries.

Section D

PID controllers, Programmable logic controllers, PC based data acquisition system, Interfacing PC to various cards- Stepper motor milli volts, Milliamps. Microprocessor development system, cross compilers, Simulator In circuit emulators, Automated test equipments etc.

Text Books :

1. Instrumentation for Engg. Measurement by James W. dally, William F. Riley, John Wiley and Sons

2 Intelligent Instrumentation by George C. Barney, PHI.

Reference Books:

1. Interfacing A Laboratory Approach by Deonzo, PHI

2. Student Reference Manual For Electronics Instrumentation Labs by Stanley wolf and Richard F.M. Smith, PHI.

Computer architecture & Organization EC-411(d)

Course Code :	EC-411(d)	L-3, T-1, P-0	
Name of the Course	Computer Architecture & Organization		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

Introduction

A brief history of computing, The Von Neumann model, system bus model, Level of machine

Data Representation

Fixed point numbers: range and precision in fixed point numbers, the associative law of algebra does not always hold in computers, radix number systems, conversion among radix, Floating point numbers: range and precision in floating point numbers, representing floating point numbers in computer –preliminaries, Error in floating point representation

SECTION – B

Arithmetic

Fixed –Point Addition and Subtraction: two's complement addition and subtraction, sign extension, hardware implementation of address and subtractors, one's complement addition and subtraction, Fixed point Multiplication and Division: unsigned multiplication, unsigned division, signed multiplication and division, Floating point Arithmetic: floating point addition and subtraction, High –performance Arithmetic: high-performance addition, high-performance multiplication, high-performance division, residue arithmetic

The Instruction Set Architecture

Hardware components of the instructions set architecture: the system bus model revisited, memory, the CPU, ARC,A RISC Computer:ARC memory, ARC registers, ARC assembly language format, The ARC instruction set, ARC instruction format, Pseudo-Operations, Synthetic instructions, Variations in machine architectures and addressing, performance of instruction set architectures, accessing data in memory-addressing modes

SECTION C

Data path and Control

Basics of microarchitecture, The datapath: datapath overview, The control section-microprogrammed: timing, developing the microprogram, traps and interrupts, nanaoprogramming, The control section-hardwired

Memory

The memory hierarchy, Random –access memory, Memory chip organization: Constructing large RAM'S from small RAM'S, commercial memory modules, read-only memory, flash memory, Cache memory: associative mapped cache, direct mapped cache, set-associative mapped cache, cache performance, hit ratios and effective, cache management, Virtual memory: overlays, paging, segmentation, protection, fragmentation, the translation lookaside buffer, Advanced topics: content addressable

SECTION D

Buses and Peripherals

Parallel bus architectures: bus structure, protocol and control, bus clocking, the synchronous bus, the asynchronous bus, bus arbitration-masters and slaves, Internal communication methodologies: programmed I/O, interrupt-driven I/O, direct memory access(DMA), Serial bus architectures:RS-232, universal serial bus, firewire, Mass storage: magnetic idsks, magnetic tape, optical disks

TEXT BOOKS

1. Computer Architecture and Organisation: An integrated approach by Miles Murdocca and Vincent Heuring, 2e wiley

2, Computer Organization - Hamacher C V 3rd Edition" , McGraw Hill., NewYork ,1990

References :

1 Computer Organization and Design Pal Chaudhary P , Prentice Hall, New Delhi.

2) Digital Computer Fundamentals ,Bartee T C McGraw Hill, New York, 1977.

3) Computer Organization and Architecture - Hayes J P- 2nd Edition ", Mc Graw Hill.

