SCHEME & SYLLABUS
2010

FOUR YEAR
B.TECH ELECTRICAL ENGINEERING PROGRAM

DEPARTMENT OF ELECTRICAL ENGINEERING

YMCA UNIVERSITY OF SCIENCE AND TECHNOLOGY
FARIDABAD-121006

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD
NEW SCHEME OF STUDIES AND EXAMINATION B-TECH 1st YEAR
(ELECTRICAL ENGINEERING) SEMESTER-I

CODE	COURSE TITLE	TEACHING SCHEDULE				INT.	EXAMINATION		TOTAL MARKS	Cr
		L	T	P	TOTAL		THEORY	PRACTICAL		
HAS-101	Physics-I	4	-	-	4	40	60	-	100	4
HAS-103	Mathematics-I	4	-	-	4	40	60	-	100	4
HAS-111	Essentials Of Communication	4	-	-	4	40	60	-	100	4
E-105	Electrical Technology	4	-	-	4	40	60	-	100	4
CE-101	Fundamentals Of Computer & Programming With C	4	-	-	4	40	60	-	100	4
MU-103	Engineering Drawing	-	-	4	4	60	-	40	100	2
HAS-109	Physics Lab-I	-	-	2	2	30	-	20	50	1
CE-103	Fundamentals Of Computer & Programming With C Lab	-	-	2	2	30	-	20	50	1
E-109	Electrical Technology Lab	-	-	2	2	30	-	20	50	1
WS-101	Workshop-I	-	-	8	8	60	-	40	100	4
	TOTAL	**20**	**0**	**18**	**38**	**410**	**300**	**140**	**850**	**29**

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD
NEW SCHEME OF STUDIES AND EXAMINATION B-TECH 1st YEAR
(ELECTRICAL ENGINEERING) SEMESTER-II

CODE	COURSE TITLE	TEACHING SCHEDULE				INT.	EXAMINATION		TOTAL MARKS	Cr
		L	T	P	TOTAL		THEORY	PRACTICAL		
HAS-102	Physics-II	4	-	-	4	40	60	-	100	4
HAS-104	Mathematics-II	4	-	-	4	40	60	-	100	4
MGMT-101	Fundamental Of Management	4	-	-	4	40	60	-	100	4
E-101	Elements Of Electronics Engg.	4	-	-	4	40	60	-	100	4
HAS-105	Chemistry	4	-	-	4	40	60	-	100	4
HAS-107	Environmental Studies	4	-	-	4	40	60	-	100	4
MU-101	Basics Of Mechanical Engineering	4	-	-	4	40	60	-	100	4
HAS-110	Physics Lab-II	-	-	2	2	30	-	20	50	1
MU-102	Basics Of Mechanical Engineering Lab	-	-	2	2	30	-	20	50	1
WS-102	Workshop-II	-	-	8	8	60	-	40	100	4
	TOTAL	**28**	**0**	**12**	**40**	**400**	**420**	**80**	**900**	**34**

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD NEW SCHEME OF STUDIES AND EXAMINATION B-TECH 2nd YEAR (ELECTRICAL ENGINEERING) SEMESTER-III

CODE	COURSE TITLE	TEACHING SCHEDULE				INT.	EXAMINATION		TOTAL MARKS	Cr
		L	T	P	TOTAL		THEORY	PRACTICAL		
HAS-201	Mathematics – III	4	-	-	4	40	60	-	100	4
E-203	Electrical Engineering Materials & Semiconductor Devices	4	-	-	4	40	60	-	100	4
E-205	Network Analysis And Synthesis	4	-	-	4	40	60	-	100	4
EL-207	Electrical Machines-I	4	-	-	4	40	60	-	100	4
E-209	Electrical Measurement And Measuring Instruments	4	-	-	4	40	60	-	100	4
E-211	Analog Electronics	4	-	-	4	40	60	-	100	4
E-213	Network Analysis And Synthesis Lab	-	-	2	2	30	-	20	50	1
EL-215	Electrical Machines-I Lab	-	-	2	2	30	-	20	50	1
E-217	Electrical Measurement And Measuring Instruments Lab	-	-	2	2	30	-	20	50	1
E-219	Analog Electronics Lab			2	2	30	-	20	50	1
EL-221	Workshop –III	-	-	8	8	120	-	80	200	4
	TOTAL	**24**	**0**	**16**	**40**	**480**	**360**	**160**	**1000**	**32**

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD
NEW SCHEME OF STUDIES AND EXAMINATION
B-TECH 2nd YEAR (ELECTRICAL ENGINEERING) SEMESTER-IV

CODE	COURSE TITLE	TEACHING SCHEDULE				INT.	EXAMINATION		TOTAL MARKS	Cr
		L	T	P	TOTAL		THEORY	PRACTICAL		
MGMT-201	Economics For Engineers	4	-	-	4	40	60	-	100	4
E-204	Electronics Instrumentation	4	-	-	4	40	60	-	100	4
E-206	Computational Techniques	4	-	-	4	40	60	-	100	4
E-208	Digital Electronics	4	-	-	4	40	60	-	100	4
EL-210	Electrical Machines-II	4	-	-	4	40	60	-	100	4
E-212	Electromagnetic Field Theory	4	-	-	4	40	60	-	100	4
E-214	Computational Technique Lab	-	-	2	2	30	-	20	50	1
E-216	Digital Electronics Lab	-	-	2	2	30	-	20	50	1
EL-218	Electrical Machine-II Lab	-	-	2	2	30	-	20	50	1
EL-220	Workshop-IV	-	-	10	10	150	-	100	250	5
	TOTAL	**24**	**-**	**16**	**40**	**480**	**360**	**160**	**1000**	**32**

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD NEW SCHEME OF STUDIES AND EXAMINATION B-TECH 3rd YEAR (ELECTRICAL ENGINEERING) SEMESTER-V

CODE	COURSE TITLE	TEACHING SCHEDULE				INT.	EXAMINATION		TOTAL MARKS	Cr
		L	T	P	TOTAL		THEORY	PRACTICAL		
EL-301	Electrical Machine-III	4	-	-	4	40	60	-	100	4
EL-303	Principle Of Communication Engg.	4	-	-	4	40	60	-	100	4
E-305	Analog Electronic Circuits	4	-	-	4	40	60	-	100	4
EL-307	Power System-I	4	-	-	4	40	60	-	100	4
E-309	Power Electronics	4	-	-	4	40	60	-	100	4
E-311	Microprocessors And Interfacing	4	-	-	4	40	60	-	100	4
EL-313	Electrical Machine-III Lab	-	-	2	2	30	-	20	50	1
EL-315	Power Electronics Lab	-	-	2	2	30	-	20	50	1
E-317	Microprocessors And Interfacing Lab	-	-	2	2	30	-	20	50	1
E-319	Analog Electronics Circuit Lab	-	-	2	2	30	-	20	50	1
EL-321	Workshop-V	-	-	8	8	120	-	80	200	4
	TOTAL	**24**	**-**	**16**	**40**	**480**	**360**	**160**	**1000**	**32**

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD
NEW SCHEME OF STUDIES AND EXAMINATION
B-TECH 3rd YEAR (ELECTRICAL ENGINEERING) SEMESTER-VI

CODE	COURSE TITLE	TEACHING SCHEDULE				INT.	EXAMINATION		TOTAL MARKS	Cr
		L	T	P	TOTAL		THEORY	PRACTICAL		
E-302	Digital System Design	4	-	-	4	40	60	-	100	4
EL-304	Control Sytems Engg.	4	-	-	4	40	60	-	100	4
EL-306	Conventional & Cad Of Electric Machine	4	-	-	4	40	60	-	100	4
EL-308	Advanced Microprocessor & Microcontroller	4	-	-	4	40	60	-	100	4
EL-310	Electric Power Generation	4	-	-	4	40	60	-	100	4
EL-312	Power System-II	4	-	-	4	40	60	-	100	4
EL-314	Control Systems Engg. Lab	-	-	2	2	30	-	20	50	1
EL-316	Advanced Microprocessor & Microcontroller Lab	-	-	2	2	30	-	20	50	1
E-318	Digital System Design Lab	-	-	2	2	30	-	20	50	1
EL-320	Power System Lab	-	-	2	2	30	-	20	50	1
EL-322	Workshop-VI	-	-	8	8	120	-	80	200	4
	TOTAL	**24**	**-**	**16**	**40**	**480**	**360**	**160**	**1000**	**32**

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD NEW SCHEME OF STUDIES AND EXAMINATION B-TECH 4th YEAR (ELECTRICAL ENGINEERING) SEMESTER-VII

COURSE NO.	COURSE TITLE	TEACHING SCHEDULE				EXAMINATION		TOTAL MARKS	CREDITS
		L	T	P	TOTAL	INT.	EXT.		
E-401	Industrial Training	8 Hr/Day				300	200	500	10

A) Procedure For Annual Examination And Marks.

1. Project Evaluation 50marks
2. Project Seminar 50Marks **200**
3. Project Viva 100 Marks

B) Continuous Assessment Marks

1. Assessment By Institute Faculty 100Marks.
2. Assessment By Industrial Guide 150Marks. **300**
3. Conduct Marks 50Marks.

TOTAL **500**

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD NEW SCHEME OF STUDIES AND EXAMINATION B-TECH 4th YEAR (ELECTRICAL ENGINEERING) SEMESTER-VIII

CODE	COURSE TITLE	TEACHING SCHEDULE				INT.	EXAMINATION		TOTAL MARKS	Cr
		L	T	P	TOTAL		THEORY	PRACTICAL		
E-402	Digital Signal Processing	4	-	-	4	40	60	-	100	4
EL-404	Electric Drives	4	-	-	4	40	60	-	100	4
EL-406	Power System Operation And Control	4	-	-	4	40	60	-	100	4
EL-408/ EL-426	Advanced Control System/Power System Stability And Facts	4	-	-	4	40	60	-	100	4
EL-410	Computer Applications To Power System	4	-	-	4	40	60	-`	100	4
EL-412/ EL-414	Utilization Of Electrical Energy/ High Voltage Engineering	4	-	-	4	40	60	-	100	4
E-416	Digital Signal Processing Lab	-	-	2	2	30	-	20	50	1
EL-418	Electric Drives Lab	-	-	2	2	30	-	20	50	1
EL-420	Major Project	-	-	4	4	60	-	40	100	2
EL-424	Workshop-VIII	-	-	8	8	120	-	80	200	4
	TOTAL	**24**	**-**	**16**	**40**	**480**	**360**	**160**	**1000**	**32**

HAS-101 PHYSICS

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

Part –A

UNIT-I-INTERFERENCE

Coherent sources, conditions for sustained interference. Division of Wave-Front - Fresnel's Biprism, Division of Amplitude- Wedge-shaped film, Newton's Rings, Michelson Interferometer, applications (Resolution of closely spaced spectral lines, determination of wavelengths).