4 Structured Computer Organization - Anenbaum A S , 3rd Edition", Prentice Hall.

5 Microprocessors Architecture Programming and Applications Goankar John Wiley.

SEMESTER-VIII
INFORMATION THEORY AND CODING EC-422

Course Code	EC-422	L-3, T-1, P-0	
Name of the Course	INFORMATION THEORY AND CODING		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1 The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2 Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

Probability and Induction: Axioms of Probability, Set Theory, Probability Space, Conditional Probability, Repeated Trials, Combined Experiments, Bernoulli Trials, Bernoulli's Theorem, and Games of Chance, Concept of a Random Variables, Distribution and Density, Function Specific Random Variables, Conditional Distributions, Binomial Random Variables, Functions of One Random Variable, Its Distribution, Mean and Variance, Moments, Characteristic Functions; Bivariate Distributions, Two Functions of Two Random Variables, Joint Moments, Joint Characteristic Functions, Conditional Distributions, Conditional Expected Values, Normality, Stochastic Convergence and Center Limit Theorem.

SECTION – B

Stochastic Processes: Systems with Stochastic Inputs, Power Spectrum, Random Walks and Poisson Points, Cyclostationary Processes, Bandlimited Processes and Sampling Theory, Deterministic Signals in Noise Bispectra and System Identification, Poisson Sum Formula, Schwarz Inequality Problems, Spectral Representation of Random Processes, Factorization and Innovations, Finite-Order Systems and State Variables, Karhunen–Lo`eve Expansions, Ergodicity, Extrapolating Spectra and Youla'sParametrization, Minimum-Phase Functions, All-Pass Functions, Mean Square Estimation, Entropy, Maximum Entropy Method, Markov Chains, Higher Transition Probabilities and Chapman–Kolmogorov Equation, Stationary Distributions and Limiting Probabilities, Transient States and Absorption Probabilities, Branching Processes, Mixed Type Population of Constant Size, Structure of Periodic Chains.

SECTION – C

Basics of Information Theory: Unit of information, Rate of information, Joint entropy and conditional entropy, Mutual information, Shannon-Hartley Theorem, Bandwidth SNR trade off, Channel capacity calculations of different channels. Estimation & Hypothesis Testing: Time and Ensemble Averages, Covariance and Correction Functions. Simple binary hypothesis tests,

Decision Criteria, Neymanpearson tests, Bayes Criteria, Multiple Hypothesis testing, Composite hypothesis testing, Asymptotic Error rate of LRT for simple hypothesis testing

SECTION – D

Queueing Systems: Characteristics of Queueing Process, Birth-death process, Arrival and service, Steady state solution; M/G/1 and G/M/1, Occupancy distribution, Renewal theory, Waiting time and busy period, Series Queues, Jackson Networks, Cyclic Queues. Little's theorem, Modeling & analysis of M/M-/- queues, Burke's Theorem, Reversibility, Queues with vacations, Work conservation principle, Priority queues, Queues served in cyclic order, Fluid-flow and diffusion approximations

Source Coding: Coding efficiency, Shannon-Fano coding, Huffman coding, Lempel-Ziv adaptive coding.

Modern Channel Coding Techniques: Block coding, Convolution coding, Turbo coding, STBC, STTC, Soft-decoding, Hard-decoding and Viterbi decoder.

Text Books

1. Probability Random Variables and Stochastic Processes, Athanasios Papoulis McGraw-Hill (1984) 4th ed.
2. Queueing theory with applications to packet telecommunication Daigle, John N., Springer (2005) 2nd ed.
3., Digital Communications, . Proakis, John G McGraw-Hill (1995)3rd edition

Reference Books

1.., Probability, random variables, and random signal principles, Peebles, P.Z McGraw-Hill (1980) 2nd ed.
2, Gallager, Robert G., Data networks, . Bertsekas, Dimitri P. Prentice-Hall (1987) 4th ed.
3. Stochastic Processes, vol. I and II, Larson, A. and Schubert, B. O., Holden-Day (1979) 5th ed.
4. Stochastic Processes, Gardener, W McGraw Hill (1986) 2nd ed.

Principles of Soft Computing EC-423

Course Code :	EC-423	L-3, T-1, P-0	
Name of the Course	Principles of Soft Computing		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

Artificial Neural Network :An Introduction: Fundamental concept, evolution of neural networks, basic models of artificial neural network, important terminologies of ANNs: weights, bias, threshold, learning rate, momentum factor, vigilance parameter, notations, linear separability, Hebb network.

Supervised Learning Network : Perceptron networks: Theory, perceptron learning rule, architecture, flowchart for training process, perceptron training algorithm for single output classes, perceptron training algorithm for multiple output classes, perceptron network testing algorithm, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, Back-Propagation Network, Radial Basis Function Network.

SECTION – B

Associative Memory Networks: Training algorithms for pattern association, autoassociative memory network, heteroassociative memory network, bidirectional associating memory, Hopfield netwok, discrete Hopfield network

Unsupervised Learning networks: Introduction, fixed weight competitive nets, maxnet, Mexican hat net:architecture, flow chart, algorithm, Hamming networks: architecture and testing algorithm, Kohonen self organizing feature maps: theory, architecture, flow chart, training algorithm, Learning vector quantization: theory, architecture, flow chart, training algorithm.

SECTION C

Introduction to Fuzzy Logic, Classical sets and Fuzzy sets: Introduction to fuzzy logic, classical sets (crisp sets), operation of classical sets, union, intersection and difference, properties and function mapping of classical sets, fuzzy set operations, properties of fuzzy set.

Classical Relation and Fuzzy Relation: Cartesian product of relation and classical relation, fuzzy relations, tolerance and equivalence relations, Membership function: Introduction and features of membership function, Defuzzification, Fuzzy arithmetic and Fuzzy measures:

introduction, fuzzy arithmetic, fuzzy measure, belief and plausibility measures, probability measures, possibility and necessity measures, Fuzzy rule base and approximate reasoning: introduction, truth values and table in fuzzy logic formation of rules, decomposition of rules (compound rule)

SECTION D

Genetic Algorithm: Introduction, biological background, genetic algorithm and search space, Operators in genetic algorithm: encoding, selection, crossover (recombination), mutation, constraints in genetic algorithm, problem solving in genetic algorithm, The Schema theorem: the optimal allocation of trials, implicit parallelism, classification of genetical algorithm, Genetic programming: working and characteristics of genetic programming

Application of Soft Computing: A fusion approach of multispectral images with SAR, (synthetic aperture radar), optimization of travelling salesman problem using genetic algorithm approach, genetic algorithm based internet search technique, soft computing based rocket engine control.

TEXT BOOKS

1. Principles of soft computing By S.N Shivanandan, S.N Deepa, Wiley Indain Publishier
2 Simulation Modeling and analysis",4A.M.Law and W.David Kelton Mc Graw Hill Inc.,

REFERENCE BOOKS

1. "Simulation of communication systems", M.C.Jeruchim, Philip Balaban and K.Sam Shanmugam Plenum Press, New York,19922. Raj Jain,
2 The Art of Computer Systems Performance Analysis, John Wiley and Sons 19913. Jerry Banks and John S.Carson,
3 Discrete-event system Simulation ǁ, Prentice Hall, Inc., NewJersey,19844.

Computer Networks And Data Communication EC-424

Course Code :	EC-424	L-3, T-1, P-0	
Name of the Course	Computer Networks and Data Communication		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1 The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2 Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

General Principles of Network Design

Problems of physical data transmission, Problems of interaction among several computers, Generalized switching problems

Packet and Circuit Switching

Circuit switching, Packet switching

Network Architecture and Standardization

Introduction, Decomposition of network node interaction, OSI model, Network standardization

Transmission Links

Introduction, Taxonomy, Transmission link characteristics, Cable types

SECTION – B

Transmission Networks

PDH networks, SONET/SDH networks, DWDM networks

Ethernet

General characteristics of LAN protocol, CSMA/CD, Ethernet frame format, Ethernet physical medium specification, Fast Ethernet

Shared Media LAN'S

Token Ring, FDDI, Wireless LAN'S, PAN and Bluetooth, Shared media LAN equipment

SECTION C

Switched LAN'S Basics

Logical network structuring using bridges and switches, switches, Full duplex LAN protocol

Advance Features of Switched LAN'S

Spanning Tree Algorithm, Link aggregation in LAN'S, Virtual LAN'S

TCP/IP Internet Working

Addressing in TCP/IP networks, Address types of TCP/IP stack, IP address format, IP address assignment order, Mapping IP addresses to local addresses, DNS, DHCP