UNIT-II-DIFFRACTION

Difference between interference and diffraction Fraunhofer and Fresnel diffraction. Fraunhofer diffraction through a single slit, Plane transmission diffraction grating, absent spectra, dispersive power, resolving power and Rayleigh criterion of resolution.

Part- B

UNIT-III-POLARISATION

Polarised and unpolarised light, Uniaxial crystals double refraction, Nicol prism, quarter and half wave plates, Detection and Production of different types of polarized light, Polarimetry; Optical and specific rotation, Biquartz and Laurent's half shade polarimeter.

UNIT-IV-LASER

Spontaneous and Stimulated emission, Laser action, characteristics of laser beam-concept of coherence , spatial and temporal coherence , He-Ne and semiconductor lasers (simple ideas), applications

Part -C

UNIT-V-FIBRE OPTICS

Propagation of light in optical fibres, numerical aperture, V-number, single and multimode fibres, attenuation, dispersion, applications

UNIT-VI-DIELECTRICS

Molecular theory, polarization, displacement vector, electric susceptibility, dielectric coefficient, permittivity & various relations between these, Gauss's law in the presence of a dielectric, Energy stored in a uniform electric field, concept of local molecular fields and Claussius Mossotti relation.

Part-D

UNIT-VII-SPECIAL THEORY OF RELATIVITY

Michelson's Morley Experiment, Postulates of Special Theory of Relativity, Lorentz transformations, Consequences of LT (length contraction and time dilation), addition of velocities, variation of mass with velocity, mass energy equivalence.

UNIT-VIII-SUPERCONDUCTIVITY

Introduction (Experimental survey), Meissner effect, London equations, Hard and Soft superconductors, Elements of BCS Theory

Text Books :

1. Perspectives of Modern Physics - Arthur Beiser (TMH)
2. Optics - Ajoy Ghatak (TMH)
3. Modern Physics for Engineers – S.P.Taneja (R. Chand)
4. Engineering Physics – SatyaPrakash (Pragati Prakashan)
5. Modern Engineering Physics – A.S.Vasudeva (S. Chand)

Reference Books :

1. Fundamentals of Physics – Resnick & Halliday (Asian Book)
2. Introduction to Electrodynamics – D.J. Griffith (Prentice Hall)

HAS-103 MATHEMATICS-1

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

Part-A

UNIT-I- MATRICS AND ITS APPLICATIONS

Rank of a matrix, Normal form, Inverse using Gauss-Jordon method, orthogonal transformation, Linear-dependence and Linear- Independence of Vectors, Eigen-Values and its properties, Eigen-vectors, Cayley-Hamilton theorem & its applications.

Part-B

UNIT-II-APPLICATIONS OF DERIVATIVES

Taylor‘s & Maclaurin‘s Series for one variable, Asymptotes, Curvature, Radius of Curvature for Cartesian, parametric and polar-curves, Radius of curvature at the origin (by using Newton‘s method, by method of expansion).

UNIT-III-PARTIAL DIFFERENTIATION AND ITS APPLICATIONS

Functions of two or more variables ,Partial derivatives of Ist and higher order, Total differential and differentiability, Homogeneous functions Euler‘s theorem, Derivatives of composite and implicit functions Jacobians, Taylor‘s series for functions of two variables ,Maxima-Minima of functions of two variables. Lagrange‘s Method of undetermined multipliers.

Part-C

UNIT-IV-DOUBLE AND TRIPLE INTEGRATIONS

Double integral, Change of Order of Integration, Double integral in polar co-ordinates, Applications of double integral to find (i) Area enclosed by plane curves (ii)Volume of solids of revolution, Triple Integal, Change of variables ,Volume of solids, Beta & Gamma functions and relation between them.

UNIT-V-INFINITE SERIES

Convergence and divergence of infinite series, Comparison Test , D‘Alembert‘s Ratio Test, Gauss Test, Raabe‘s test, Logrithmic Test, Cauchy‘s Root Test, Alternating series, Conditional convergence & absolute convergence.

Text Books:

1. B.S.Grewal,Engg. Mathematics
2. H.C.Taneja ,Engg. Mathematics
3. R.S. Goyal,Engg. Mathematics
4. Babu Ram , Engg. Mathematics

HAS-111 ESSENTIALS OF COMMUNICATION

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

UNIT-I- LITERATURE

Science fiction _Reason‘; The Discovery by Herman Ould; _Three Questions‘ by Leo Tolstoy, _Metamorphoses‘ by Franz Kafka; Excerpt from _Gitanjali‘

UNIT-II- SEMANTICS AND SYNTAX

Words often Confused; Synonyms and Antonyms; One –word Substitutes; Homophones And Homonyms; Idioms; Correct the sentences

UNIT-III- COMPOSITION/WRITING:

Paragraph; Case Study; Reports; Dialogue; Creative/Analytical Writing; Unseen Passage; Precis

UNIT-IV- PHONETICS

IPA, Transcription, Use of Phonetic Dictionary, Definitions of Vowels, Consonants

UNIT-V- INTERNAL ASSESSMENT:
Newspaper scrap book/Case Study of any great engineering enterprise; Group Discussion; Debate/Declamation

Text Book:

Selection of stories from I, Robot by Issac Asimov. Harper Collins. 1996 Notes/ Masterial provided by the teacher
Bande Usha and Krishan Gopal ed. The Pointed Vision: An Anthology of Short Stories. Oxford P: Kadyan Asha ed. Chronicles of Time: An Anthology of Poems: Oxford UP.2004.

Reference Books:

1. Communication English. ESuresh Kumar, P Sreehari (University College of Engineering,Hyderabad) Orient Longman,2007.
2. Cambridge Phonetic Dictionary CDs(I-IV)
3. Oxford Idioms Dictionary for Learners of English. Oxford University Press.2001
4. Oxford Paperback Dictionary and Thesaurus & Wordpower Guide. Oxford University Press.2001

E-105 ELECTRICAL TECHNOLOGY

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

UNIT-I- DC CIRCUITS
Introduction of electric circuit, ohm‘s law, limitations of ohm‘s law, ideal, Practical and dependent sources and their characteristics, Source transformation, Voltage and Current division, Kirchhoff‘s Voltage law and Kirchhoff‘s Current law; Mesh and Nodal analysis

UNIT-II- AC FUNDAMENTAL
Production of alternating voltage or current, phasor representation of alternating quantity, Instantaneous, Peak, Average and RMS values of periodic waveforms; Peak factor, Form factor; pure R,L & C in AC circuit, j notation and concept of phasor, active, reactive and apparent power, Power factor

UNIT-III- MAGNETIC CIRCUITS
Magnetic Circuits, Magnetic Materials and their properties, static and dynamic emfs and force on current carrying conductor, AC operation of Magnetic Circuits, Hysteresis and Eddy current losses.

UNIT-IV- NETWORK THEOREMS
Superposition, Thevenin‘s and Norton‘s, Reciprocity, Compensation, Maximum Power transfer, Tellegan‘s and Millman‘s theorems, Application of theorems to dc and ac circuits

UNIT-V-AC CIRCUITS
AC series circuit RL, RC, and RLC, AC parallel circuits, combination of series and parallel circuits, Series and Parallel resonance, selectivity, bandwidth and Q factor, earthing

UNIT-VI-POLYPHASE SYSTEMS
Advantages of 3-phase systems, generation of 3-phase voltages; phase sequence; star & delta connections; interconnection of 3-phase sources and loads; voltage, current & power in star & delta connected systems, analysis of 3-phase balanced circuits, measurement of 3-phase power- 2 wattmeter method, effect of power factor on wattmeter reading

UNIT-VII-ELECTRICAL MACHINES
Introduction to transformer, DC machines, induction motor, synchronous machines; Principle, construction and working

Text Book:

1. Basic Electrical Engineering by Kothari & Nagrath TMH
2. Principle of electrical Engg. By V. Del Toro Printice Hall
3. Electrical Technology by B L Thereja S.Chand

MU-103 ENGINEERING DRAWING

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I-INTRODUCTION
Importance, Significance and scope of Engineering Drawing, Lattering, Dimensioning, Scales, Sense of proportioning, different types of projections, orthographic projections, B.I.S Specifications.

UNIT-II-PROJECTION OF POINTS & LINE
Introduction of plain of plane of projection, reference & auxiliary plane, projection of points and line in different quadrants, traces, inclinations & true lengths of the lines, projections on auxiliary plane, shortest distance intersecting and nonintersecting lines.

UNIT-III-PROJECTION OF PLANES
Parallel to one reference plane, inclined to one plane but perpendicular to the other, inclined to both reference planes.

UNIT-IV-PROJECTION OF SOLIDS
Projection of Polyhedra, solids of revolution-in simple positions with axis perpendicular to a plane, with axis parallel to both planes, with axis parallel to one plane and inclined to the other, projection of section of prisms, pyramids, cylinders and cones.