SECTION D

Internet Protocol

IP packet format, IP routing method, Routing using mask, Fragmentation of IP packets, IPV6,

Core protocol of TCP/IP stack

TCP and UDP transport layer protocol, Routing protocols, Internet control message protocol,

Advanced features of IP routers

Filtering, Routers

Wide Area Networks

Virtual circuit techniques, X.25 networks, ATM technologies, Methods of remote access, Virtual private network services, MPLS VPN

TEXT BOOKS

1. Computer Networks: Principles, technologies and protocols for network design by Natalia Olifer and Victor Olifer

Reference Books:

1. Computer Networks by Tenanbaum (3rd edition)
2. Data & Computer Communication by Black.
3 Data Communication and Networking by FORAUZAN

SOFT COMPUTING LAB EC-423(P)

Course Code	**EC-423(P)**	L-0, T-0, P-2	
Name of the Course	**SOFT COMPUTING LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. MATLAB Environment for soft computing techniques.
2. Write a program to implement AND function using ADALINE with bipolar inputs and outputs.
3. Write a MATLAB program to construct and test auto associative network for input vector using HEBB rule.
4. Write a MATLAB program to construct and test heteroassociative network for binary inputs and targets.
5. Write a MATLAB program to implement discrete Hopfield network and test the input pattern.
6. Write a MATLAB program to implement full counter propagation network for a given input pattern.
7. Implement a back propagation network for a given input pattern by a suitable MATLAB program. Perform 3 epochs of operation.
8. Write a program to implement ART 1 network for clustering input vectors with vigilance parameter.
9. Write a MATLAB program to create a feed forward network and perform batch training.
10. Consider a surface described by z=sin(x)cos(y) defined on a square -3<=x<=3, -3<=y<=3
    - Plot the surface z as a function of x and y
    - Design a neural network which will fit the data. You should study different alternatives and test the final result by studying the fitting error.
11. Write a MATLAB program to implement fuzzy set operation and properties.
12. Write a program to implement composition of Fuzzy and Crisp relations.
13. Find the fuzzy relation using fuzzy max-min method.
14. Write a MATLAB program for maximizing f(x)=x^2 using GA, where x is ranges from 0 to 31. Perform 5 iterations only.

DATA COMMUNICATION LAB EC-424(P)

Course Code	**EC-424(P)**	L-0, T-0, P-2	
Name of the Course	**DATA COMMUNICATION LAB**		
Lectures to be Delivered	26 hours of Lab sessions (2 hrs. per week)		
Semester End Examination	Max Marks:25	Min Pass Marks: 10	Maximum Time: 3 hrs
Continuous Assessment	Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20%		Max Marks:25

Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. To study different types of transmission media
2. To study Quadrature Phase Shift Keying Modulation.
3. To study Quadrature Amplitude Modulation.
4. To Study Serial Interface RS-232 and its applications.
5. To study the Parallel Interface Centronics and its applications.
6. To configure the modem of a computer.
7. To make inter-connections in cables for data communication in LAN.
8. To install LAN using Tree topology.
9. To install LAN using STAR topology.
10. To install LAN using Bus topology.
11. To install LAN using Token-Ring topology
12. Set up hardware for ISDN and Study of ISDN Instruments
    1. ISDN Telephone
    2. Terminal Adaptor (For the interface of Analog Telephone and PC)

ELECTIVE II

TV Engineering EC-421(a)

Course Code	EC-421(a)	L-3, T-1, P-0	
Name of the Course	Modelling & simulation of Communication System		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

FUNDAMENTALS OF TELEVISION

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.

SECTION B

MONOCHROME TELEVISION TRANSMITTER AND RECEIVER

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- DC re-insertion-Video amplifier circuits-Sync operation- typical sync processing circuits-Deflection current waveforms, Deflection oscillators- Frame deflection circuits- requirements- Line deflection circuits-EHT generation-Receiver antennas.

SECTION C

ESSENTIALS OF COLOUR TELEVISION

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- Gray scale trackingcolour signal transmission- Bandwidth-Modulation of colour difference signals-Weighting factors-Formation of chrominance signal.

SECTION D

COLOUR TELEVISION SYSTEMS

NTSC colour TV systems-SECAM system- PAL colour TV systems- Cancellation of phase errors-PAL-D Colour system-PAL coder-PAL-Decoder receiver-Chromo signal amplifier-separation of U and V signals-colour burst separation-Burst phase Discriminator-ACC amplifier-Reference Oscillator-Ident and colour killer circuits-U and V demodulators- Colour signal matrixing. Sound in TV

ADVANCED TELEVISION SYSTEMS

Satellite TV technology-Geo Stationary Satellites-Satellite Electronics-Domestic Broadcast System-Cable TV-Cable Signal Sources-Cable Signal Processing, Distribution & Scrambling-Video Recording- Video Disc recording and playback-DVD Players-Tele Text Signal coding and broadcast receiver- Digital television-Transmission and reception –Projection television-Flat panel display TV receivers-LCD and Plasma screen receivers-3DTV-EDTV. Introduction to Digital TV Technology and their merits , HDTV

TEXTBOOKS

1, “Monochrome Television Practice, Principles, Technology and servicing.” . R.R.Gulati Third Edition 2006, New Age International (P) Publishers.
2. Monochrome & Color Television, R.R.Gulati, New Age International Publisher, 2003.

REFERENCES

1., “Television and Video Engineering”, A.M Dhake 2nd ed., TMH, 2003.

2., Color Television, Theory and Practice, R.P.Bali Tata McGraw-Hill, 1994,

Modelling & Simulation of Communication system EC-421(b)

Course Code	EC-421(b)	L-3, T-1, P-0	
Name of the Course	Modelling & simulation of Communication System		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1 The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2 Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Simulation and Modeling Methodology, Review of Random Process: Univariate and multivariatemodels, Transformation of random variables, Bounds and approximation, Random process models -Markov and ARMA Sequences, Sampling rate for simulation.Random Number Generation, Testing Random Number Generators.Modeling of Transmitter and Receiver subsystems: Information sources, Radio frequency and opticalmodulation. Demodulation and detection, Multiplexing.

Section B

Communication channels and models: Fading and multipath channels, The Almost Free spacechannel, Conducting and Guided wave media, Finite state channel models.Estimation of parameters in simulation: Quality of an estimator, Estimating the average level of waveform, Estimating the power spectral density of a process.

Section C

Estimation of performance measures from simulation : Estimation of SNR, Estimating Performancemeasures for digital systems :The Monte Carlo Method , Importance sampling method. Review of Queuing models, Burke's theorem, Queuing Networks, Operational Laws, Mean value analysis , Hierarchical decomposition of Large Queuing networks: Queuing network model with aload dependent server.

Section D

Analysis of simulation Results: Model Verification Techniques, Model Validation Techniques,Transient Removal, Terminating Simulations , Stopping Criteria, Variance Reduction

Text Books :

1 Simulation of communication systems",. M.C. Jeruchim, Philip Balaban and K.Sam Shanmugam Plenum Press, New York,1992

2.,The Art of Computer Systems Performance Analysis, Raj Jain John Wiley and Sons 1991

Reference Books :

1, Discrete-event system Simulation Jerry Banks and John S.Carson Prentice Hall, Inc., New Jersey,1984

2 Simulation Modeling and analysis", A.M.Law and W.David Kelton Mc Graw Hill Inc., NewYork

Digital Image Processing EC-421(c)

Course Code :	EC-421(c)	L-3, T-1, P-0	
Name of the Course	Digital Image processing		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1 The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2 Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

Digital image representation: Basic ideas in digital image processing: problems and applications - Image representation and modeling Sampling and quantization - Basic relationships between pixels - Two dimensional systems - shift in variant linear systems - Separable functions; 2-D convolution; 2-D correlation.

Image perception - light, luminance, brightness and contrast - MTF of the visual system - visibility function - monochrome vision models - image fidelity criteria - colour representation - colour matching and reproduction - colour co-ordinate systems - colour difference measures - colour vision models.