UNIT-V-DEVELOPMENT OF SURFACE
Development of simple object with and without sectioning

UNIT-VI-ISOMETRIC PROJECTION
Introduction, isometric scale, Isometric view of plane figure, prisms, pyramids and cylinders

UNIT-VII-ORTHOGRAPHIC DRAWINGS
Orthographic drawings of machines components and Nuts, Bolted Joints, Screw threads, Screw joints

CE-101 FUNDAMENTALS OF COMPUTER & PROGRAMMING IN C

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT –1- AN OVERVIEW OF COMPUTER SYSTEM AND OPERATING SYSTEMS
Fundamentals: Evolution of computers, Hardware organization of a computer. Introduction to microprocessors, generation of microprocessors, commonly used CPUs.
Input/Output Devices, Input/output ports and connectors.
Different Number Systems:- Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, and their inter- conversions.
Operating System Basics: Introduction to Operating system, Functions of an Operating Systems, Classification of Operating Systems, Basic introduction to DOS, UNIX/LINUX OS, Windows XP, working with Windows.Introduction to computer viruses.

UNIT-2- BASIC INTRODUCTION TO PROGRAMMING LANGUAGES

Machine Language, Assembly Languages, High level Languages, Types of high level languages, Complier, Interpreter, Assembler, Loader, Linker, Relationship between Compiler, Loader and Linker.

UNIT-3- BASIC INTRODUCTION TO COMPUTER NETWORKS

Data Communication, modulation, Network devices, LAN, LAN topologies, WAN, OSI Reference model Introduction to Internet and protocols: TCP/IP ref. model, Backbone network, Network connecting devices. Hypertext documents, HTTP, DNS, Network Security.

UNIT-4- AN OVERVIEW OF C

Constants, Variables and Data types, operators and Expressions, managing I/O operations, Decision Making and branching, Decision Making and looping, Arrays, Character Arrays and Strings, User Defined Functions

UNIT-5-STRUCTURE AND UNION IN C

Defining structure, declaring variables, Accessing structure members, structure initialization, copying and comparing structures variables, operations on individual members, Array of structure, structure with structure, unions, size of structure.

UNIT-6-POINTERS IN C

Introduction, Understanding Pointers, Accessing the address of a variable, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a variable through its pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factors, pointers and Arrays, Pointer and Character Strings, Arrays of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers to Functions

UNIT-7- DYNAMIC MEMORY ALLOCATION AND FILE MANAGEMENT IN C

Introduction, Dynamic memory allocation, allocating a block of memory: Malloc, allocating multiple blocks of memory: Calloc. Releasing the used space: Free, Altering the size of block: Realloc, Defining and opening file, closing file, I/O operation on files, error handling during I/O operations, Random Access to files and command line arguments.

Text Books:

1. Fundamental of Information Technology by A.Leon & M.Leon.
2. UNIX Concepts and Application(4/e) by Sumitabha Das
3. Programming Languages (4th Edition) by Pratt IW
4. Fundamentals of Computers and Programming with C by A. K. Sharma Dhanpat Rai publications
5. Computer Networks (4th Edition) by Andrew S. Tanenbaum

Reference Books:

1. Digital Principles and Application by Donald Peach, Albert Paul Malvino
2. Operating System Concepts, (6th Edition) by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne.

HAS-109 PHYSICS LAB-I

L	P	Cr	INTERNAL:30
0	2	1	EXTERNAL:20
			TOTAL:50

1. To find the wavelength of sodium light by Newton's rings experiment.
2. To find the wavelength of sodium light by Fresnel's biprism experiment.
3. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
4. To find the refractive index and cauchy's constants of a prism by using spectrometer.
5. To find the wavelength of sodium light by Michelson interferometer.
6. To find the resolving power of a telescope.
7. To find the pitch of a screw using He-Ne laser
8. To find the specific rotation of sugar solution by using a polarimeter.
9. To compare the capacitances of two capacitors by De'sauty bridge and hence to find the dielectric constant of a medium.
10. To find the flashing and quenching potentials of Argon and also to find the capacitance of unknown

capacitor.

11. To study the photoconducting cell and hence to verify the inverse square law.
12. To find the temperature co-efficient of resistance by using platinum resistance thermometer and Callender and Griffith bridge.
13. To find the frequency of A.C. mains by using sonometer.
14. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.

Note : The experiments in Ist semester will be based mainly upon Optics, Electrostatics. Students will be required to perform at least 10 experiments out of the list.

CE- 103 FUNDAMENTALS OF COMPUTER & PROGRAMMING WITH C LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Write a program to add, subtract, multiply and divide two numbers using menu driven program.
2. Write a program to find the largest of three numbers.(using if-then-else)
3. Write a program to find the largest number out of ten numbers (using for- statement)
4. Write a program to find the average mail height & Average female heights in the class(input is in the form of sex code, height) .
5. Write a program to find roots of quadratic equation using functions.
6. Write a program using arrays to find the largest and second largest number out of given numbers using bubble sort.
7. Write a program to multiply two matrices
8. Write a program to read a string and write it in reverse order.
9. Write a program to concatenate two strings.
10. Write a program to sort numbers using the Quicksort Algorithm.
11. Represent a deck of playing cards using arrays.
12. Write a program to check that the input string palindrome or not. Education plus:
13. Write a program to calculate the length of the string
14. Write a program to find factorial of a number using function.
15. Write a program using structure to enter a list of books, their prices and number of pages.

E-109 ELECTRICAL TECHNOLOGY LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. To study various type of meters.
2. To verify KCL and KVL.
3. To verify Thevenin‘s theorem.
4. To Verify Maximum Power Transfer theorem.
5. To verify Superposition theorems.
6. To study frequency response of a series R-L-C circuit and determine resonant frequency& Q- factor for various values of R,L,C.
7. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q -Factor for various values of R,L,C.
8. To find inductance of coil without core and with U &I shape iron core.
9. To measure power and power factor in a 3-phase system by two wattmeter method.
10. To perform polarity test and find turn ratio of single phase transformer.

HAS-102 PHYSICS-II

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

Part –A

UNIT-1-CRYSTAL STRUCTURE

Space lattice, unit cell and translation vector, Miller indices, simple crystal structure.

Laue's treatment to Bragg's law, powder method, Point defects in solids – Schottky and Frenkel defects. Bonding in solids- Ionic and covalent bonds.

UNIT-II-QUANTUM PHYSICS

Difficulties with Classical physics, Introduction to quantum mechanics-simple concepts. Black Body radiations Discovery of Planck's constant, phase velocity and group velocity. Schrodinger wave equations-time dependent and time independent, Expectation value, Ehrnfest Theorem, particle in a one-dimensional box. Quantum Statistics (Bose-Einstein and Fermi-Dirac Statistics). Elementry ideas of quark, gluons and hadrons.

Part B

UNIT-III-NANO-SCIENCE

Features of nanosystems, concept of quantum size effect, quantum dots and their applications.

UNIT-IV-FREE ELECTRON THEORY

Elements of classical free electron theory and its limitations. Drude's theory of conduction , quantum theory of free electrons. Fermi level, density of states. Fermi-Dirac distribution function. Thermionic emission, Richardson's equation.

Part C

UNIT-V-BAND THEORY OF SOLIDS

Origin of energy bands, Kronig-Penny model (qualitative), E-K diagrams, Brillouin Zones,concept of effective mass and holes. Classification of solids into metals, semiconductors and insulators, Fermi energy and its variation with temperature, Hall Effect and its applications

UNIT-VI-PHOTOCONDUCTIVITY & PHOTOVOLTAICS

Photoconductivity in insulating crystal, variation with illumination, effect of traps, application of photoconductivity, photovoltaics cells, solar cell and its characteristics.

Part D

UNIT-VII-MAGNETIC PROPERTIES OF SOLIDS

Atomic magnetic moments, orbital diamagnetism, Classical theory of paramagnetism, ferromagnetism, molecular fields and domain hypothesis

Text Books :

1. Concepts of Modern Physics - Arthur Beiser (TMGH)
2. Solid State Physics – S.O.Pillai (New Age Int. Ltd. Pub.)
3. Modern Physics for Engineers – S.P.Taneja (R. Chand)
4. Engineering Physics – SatyaPrakash (Pragati Prakashan)
5. Modern Engineering Physics – A.S.Vasudeva (S. Chand)

Reference Books :

1. Introduction to Solid State Physics – Kittel (John Wiley)
2. Quantum Mechanics – A. Ghatak
3. ATextbook of Engineering Physics-Avadhanulu and Kshirsagar (S.Chand)

HAS-104 MATHEMATICS-II

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

Part-A

UNIT-I-ORDINARY DIFFERENTIAL EQUATION AND ITS APPLICATIONS

Exact differential Eqn.Of first order, Equations reducible to exact differential eqn., differential eqn.of second and higher order Complete solutions =C.F. + P.I, Method of variation of parameter to find P.I., Cauchy's and Legendre's linear Eqn., Simultaneous linear eqns.with constant co-efficient, Application of linear differential eqns.to Electric circuits.

Part-B

UNIT-II-LAPLACE-TRANSFORMS AND ITS APPLICATIONS

Laplace-transforms of elementary functions ,Properties of Laplace-transforms,Existance conditions, transforms of derivatives, Transforms of Integrals, Multiplications by t^n,division by t^n, Evaluation of integrals by Laplace – transforms,Laplace-transforms of Unit-step function,unit -impluse function and periodic function,Inverse transforms, Convolution theorem,App. to linear differential eqn.And simultaneous linear differential eqns with constant co-efficients.

UNIT-III-PARTIAL DIFFERENTIAL EQUATION AND ITS APPLICATIONS

Formation of partial-differential eqns. Lagrange's linear partial –differential eqns.,First order non-linear partial diff.Eqns.,Charpit's method.Homogeneous Partial-diff eqn.of second and higher order.

Part-C

UNIT-IV-VECTOR CALCULUS

Differentiation of vectors,scalar and Vector-point functions,Gradient of a scalar field and directional derivatives,divergence and curl of a vector field and their physical interpretations,Integration of vectors,line integral,Surface integral,Volume integral,Green's theorem,Stoke's theorem,Guass theorem and their simple applications.

Text Books:

5. B.S.Grewal,Engg. Mathematics
6. H.C.Taneja ,Engg. Mathematics
7. R.S. Goyal,Engg. Mathematics
8. Babu Ram , Engg. Mathematics

MGMT-101 FUNDAMENTAL OF MANAGEMENT

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

Unit I

Concept and significance of Management, Functions of management and their interrelationship, levels of Management and skills required at various levels, Management vs. Administration, Management as art, science or profession.

Unit II

Human Resource Management- Functions of HRM; Source of recruitment and selection process, Training needs and types, Motivation Theories – Maslow's need Hierarchy theory, Mc Gregor's Theory X and Y, Herzberg Theory.

Unit III

Marketing- Evolution of modern marketing concept, Functions of marketing management, Advertisement-Importance, choice of Media and criticism, Marketing mix, Marketing Research Process.

Unit IV

Production Management- Functions and scope of production management, Production Planning and Control- Stages of PPC, Meaning and methods of inventory control, Concept of TQM (In brief)

Unit V

Financial Management- Functions of Financial Management, Sources of finance, Factors effecting Capital Structure of a company.

Unit VI

Case Study (For Assignment Only)

Books

1. Gupta R. S., Sharma B.D., Bhalla N. S., Principle and Practices of Management, Kalyani Publishers
2. Chhabra T. N., Principles and Practices of Management, Dhanpat Rai & Co.
3. Prasad L. M., Principles and Practices of Management, Sultan Chand & Sons
4. Gupta C. B., Management (Theory and Practice), Sultan Chand & Sons

E-101 ELEMENTS OF ELECTRONICS ENGINEERING

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

Part- A

UNIT-I-SEMICONDUCTOR PHYSICS:

Basic concepts**,** Intrinsic and extrinsic semiconductors, diffusion and drift currents, p-n junction under open-circuit, reverse bias and forward-bias conditions, p-n junction in the breakdown region, Ideal diode, terminal characteristics of junction diode.

UNIT-II-AMPLIFIERS:

Introduction of different types of amplifiers and their characteristics, Principle of amplification, Frequency response of RC coupled amplifiers, amplifier bandwidth and Concept of Cascaded Amplifiers, Feedback amplifiers, Effect of positive and negative feedback on amplifier gain and bandwidth**.**

Part-B

UNIT-III-OSCILLATORS:

Criteria for oscillations, Qualitative analysis of LC, RC and Crystal Oscillators, Study of Wein Bridge Oscillators

UNIT-IV-OPERATIONAL AMPLIFIERS:

Op-amps, its characteristics and its applications.

UNIT-V-POWER SUPPLIES

Introduction and Working of Switched Mode Power Supply (SMPS), Voltage Regulator, Introduction to Inverters and UPS.

Part-C

UNIT-VI-DIGITAL ELECTRONICS:

Binary, Octal and Hexadecimal number systems and conversions, Boolean Algebra, Truth tables of logic gates (AND, OR, NOT), NAND, NOR as universal gates, Difference between combinational circuits and sequential circuits, Introduction to flip-flops (S-R & J-K).

UNIT-VII-ELECTRONICS INSTRUMENTS:

Role, importance and applications of general-purpose test instruments viz Multimeter Digital & Analog, Cathode Ray Oscilloscope (CRO), Function/Signal Generator.

Part-D

UNIT-VIII-DISPLAYS :

Seven segment display, Fourteen segment display, Dot matrix display

Led Display : Introduction, Construction, Advantage of LEDs in electronics display
Lcd Display : Introduction; Types of LCD display:- Dynamic scattering and field effect type;
Types Of Liquid Crystal Cells :Transmitting type and reflective type; Advantage & disadvantage of LCD display common applications.

Books Recommended

1. Sedra A S and Smith K C, ―Microelectronic Circuits‖ 4th Ed., New York, Oxford University Press, New York (1997).
2. Tocci R J and Widmer N S, ―Digital Systems – Principles and Applications‖, 8th Ed., Pearson Education India, New Delhi (2001).
3. Cooper and Helfrick, ―Modern Electronic Instrumentation and Measuring Techniques‖, 4th print Prentice Hall of India, New Delhi (1996).
4. Boylestad and Nashelsky, ―Electronic Devices and Circuit Theory‖, 8th Ed, Pearson Education India, New Delhi (2002).
5. Millman and Grabel, ―Microelectronics‖, 2nd Ed. Tata McGraw-Hill (1999).

HAS-105 CHEMISTRY

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- POLYMERS AND POLYMERIZATION:

Introduction & Classification of polymers. effect of structure on properties of polymers, Bio degradable polymers, preparation, properties and technical application of thermo–plastics (PVC, PVA, Teflon)& thermosets(PF,UF), elastomers (SBR,GR–N), Silicones , Introduction to polymeric composites.

UNIT-II- PHASE RULE:

Terminology, Derivation of Gibb's phase rule. One component system (H_2O system), two components systems: Simple eutectic system (Pb – Ag), system with congruent melting point (Zn – Mg), system with incongruent melting point (Na-K),Cooling curves.

UNIT-III- WATER AND ITS TREATMENT :

Part – a) Sources of water, impurities in water, hardness of water and its determination, (EDTA method) units of hardness, alkalinity of water and its determination, Related numerical problems, Problems associated with boiler feed water: scale and sludge formation, Priming and foaming, Boiler corrosion & Caustic embrittlement.

Part – b) Treatment of water for domestic use: coagulation, sedimentation, filteration and disinfection. Water softening : Lime-Soda treatment, Zeolite, Ion – exchange process, Mixed bed demineralization, Desalination (Reverse Osmosis , Electrodialysis) & related numericals.

UNIT-IV-CORROSION AND ITS PREVENTION:

Mechanism of Dry and wet corrosion (rusting of iron), types of corrosion, galvanic corrosion, differential aeration corrosion, stress corrosion. Factors affecting corrosion, preventive measures (proper design, Cathodic and Anodic protection, Protective coatings, Microbiological Corrosion.

UNIT-V-LUBRICATION AND LUBRICANTS:

Introduction, mechanism of lubrication, classification of lubricants. Additives for lubricants. Properties of lubricants (Flash & Fire point, Saponification number, Iodine value, Acid value , Viscosity and Viscosity index Aniline point, Cloud point and pour point).Biodegradable lubricants.

UNIT-6-ALLOYS :

Classification and necessity for making alloys, Composition properties and uses of following alloys: Brass, Bronze, Gun metal, Duralumin, Steel, Effect of alloying elements like C, Ni, Cr, Mn, Si, Mo and Co on properties of steel

UNIT-VI-FUELS :

Definition and characteristics of a good fuel, Classification of fuels with suitable examples, Definition and

determination of calorific value of a fuel with the help of bomb calorimeter, Proximate and Ultimate analysis of a fuel and its importance, Merits and demerits of gaseous fuel over other varieties of fuel, Composition properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas (iv) LPG (v) CNG

Text Books:

1. Engineering Chemistry , P.C. Jain Monica Jain (Dhanpat Rai & Co)
2. Chemistry in Engineering & Tech , Vol. I & II , Kuriacose (TMH)

Reference Books:

1. Instrumental methods of Chemical analysis, MERITT & WILLARD (EAST – WEST press)
2. Physical Chemistry , P.W Atkin (ELBS, OXFORD Press)
3. Physical Chemistry W.J.Moore (Orient Longman)

HAS-107 ENVIRONMENTAL STUDIES

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, scope and importance. Need for public awareness.

UNIT-II- NATURAL RESOURCES

Renewable and non-renewable resources Natural resources and associated problems
Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources : Use and exploitation, environmental effects of extracting and mineral resources, case studies.
Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources : Growing energy needs, renewable and non- renewable energy sources, use of alternate energy sources. Case studies.
Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources.
Equitable use of resources for sustainable lifestyles.

UNIT-III- ECOSYSTEMS

Concept of an ecosystem. Structure and function of an ecosystem, Producers, consumers and decomposers.
Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids,
Introduction, types, characteristic features, structure and function of the following ecosystem :

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT-IV- BIODIVERSITY AND ITS CONSERVATION

Introduction – Definition : genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity : in-situ and ex-situ conservation of biodiversity.

UNIT-V- ENVIRONMENTAL POLLUTION

Definition, Causes, effects and control measures of : Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution , Nuclear hazards
Solid waste Management : Causes, effects and control measures of urban, and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management : floods, earthquake, cyclone

and landslides.

UNIT-VI- SOCIAL ISSUES AND THE ENVIRONMENT

From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. Case studies,

Environmental ethics : Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

Wasteland reclamation, Consumerism and waste products,

Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

UNIT-VII- HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

UNIT-VIII- FIELD WORK

Visit to a local area to document environmental assets-river / forest / grassland / hill / mountain.

Visit to a local polluted site – Urban / Rural / Industrial / Agricultural.

Study of common plants, insects, birds.

Study of simple ecosystems – pond, river, hill slopes, etc.

Text Books:

1. Perspectives in Environmental Studies by A. Kaushik and C. P. Kaushik
2. Environmental Studies by J. P. Sharma

Reference Books

1. Environmental Chemistry by A. K. De
2. Environmental Science by Miller
3. Fundamental of Ecology by Odum

MU-101 BASICS OF MECHANICAL ENGINEERING

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT-I-BASIC CONCEPTS OF THERMODYNAMICS

Introduction, States, Work, Heat, Temperature, Zeroth, 1^{st}, 2^{nd} & 3^{rd} law of Thermodynamics, concept of internal energy, enthalpy and entropy, Problems

UNIT-II-PROPERTIES OF STEAM & BOILERS

Formation of Steam at constant pressure, Thermodynamics Properties of Steam, Use of steam tables, Measurement of dryness fraction by throttling calorimeter, problems. Classification of boilers, Comparison of water and fire tube boilers, mounting and accessories with their function, Constructional and operational details of Cochran and Babcock and Wilcox boilers

UNIT-III-REFRIGERATION & AIR CONDITIONING

Introduction to Refrigeration & Air conditioning, units of refrigeration, Coefficient of performance, Difference between a Heat engine refrigerator and heat pump, simple refrigeration vapour compression cycle, Psychometric charts and its use, simple problems on Coefficient of performance

UNIT-IV- I.C ENGINES

Introduction, classification, Constructional details and working of 2 stroke & 4 stroke petrol engine & diesel

engine, Otto, diesel and dual cycles, simple problems on Otto & diesel cycles.