SECTION B

Image transforms: 2-D Discrete Fourier transform - properties; Walsh Hadamard, Discrete Cosine, Haar and Slant transforms; The Hotelling transform. Matrix theory - block matrices and Kronecker products - Circulant matrix formulation for complexity reduction; Algebraic methods - random fields - spectral density function -

SECTION C

Image enhancement & Restoration: Image enhancement: Basic gray level transformations – Histogram processing: histogram equalization and modification - Spatial operations - Transforms operations - Multispectral image enhancement - Colour image enhancement

Image restoration: Degradation model; Restoration in presence of noise only – Estimating the degradation function - Inverse _filtering - Wiener _filtering – Constrained Least Squares filtering.

SECTION D

Image compression: Fundamental concepts of image compression - Compression models - Information theoretic perspective - Fundamental coding theorem – Lossless Compression: Huffman Coding- Arithmetic coding – Bit plane coding – Run length coding - Lossy compression: Transform coding – Image compression standards.

Image segmentation: Detection of Discontinuities – Edge linking and boundary Description: Local processing – Global processing – Hough transform – Thresholding – Region based segmentation.

Text Books:

1., "Digital Image Processing", Pratt W.K John Wiley, 1991
2., Digital Image Processing, R. C. Gonzalez, R. E. Woods Pearson Education. II Ed.,2002

. **Reference Books**

1. Digital image processing., . K. R. Castleman Prentice Hall, 1995.
2 Digital Pictures-Representation Compression and Standards", Netravalli A.N. & Hasbell B.G Plenum Press, New York, 1988.
3, Digital Picture Processing", Vol.1&2, Rosenfeld & Kak A.C Academic Press, 1982.

4 Two Dimensional Signal And Image Processing, Jae S. Lim, Prentice-Hall, Inc, 1990
5 Fundamentals of Digital Image Processing," . Jain A.K.,, Prentice-Hall, 1989

Satellite Communication EC-421(d)

Course Code :	EC-421(d)	L-3, T-1, P-0	
Name of the Course	Satellite Communication		
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

1 The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2 Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION A

Introduction to Satellite and Their Application

What is satellite, History of evolution of satellite, Evolution of launch vehicle, Future trends

Satellite Orbits and Trajectories

Definition of orbit and trajectory, Orbiting satellite: basic principle, Orbital parameter, Injection velocity and resulting satellite trajectories, Types of satellite orbits

Satellite launch and In-Orbit Operations

Acquiring the desired orbit, Satellite launch sequence, Orbital perturbations, Orbital effects on satellite performance, Eclipses, Look angle of satellite, Earth coverage and ground tracks

SECTION – B

Satellite Hardware

Satellite sub-systems, Mechanical structures, Propulsion sub-systems, Thermal control sub-system, Power supply sub-system, Attitude and orbit control, Tracking and telemetry and command sub-system, Pay load, Antenna sub-system, Space qualification and equipment reliability

Multiple Access Technique

Frequency Division Multiple Access(FDMA), SCPC systems, MCPC systems, Time Division Multiple Access(TDMA), TDMA frame structure, FDMA versus TDMA, Code Division Multiple Access(CDMA), Space domain Multiple Access(SDMA)

SECTION C

Satellite Link Design Fundamental

Transmission Equation, Satellite link parameters, Frequency consideration, Propagation consideration, Noise consideration, Interference related problem, Antenna gain to noise temperature(G/T) ratio

Earth Station

Earth station, Types of earth station, Earth station architecture, Earth station design consideration, Earth station testing, Earth station hardware, Satellite tracking, Some representative earth stations

SECTION D

Communication Satellites

Introduction to communication satellite, Communication related applications of satellites, Frequency bands, Pay loads, Satellite versus terrestrial networks, Satellite telephony, Satellite television, Satellite radio, Satellite data communication services, Important missions

Other Applications

Remote sensing satellites, Weather forecasting satellites, Navigation satellites, Scientific Satellites, Military Satellites

TEXT BOOKS:

1. Satellite Communications by Anil K. Maini, Varsha Aggarwal- Wiley & sons