UNIT-V-SIMPLE LIFTING MACHINES
Definition of machine, velocity ratio, Mechanical advantage, Efficiency, Laws of machines, Reversibility of machine, Wheel and axle, Differential pulley block, Single, Double and Triple start worm and worm wheel, single and double purchase winch crabs, Simple and compound screw jacks, Problems.

UNIT-VI-STRESSES AND STRAINS
Introduction, Concept & types of Stresses and Strains, Poisons ratio, stresses and Strains in simple and compound bar under axial loading, Stress– Strain diagrams, Hooks law, Elastic constants & their relationships, Problems.

UNIT-VII-MACHINE TOOLS
Introduction to Metal cutting, working Principal, parts and specification of commonly used machine tools in Workshop such as Lathe, shaper, planner, Milling, Drilling and Slotter.

UNIT-VIII-MANUFACTURING SYSTEMS
Introduction to Manufacturing Systems, Fundamentals of Numerical Control (NC), Advantage of NC systems, Classification of NC and CNC.

Text Books:

1. Elements of Mechanical Engineering- R.K Rajput Laxmi Pub, Delhi.
2. Elements of Mechanical Engineering- D.S Kumar, S.K Kataria and Sons.
3. Engineering Thermodynamics- P.K Nag TMH, New Delhi.
4. Refrigeration & Air conditioning- Arora & Domkundwar, Dhanpat Rai & Co. Pvt. Ltd.
5. Workshop Technology Vol I &II –Hazra & Chaudhary, Asian Book Comp., New Delhi.

Reference Books:

1. Strength of Materials– Popov, Pub. - PHI, New Delhi.
2. Strength of Materials– G.H Ryder, Pub-ELBS.
3. Engineering Thermodynamics- C.P Arora, Pub- TMH, New Delhi.
4. Refrigeration & Air conditioning- C.P Arora, Pub- TMH, New Delhi.
5. Manufacturing Science- Amitabha Ghosh & Ashok Kumar Malik, - East- West Press.
6. Manufacturing Process & Systems- Oswald, Munoz, John Wiley.
7. Workshop Technology Vol I, II & III- Chapman, WAJ, Edward Arnold.

HAS- 110 PHYSICS LAB - II

L P Cr
0 2 1

INTERNAL:30
EXTERNAL:20
TOTAL:50

1. To find the low resistance by carey - Foster's bridge.
2. To find the resistance of a galvanometer by Thomson‘s constant diffelction method using a post office box.
3. To find the value of high resistances by Substitution method.
4. To find the value of high resistances by Leakage method.
5. To study the characteristics of a solar cell and to find the fill factor.
6. To find the value of e/m for electrons by Helical method.
7. To find the ionisation potential of Argon/Mercury using a thyratron tube.
8. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
9. To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
10. To find the value of Planck's constant by using a photo electric cell.
11. To find the value of co-efficient of self-inductance by using a Rayleigh bridge.
12. To find the value of Hall Co-efficient of semi-conductor.
13. To study the V-I characteristics of a p-n diode.
14. To find the band gap of intrinsic semi-conductor using four probe method.
15. To calculate the hysteresis loss by tracing a B-H curve.

Note : Students will be required to perform at least 10 experiments out of the list.

The experiments in Second semester will be based upon Electricity, Magnetism, Modern Physics and Solid State Physics which are the parts of theory syllabus.

MU- 102 BASICS OF MECHANICAL ENGINEERING LAB

L	P	Cr	
0	2	1	

INTERNAL:30
EXTERNAL:20
TOTAL:50

1. To study the Cochran and Babcock and Wilcox boilers.
2. To study the working and function of mounting and accessories in boiler.
3. To study 2 stroke & 4 stroke diesel engine.
4. To study 2 stroke & 4 stroke petrol engine.
5. To study the vapour compression Refrigeration System and determination of its Coefficient of performance.
6. To study the functioning of Window Room Air Conditioner.
7. To calculate the Mechanical Advantage, Velocity Ratio and efficiency of Single start, Double start and Triple start worm wheel.
8. To calculate the Mechanical Advantage, Velocity Ratio and efficiency of Single Purchase, Double Purchase winch crabs and plot graphs.
9. To study Simple screw jacks and compound screw jacks and determine their efficiency.
10. To find the Mechanical Advantage, Velocity Ratio and efficiency of a Differential wheel and axle.
11. To perform tensile test, plot the stress- strain diagram and evaluate the tensile properties of a given metallic specimen.

HAS-201 MATHEMATICS-III

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

Part-A

Fourier Series and Fourier Transforms: Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, , half range sine and cosine series. Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, Fourier integrals.

Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem. Applications of Fourier transform for solution of standard equations/ boundary value problems.

Part-B

Functions of Complex Variable: Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions, Limit and Continuity of a function, Differentiability and Analyticity.

Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, Milne Thomson Method to find harmonic conjugate of a function. application to flow problems. Integration of complex functions. Cauchy- Integral theorem and formula.

Power series, radius and circle of convergence, Taylor's, Maclaurin's and Laurent's series.

Zeroes and singularities of complex functions, Residues. Cauchy's residue theorem, Evaluation of real integrals using residues (around unit and semi circle only).

Part-C

Probability Distributions : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Linear Programming: Linear programming problems formulation, solving linear programming problems using (i) Graphical method(corner point, iso cost/iso profit) (ii) Simplex method (iii) BIG M method (iv) Duality concept and Dual simplex method.

TEXT BOOKS :
1. Advanced Engg. Mathematics: F Kreyszig. Wiely Estern Ltd.
2. Higher Engg. Mathematics : B.S. Grewal, Khanna Publishers, New Delhi

REFERENCE BOOKS :
1. Advanced Engg. Mathematics: Michael D. Greenberg.
2. Operation Research: H.A. Taha.
3. Probability and statistics for Engineers: Johnson. PHI.

E-203 ELECTRICAL ENGINEERING MATERIALS AND SEMICONDUCTOR DEVICES

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- CONDUCTING MATERIALS:

Review of energy bands, description of materials, drift velocity, collision time, Mean free path, mobility, conductivity, relaxation time, factors affecting conductivity of materials, types of thermal conductivity, Wiedmann-Franz law, super conductivity, effect of magnetic field, conducting materials, applications.

UNIT-II- DIELECTRIC MATERIALS:

Behaviour of dielectric materials in static electric field, Dipole moments, Polarization, Dielectric constant, Polarizability, Susceptibility, mechanisms of polarization, behaviour in alternating field, dielectric loss, loss tangent, types of dielectric & insulating materials, electrostriction, Piezo-electricity, Applications.

UNIT-III- MAGNETIC MATERIALS:

Permeability, Magnetic susceptibility, magnetic moment, Magnetization, Dipole moment, types of magnetic materials, Magnetostriction, eddy current & hysteresis losses, applications.

UNIT-IV- SEMICONDUCTORS:

Review of Si and Ge as semiconducting materials, Continuity Equation, P-N junction, Drift & Diffusion, Diffusion & Transition capacitances of P-N junction.

UNIT-V- CONSTRUCTION AND CHARACTERISTICS OF DEVICES:

Brief introduction to Planar Technology for device fabrication., metal -semiconductor junctions (ohmic and non-ohmic), breakdown mechanisms in p-n junction, zener diode, electrical and optical excitation in diodes, LED, solar cells and photo-detectors.

UNIT-VI- BIPOLAR AND MOS DEVICES :

BJT, UJT, JFET, MOSFETS

UNIT-VII- POWER DEVICES :

Thyristor, Diac, Triac, GTO, IGBT, VMOS

TEXT BOOKS:
1. Electrical Engineering Materials: A.J. Dekker; PHI.
2. Solid State Electronic Devices : StreetMan & Banerjee; Pearson.
3. Electronic Devices & Circuits: Millman & Halkias; MGH.

REFERENCE BOOKS:
1. Electrical Engineering Materials: S.P Seth & P.V Gupta; Dhanpat Rai.
2. Text Book of Power Electronics : H.C.Rai; Galgoitia Publications.
3 Electronic Devices & Circuit Theory : Boylestad & Nashelsky; Pearson.
4. Semiconductor devices: Jaspreet Singh; John Wiley.

E-205 NETWORK ANALYSIS AND SYNTHESIS

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- INTRODUCTION
Introduction to lumped element electrical systems, Dual networks, Solution to some typical problems,Thevenin's and Norton theorem, equivalent circuits. Analogus system Electrical analogus to mechanical translational and rotational system. f-v analogy, f-I analogy.

UNIT-II- TRANSIENTS:
Transient response of simple R - L, R - C and R - L - C series and parallel circuits using classical differential equation approach and Laplace Transform method. Response of RL, RC, RLC circuits for impulse and pulse and non sinusoidal periodic functions, excitations using Laplace Transform method.

UNIT-III- NETWORK FUNCTIONS :
Terminal pairs or Ports, Network functions for one-port and two-port networks, poles and zeros of Network functions, Restrictions on pole and zero Locations for driving point functions and transfer functions, Time domain behaviour from the pole-zero plot.

UNIT-IV- CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS :
Relationship of two-port variables, short-circuit Admittance parameters, open circuit impedance, parameters, Transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.

UNIT-V- TOPOLOGY
Principles of network topology , graph matrices, network analysis using graph theory.

UNIT-VI- TYPES OF FILTERS AND THEIR CHARACTERISTICS :
Filter fundamentals, high-pass, low-pass, band-pass, and band-reject Filters.

UNIT-VII- NETWORK SYNTHESIS :
Positive real functions, synthesis of one port and two port networks, elementary ideas of Active networks.

TEXT BOOKS:
1. Network Analysis & Synthesis : Umesh Sinha; Satya Prakash Pub.
2. Network Analysis & Synthesis : F.F.Kuo; John Wiley & Sons Inc.
3.Network Analysis: Van Valkenburg; PHI

REFERENCE BOOKS:
1. Introduction to modern Network Synthesis : Van Valkenburg; John Wiley
2. Basic circuit theory:Dasoer Kuh; McGraw Hill.
3. A Course in Electrical Circuit Analysis by Soni & Gupta; Dhanpat Rai Publication.
4. Circuit Analysis : G.K. Mithal; Khanna Publication.
5. Networks and Systems : D.Roy Choudhury; New Age International.

EL-207 ELECTRICAL MACHINES – I

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- ELECTRO MECHANICAL ENERGY CONVERSIONS:
Electromechanical energy conversion principle, coupling field theory, singly excited magnetic system, doubly excited magnetic system, singly excited electric field system, dynamic equations

UNIT-II- BASIC CONCEPTS OF ROTATING ELECTRIC MACHINES:-
Elementary concept of an electrical machines, common factors of rotating electric machines, types of rotating machines, mmf and flux distribution in DC & AC machines, torque production and torque balance, temperature rise in electrical machines, heating and cooling time curves, duty cycles, rating of machines.

UNIT-III- D.C. GENERATOR
Principles and constructional features and operation of DC generators and motors, types of Windings – lap and wave; Armature reaction and compensations, commutation and inter poles, magnetization curve, field resistance line, characteristics of separately exited DC generators and self excited DC generator(shunt generator, series generator and compound generator), performance curves, voltage regulation and applications, Parallel operation of D.C. generators,

UNIT-IV- DC MOTOR
Working Principle, importance of back emf, power relation in motors, types of DC motors, speed regulation, torque, armature torque, shaft torque, armature reaction in DC motor, operating characteristics of separately excited DC Motors and self excited dc motor(shunt, series and compound wound), performance curves and applications,
Speed control of DC shunt and series motor, necessity of starter, DC motor starters and their design, automatic starters
Power Losses, efficiency and testing of DC machines, brake test, Swinburne‘s, Hopkinson‘s test, Field Test etc, maintenance of DC machines

Text Books:
1. Electrical Machines by I.J. Nagrath and D.P. Kothari 3rd Ed., TMH
2. Electric Machinery by P.S. Bhimbra, Khanna Pub.
3. The Performance & design of D.C. Machines by A.E.
Clayton **Reference Books**:
1. Electric Machinery, 6th Ed. By Fitzgerald & Kingsley, TMH
2. Theory & performance of Electric Machines, by J.B.Gupta, S.K.Kataria & Sons
3. Electric Machinery & Transformers by Irving L.Kosow , PHI

E-209 ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- UNITS STANDARDS AND ERRORS
S.I. units, Absolute standards(International, Primary, Secondary, and Working standards),True Value, Errors(Gross, Systematic and Random); Static Characteristic of instruments(Accuracy, Precision, Sensitivity, Resolution and threshold).

UNIT-II- MEASURING SYSTEM FUNDAMENTALS
Classification of Instruments (based upon mode of measurement- Indicating , Recording and Integrating Instruments), Generalized Instrument (block diagram and description of various blocks) , the three forces in an electromechanical indicating instrument (deflecting controlling and damping forces and the interplay between them), Comparison between gravity and spring controls : Comparison of methods of damping and their suitability for bearing supports , Pivot –less supports (simple suspension and taut band suspension , scale , information , instrument cases (covers) .

UNIT-III- MEASURING INSTRUMENTS
Construction , Operating principle , torque equation , shape of scale , use as Ammeter or as voltmeter (Extension of range) , use on AC / DC or both , advantages and disadvantages, errors(both on AC/DC)of PMMC types, electrodynamic type, moving iron type(attraction , Repulsion and combined attraction, repulsion types). Hot Wire type and induction type, electrostatic type instruments.

UNITIV- WATTMETERS AND ENERGY METERS

Construction, Operating principle, Torque Equation, Shape of Scale, Errors, Advantages and Disadvantages of Electrodynamic and induction type watt meters; and single phase induction type energy meter, compensation and creep in energy meter.

UNIT-V- INSTRUMENT TRANSFORMER
Current and Voltage transformer, Constructional features, Ratio and Phase angle errors

UNIT-VI- LOW AND HIGH RESISTANCE MEASUREMENTS
Limitations of wheatstone bridge , Kelvin‘s double Bridge method , difficulties in high resistance measurements , measurement of high resistance by direct deflection , Loss of Charge method , Megohm Bridge and Meggar .

UNIT-VII- A.C. BRIDGES
General Balance equation, Circuit Diagram, Phasor Diagram, Advantages, Disadvantages and Application of Maxwell‘s inductance, Maxwell‘s inductance capacitance bridge, Hay‘s, Anderson‘s, Owen‘s, De-sauty‘s, Schering and Wein‘s Bridges, Shielding and Earthing.

TEXT BOOK:
A course in Electrical And Electronic measurement and instrumentation : A.K. Sawhney, Dhanpat Rai Publication

REFERENCE BOOKS:

1. Electrical Measurements: E.W. Golding
2. Electrical And Electronic measurement and instrumentation : J.B. Gupta, Kataria and Sons.
3. Electronic instrumentation and measurement technique : W.D. Cooper & A.D. Helfrick
4. Measuring systems : E.O. Doeblin; TMH.

E-211 ANALOG ELECTRONICS

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- SEMICONDUCTOR DIODE & DIODE CIRCUITS
Diode as a circuit element, Load line concepts, half wave & Full wave rectifier, Filter circuits (Capacitor & Inductor Filter), Clipping circuits, clamping circuits, Peak to peak detector, Voltage multiplier circuit.

UNIT-II- TRANSISTOR AT LOW FREQUENCIES
Bipolar junction transistor operation, Characteristics, Analysis of a transistor amplifier circuits using h - parameters, emitter follower, Miller‘s theorem.

UNIT-III- TRANSISTOR BIASING:
Operating point, Selection of operating point, bias stability, Stability factor, Different methods for transistor biasing: fixed bias, collector to base bias, emitter bias, voltage divider biasing, compensation techniques (thermistor & Sensistor compensation).

UNIT-IV- TRANSISTOR AT HIGH FREQUENCIES:
Hybrid P model, CE short circuit gain, frequency response, alpha cut off frequency, Gain Bandwidth product, Emitter follower at high frequencies .

UNIT-V- FET & FET CIRCUITS:
Junction field effect transistor, Pinch off voltage, Volt ampere characteristics, small signal model, common source amplifier, source follower, biasing of FET, application of FET as voltage variable resistance.

UNIT-VI- REGULATED POWER SUPPLY:
Block Diagram of Power supply, Voltage regulation, Series and Shunt voltage regulator, IC Regulator

TEXT BOOKS:

1 Integrated Electronics: Millman & Halkias ; McGrawHill
2 Electronic circuit analysis and design (Second edition): D.A.Neamen; TMH

REFERENCE BOOKS:

1. Electronics Principles: Malvino ; McGrawHill
2. Electronics Circuits: Donald L. Schilling & Charles Belove ; McGrawHill
3. Electronics Devices & Circuits: Boylestad & Nashelsky ; Pearson.

E-213 NETWORK ANALYSIS AND SYNTHESIS LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify "Z" parameters of a two port network.
5. To calculate and verify "Y" parameters of a two port network.
6. To determine equivalent parameter of parallel connections of two port network.
7. To plot the frequency response of low pass filter and determine half-power frequency.
8. To plot the frequency response of high pass filter and determine the half-power frequency.
9. To plot the frequency response of band-pass filter and determine the band-width.
10. To calculate and verify "ABCD" parameters of a two port network.
11. To synthesize a network of a given network function and verify its response.
12. Introduction of P-Spice

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

E-215 ELECTRICAL MACHINES-I LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. To study construction and starting methods of DC motor.
2. To obtain magnetization characteristics of separately excited DC Machine.
3. To obtain magnetization characteristics of self-excited DC Machine.
4. To obtain Load characteristics D.C series generator.
5. To obtain Load characteristics of D.C Shunt Generator.
6. To obtain Load characteristics test on D.C Compound Generator.
7. To obtain speed torque characteristics of DC shunt motor.
8. Speed control of DC shunt motor by field control method
9. Speed control of DC shunt motor by armature voltage control method
10. Load test on DC shunt motor.
11. Load test on DC Series Motor
12. To obtain efficiency of dc machine using Swinburne‘s Test.
13. To perform Hopkinson‘s test and determine losses and efficiency of DC machine.
14. To perform parallel operation of DC shunts generators.
15. Field Test

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

E-217 ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.
3. Measurement of temperature using R.T.D.
4. Measurement of temperature using Thermocouple.
5. Measurement of pressure using Strain Guage.
6. Measurement of pressure using Piezo-Electric Pick up.
7. Measurement of distance using Capacitive Pick up.
8. Measurement of distance using Inductive Pick up.
9. Measurement of speed of DC Motor using Magnetic Pick up.
10. Measurement of speed of DC Motor using Photo Electric Pick up.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

E-219 ANALOG ELECTRONICS-LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Study of Half wave & full wave rectifiers.
2. Study of power supply filters.
3. Study of Diode as clipper & clamper.
4. Study of Zener diode as a voltage regulator.
5. Study of CE amplifier for voltage, current & Power gains and input, output impedances..
6. Study of CC amplifier as a buffer.
7. To study the frequency response of RC coupled amplifier.
8. Study of 3-terminal IC regulator.
9. Study of transistor as a constant current source in CE configuration.
10. Study of FET common source amplifier.
11. Study of FET common Drain amplifier.
12. Graphical determination of small signal hybrid parameters of bipolar junction transistor.
13. Study & design of a d.c. voltage doubler.

NOTE : At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EL-221 WORKSHOP -III

L P Cr **INTERNAL:120**
0 8 4 **EXTERNAL:80**
TOTAL:200

1. Introduction of tools, electrical materials, symbols and abbreviations.
2. To study stair case wiring.
3. To study house wiring i.e., batten, cleat, casing-caping and conduit wirings.

4. To study fluorescent tube light.
5. To study high pressure mercury vapour lamp (H.P.M.V).
6. To study Sodium lamp.
7. To study repairing of home appliances such as heater, electric iron, fans etc.
8. To study construction of moving iron, moving coil, electrodynamics & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses, relays, contactors, MCBs and circuit breakers.
11. Insulation testing of electrical equipments.
12. To design, fabricate a PCB for a circuit, wire-up and test.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

MGMT-201 ECONOMICS FOR ENGINEERS

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT- I
Introduction to the subject: Micro and Macro Economics, Relationship between Science, Engineering, Technology and Economic Development. Production Possibility Curve, Nature of Economic Laws.

UNIT- II
Time Value of Money: concepts and application. Capital budgeting; Traditional and modern methods, Payback period method, IRR, ARR, NPV, PI (with the help of case studies)

UNIT- III
Meaning of Demand. Law of Demand, Elasticity of Demand; meaning, factors effecting it and its practical application and importance. Demand forecasting (a brief explanation)

UNIT- IV
Meaning of Production and factors of production, Law of variable proportions and returns to scale. Internal and external economies and diseconomies of scale. Concepts of cost of production, different types of costs; accounting cost, sunk cost, marginal cost, Opportunity cost. Break even analysis, Make or Buy decision (case study). Relevance of Depreciation towards industry.

UNIT- V
Meaning of market, types of market, perfect competition, Monopoly, Monopolistic, Oligopoly. (main features). Supply and law of supply, Role of demand and supply in price determination

UNIT- VI
Indian Economy, nature and characteristics. Basic concepts; fiscal and monetary policy, LPG, Inflation, Sensex, GATT, WTO and IMF. Difference between Central bank and Commercial banks

Books

1. Jain T.R., Economics for Engineers, VK Publication
2. Chopra P. N., Principle of Economics, Kalyani Publishers
3. Dewett K. K., Modern economic theory, S. Chand
4. H. L. Ahuja., Modern economic theory, S. Chand
5. Dutt Rudar & Sundhram K. P. M., Indian Economy
6. Mishra S. K., Modern Micro Economics, Pragati Publications
7. Pandey I.M., Financial Management; Vikas Publishing House
8. Gupta Shashi K., Management Accounting, Kalyani Publication

E-204 ELECTRONICS INSTRUMENTATION

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT -I- OSCILLOSCOPE
Block diagram, study of various stages in brief, high frequency CRO considerations. Sampling and storage oscilloscope.

UNIT -II- ELECTRONIC INSTRUMENTS
Instruments for measurement of voltage, current & other circuit parameters, Q-meters, R.F. power measurements, introduction to digital meters.

UNIT -III- GENERATION & ANALYSIS OF WAVEFORMS
Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

UNIT-IV- FREQUENCY & TIME MEASUREMENT
Study of decade counting Assembly(DCA), frequency measurements, period measurements, universal counter, introduction to digital meters.

UNIT -V- DISPLAY DEVICES
Nixie tubes, LED‘s LCD‘s, discharge devices.

UNIT- VI- TRANSDUCERS
Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

UNIT -VII- INTRODUCTION TO SIGNAL CONDITIONING
DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

T**EXT BOOK:**
A course in Electrical & Electronics Measurements & Instrumentation : A.K.Sawhney; Dhanpat Rai & Sons.

REFERENCE BOOKS
Electronics Instrumentation & Measurement Techniques : Cooper; PHI.

E-206 COMPUTATIONAL TECHNIQUES

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

Part-A

UNIT-I- FINITE DIFFERENCES AND INTERPOLATION
Various difference operators and relation between them .Newton‘s forward and backward interpolation formulae Central difference interpolation formula. Gauss forward and backward interpolation formulae. Langrages interpolation formula and Newton‘s divided difference formulae.

UNIT-II- SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS
Bisection method, method of false position,secant method, iteration method, Newton's Raphson method, Generalised Newton-Raphson method

UNIT-III- SOLUTION OF SIMULTANEOUS ALGEBRAIC EQUATIONS
Jacobi's method, Gauss-Seidal method, Relaxation method

UNIT-IV- NUMERICAL DIFFERENTIATION AND INTEGRATION
Formula for derivatives Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules, Boole's rule and Weddle's rule, Romberg's Integration.

Part-B

UNIT-V- NUMERICAL SOLUTION OF O.D.E
Taylor series,Picard's method, Eule , Modified Euler method, Runge-Kutta second and fourth order methods, predictor collector methods(Adams-Bashforth and Milne's method only),

UNIT-VI- NUMERICAL SOLUTION OF P.D.E
Finite difference approximations of partial derivatives, solution of Laplace equation (Standard 5-point formula only), one-dimensional heat equation (Schmidt method, Crank-Nicolson method, Dufort and Frankel method) and wave equation.

TEXT BOOKS :
1. Numerical Methods in Engg. & Science : B.S. Grewal;khanna
2. Numerical Methods for Scientific and Engg. Computations :M.K. Jain, S.R.K. Iyenger and R.K. Jain-Wiley Eastern Ltd

REFERENCE BOOKS :
1. Computer oriented Numerical methods :U.Ra
2. Introduction to Numerical Analysis C.E.Froberg;Addison Wesly

E-208 DIGITAL ELECTRONICS

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT-I- FUNDAMENTALS OF DIGITAL TECHNIQUES
Digital signal, logic gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, Boolean algebra. Review of Number systems. Binary codes: BCD, Excess-3, Gray, EBCDIC, ASCII, Error detection and correction codes.

UNIT-II- COMBINATIONAL DESIGN USING GATES
Design using gates, Karnaugh map and Quine Mcluskey methods of simplification.

UNIT-III- COMBINATIONAL DESIGN USING MSI DEVICES
Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Decoders / Drivers for display devices.

UNIT-IV- SEQUENTIAL CIRCUITS:
Flip Flops : S-R, J-K, T, D, master-slave, edge triggered, shift registers, F/F Conversions, sequence generators, Counters, Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits.

UNIT-V- DIGITAL LOGIC FAMILIES:
Switching mode operation of p-n junction, bipolar and MOS. devices. Bipolar logic families:RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families.

UNIT-VI- A/D AND D/A CONVERTERS:
Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for D/A converters. A/D converters : Quantization, parallel -comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

UNIT-VII- MEMORIES AND PLD'S

Classification of memories –RAM organization l-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell – ROM- PROM –EPROM –EEPROM –EAPROM –Programmable Logic Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)-Field Programmable Gate Arrays(FPGA).

TEXT BOOK :

1. Modern Digital Electronics(Edition III) : R. P. Jain; TMH

REFERENCE BOOKS :

1. Digital Integrated Electronics : Taub & Schilling; MGH
2. Digital Principles and Applications : Malvino & Leach; McGraw Hill.
3. Digital Design : Morris Mano; PHI.

EL-210 ELECTRICAL MACHINES – II

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

UNIT –I-SINGLE PHASE TRANSFORMER

Principle, Constructional features of transformers, working, ideal transformer, EMF equation, no load and load phasor diagram, transformer with winding resistance and leakage reactance, equivalent circuit of single phase transformers, approximate equivalent circuit, regulation, losses, efficiency and all day efficiency, testing of transformers: OC & SC tests, sumpner's test, Parallel operation of transformer with equal and unequal voltage ratios and its load sharing

UNIT – II- POLY PHASE TRANSFORMERS

Three phase transformer, Auto transformers, 3 phase transformer windings and its connections star-star, star-delta, delta-star, delta-delta and Zig-zag, open delta, Tertiary transformer winding, Scott connected transformers, tap changing

UNIT –III- POLYPHASE INDUCTION MOTORS

Introduction, construction and principle of operation, frequency of rotor current, rotor emf, torque equation and torque slip and torque speed characteristics, effect of change of voltage and frequency on torque and slip or speed, full load torque and maximum torque, starting torque and maximum torque, equivalent circuit, power losses, efficiency, testing of induction motors and circle diagram.

Starting of induction motor, types of starters speed control of induction motors-pole changing, cascade connection, injection of emf into rotor circuit, harmonics, cogging and crawling, effect of harmonics, elimination of harmonics, double cage rotors, Induction generators and their applications

UNIT-IV- SINGLE PHASE INDUCTION MOTORS:

Double field revolving theory, starting methods – split phase, capacitor start and run, shaded pole motors and their characteristics and their applications, equivalent Circuit.

Text Books:

1. Electric Machines by Nagarath & Kothari
2. Generalized theory of Electric Machines by P.S.Bimbra
3. Electrical Machinery by Fitzgerald, Kingsley and S.D.Umans ,MGH

Reference books:

1. Alternating current Machines by A.F. Puchatein, T.C. Lloyd and A.G.Conarad
2. A.C Machines by A.E.Langsford

E-212 ELECTROMAGNETIC FIELD THEORY

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- STATIC ELECTRIC FIE0LDS
Coulomb‘s Law, Introduction to Del operation, Study of Del operation on scalar and vector and its physical interpretation, Laplacian operator, Stoke‘s Theorem and Divergence Theorem, Gauss‘s Law, potential function, field due to a continuous distribution of charge, equi-potential surfaces, Poison‘s equation, Laplace‘s equation, method of electrical images, capacitance, electro-static energy, boundary conditions, the electro-static uniqueness theorem for field of a charge distribution, Dirac-Delta representation for a point charge and an infinitesimal dipole.

UNIT-II- STEADY MAGNETIC FIELDS
Faraday Induction law, Ampere‘s Work law in the differential vector form, Ampere's law for a current element, magnetic field due to volume distribution of current and the Dirac-delta function, Ampere‘s Force Law, boundary conditions for magnetostatic, magnetic vector potential, scalar vector potential (Alternative derivation).

UNIT-III- TIME VARYING FIELDS
Introduction to conduction current, convection current and displacement current; Equation of continuity for static and time varying fields, inconsistency of Ampere‘s law, Maxwell‘s field equations and their interpretation, solution for free space conditions, electromagnetic waves in a homogeneous medium, Discussion on : Group velocity, Phase velocity, Attenuation constant, Phase constant, Refractive index; propagation of uniform plane-wave, relation between E & H in a uniform plane-wave, wave equations for conducting medium, Maxwell‘s equations using phasor notation, wave propagation in a conducting medium, Loss Tangent, conductors, dielectrics, wave propagation in good conductor and good dielectric, depth of penetration, polarization, linear, circular and elliptical,

UNIT-IV- REFLECTION AND REFRACTION OF E M WAVES
Reflection and refraction of plane waves at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence), Brewester's angle and total internal reflection, reflection at the surfaces of a conductive medium, surface impedance, transmission-line analogy, poynting theorem, interpretation of E x H, power loss in a plane conductor.

UNIT-V-TRASMISSION LINE THEORY
Transmission line as a distributed circuit, Primary and Secondary constant, Transmission line equation, input impedance of terminated line, infinite transmission line, Distortion less and Loss less transmission line, Open circuit and short circuit transmission line, Reflection coefficient, Standing waves, VSWR, Smith's chart and its applications.

TEXT BOOK :
1. Electro-magnetic Waves and Radiating System: Jordan & Balmain, PHI.

Refrence Books:
1. Engineering Electromagnetics : Hayt; TMH
2. Electro-Magnetics : Krauss J.DF; Mc Graw Hill.
3. Priciples of Electromagnetics; Matthew N.O. Sadiku; Oxford publications

E-214 COMPUTATIONAL TECHNIQUE LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

WRITE DOWN AND EXECUTE THE FOLLOWING PROGRAMS USING C/C++/MATLAB

1. To find the roots of non-linear equation using Bisection method/Muller's method.
2. To find the roots of non-linear equation using Newton's method/Muller's method.
3. Curve fitting by least - square approximations.
4. To solve the system of linear equations using Gauss- Elimination method.
5. To solve the system of linear equations using Gauss-Seidal iteration method.
6. To solve the system of linear equations using Gauss-Jorden method.
7. To Integrate numerically using Trapezoidal rule.
8. To Integrate numerically using Simpson's rules.
9. To find the largest eigen value of a matrix by power-method.
10. To find numerical solution of ordinary differential equations by Euler's method.
11. To find numerical solution of ordinary differential equations by Runge-Kutta method.
12. To find numerical solution of ordinary differential equations by Milne's method.
13. To find the numerical solution of Laplace equation.
14. To solve a given problem using newtons forword interpolation formula.
15. To solve a given problem using lagranges forword interpolation formula.

NOTE: Atleast ten experiments are to be performed; atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

E-216 DIGITAL ELECTRONICS LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. Design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design & verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
10. To design & realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND & NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation . Verify the operation of a ring counter and a Johnson counter.

NOTE : At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EL-218 ELECTRICAL MACHINES-II- LAB

L	P	Cr	
0	2	1	

INTERNAL:30
EXTERNAL:20
TOTAL:50

1. To perform polarity test on transformer and also find turn ratio.
2. To perform OC & SC tests on single - phase transformer and draw equivalent circuit.
3. To perform direct load test on single - phase transformer and draw efficiency vs load curve.
4. Sumpner‘s test on Transformers
5. Scott Connection of Transformers
6. Parallel Operation of Two Single - Phase Transformers
7. Load test on 3-phase transformer
8. To study starting methods of induction motors.
9. Determination of the effect of rotor resistance on the torque speed curve.
10. Load test on 3 - phase squirrel cage induction motor.
11. Load test on 3 - phase slip ring induction motor.
12. No load and Blocked rotor test on 3 - phase induction motor.
13. Effect of capacitor on the starting and running of single phase induction motor and method of reversing the direction of rotation.
14. Brake test on single - phase induction motor
15. Determination of Equivalent Circuit of Single - Phase Induction Motor

NOTE: Atleast ten experiments are to be performed; atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EL-301 ELECTRICAL MACHINES-III

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT -I- SYNCHRONOUS GENERATOR
Constructional features, production of sinusoidal alternating EMF, winding factor, EMF equation, Harmonics in voltage waveform, leakage reactance, armature reaction, synchronous impedance, determination of synchronous impedance, short circuit ratio, voltage regulation, Voltage regulation by Synchronous impedance method, mmf method , Zero power factor or Poitier method, two reactance concept for salient pole synchronous machines, power developed by synchronous generator, transient condition of alternator, losses and efficiency

UNIT-II- SYNCHRONOUS MOTOR
Principle of operation, effect of load on a synchronous motor, armature reaction, effect of varying excitation on armature current and power factor, equivalent circuit and phasor diagram, power developed in synchronous motor, different torques, two reactance concept for salient pole synchronous motor, stability and maximum load angle, v-curves, synchronous condenser, hunting, starting methods of synchronous motor

UNIT-III- PARALLEL OPERATION OF ALTERNATORS
Introduction, requirement for parallel operation, synchronizing of alternators, methods of synchronization, load sharing, synchronous machine on infinite bus bar

UNIT-IV- GENERALIZED THEORY OF ELECTRICAL MACHINES
Basics for development of generalized approach for analysis of electrical machines, Kron's Primitive machine, Concept of rotational transformer, voltage and pseudo stationary coil, Expression for self and mutual inductances of various windings w.r.t. rotor position, Park's and Inverse Parks transformation.

UNIT-V- SPECIAL ELECTRIC MOTORS
Linear induction motor, Schrage motor, AC series motor, Universal Motor, stepper motor, reluctance motor, hysteresis motor etc.

Text Books:

1. Electric Machines by Nagarath & Kothari
2. Generalized theory of Electric Machines by P.S.Bimbra
3. Electrical Machinery by Fitzgerald, Kingsley and S.D.Umans ,MGH

Reference books:

1. Alternating current Machines by A.F. Puchatein, T.C. Lloyd and A.G.Conarad
2. A.C Machines by A.E.Langsford

EL-303 PRINCIPLES OF COMMUNICATION ENGINEERING

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT- I- INTRODUCTION TO COMMUNICATION SYSTEMS
Block diagram of communication system with brief description to each block, importance of modulation

UNIT- II- AMPLITUDE MODULATION
Basic definition, mathematical and graphical analysis of AM signals, power relation, generation of AM waves, demodulation of AM waves

UNIT -III-ANGLE MODULATION
Basic definitions: phase modulation & frequency modulation, mathematical analysis of frequency & phase modulation, narrow band frequency modulation, generation and demodulation of FM waves.

UNIT -IV- PULSE MODULATION
Sampling theory, pulse amplitude modulation (PAM), pulse width modulation, pulse position modulation, element of pulse code modulation and data modulation

UNIT- V- DIGITAL COMMUNICATION TECHNIQUES
Block diagram of digital communication system, different digital communication techniques, advantages of digital communication

UNIT -VI- NOISE
Various types of noise, S/N ratio, noise figure

UNIT-VII-OPTICAL COMMUNICATION
Block diagram of optical communication system, basics of transmission of light rays, advantages of optical fiber communication, brief introduction to optical fiber

UNIT-VIII- RADAR AND SATELLITE COMMUNICATION
Radar block diagram, basic radar range equation, basic pulse radar system, introduction to satellite communication system

TEXT BOOKS :
1. Electronic Communication systems : Kennedy; TMH.

REFERENCE BOOKS :

1. Communication system : Simon Hykin (Johan Wiely)
2. Introduction to Radar System: M.I. Skolanik(MGH)
3. Optical Fiber Communication: Johan M Senior(PHI)

E-305 ANALOG ELECTRONICS CIRCUITS

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- SINGLE AND MULTISTAGE AMPLIFIERS

Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, RC-coupled amplifier, low frequency response of RC coupled stage, effect of an emitter bypass capacitor on low Frequency response, multistage CE amplifier.

UNIT-II- FEEDBACK AMPLIFIERS

Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

UNIT-III- OSCILLATORS

Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, general form of oscillator circuit, wien-bridge oscillator, crystal oscillator.

UNIT-IV- POWER AMPLIFIERS

Class A, B, and C operations; Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

UNIT-V- OPERATIONAL AMPLIFIERS

Ideal and practical operational amplifiers, inverting and non-inverting amplifier, differential amplifier, emitter coupled differential amplifier, transfer characteristics of a differential amplifier, offset error : voltage and current, common mode rejection ratio (CMRR) .

UNIT-VI- LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS

Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

UNIT-VII- NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS

Comparators, sample & hold circuits, logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators, regenerative comparator (Schmitt Trigger), multi-vibrators, 555 timer IC(mono stable & Astable operation) & its application

TEXT BOOK:

1. Integrated Electronics: Milman Halkias, TMH.
2. Microelectronic Circuits : Sedra & Smith.

REFERENCE BOOKS:

1. Operational Amplifiers:Gaikwad
2. Electronic Circuit Analysis and Design (Second edition) : D.A.Neamen; TMH
3. Linear Integrated Circuit: D R Chaudhry

EL-307 POWER SYSTEMS –I

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- INTRODUCTION
Structure of a power system, indoor and outdoor substations, equipment for substations, layout, and auxiliary supply

UNIT-II- TRANSMISSION LINES
Calculation of line parameters, Ferranti effect, proximity effect

UNIT-III- PERFORMANCE OF LINES
Models of short, medium and long transmission lines, performance of transmission lines, circle diagram, capacity of synchronous condensor, tuned lines, voltage control

UNIT-IV- MECHANICAL DESIGN
Sag and stress calculations, effect of ice and wind, dampers.

UNIT-V- INSULATORS
Types, insulating materials, voltage distribution over insulator string, equalizer ring

UNIT-VI- CORONA
Phenomenon, critical voltage, power loss, , reduction in losses , radio interference , HVDC transmission – types of links , advantages and limitations

UNIT-VII- CABLES
Types of LV and HV cables, grading of cables, capacitance, ratings

UNIT-VIII- DISTRIBUTION SYSTEMS
Radial, ring mains and network distribution system, comparison of various types of AC and DC systems

TEXTBOOKS:
1. Power System Engg. : I.J.Nagrath and D.P.Kothari (TMH).
2. A Course in Electrical Power : Gupta , Soni and Bhatnagar (Dhanpat rai and sons).

REF. BOOKS :
1. Elements of Power system analysis : W.D.Stevenson (MGH).
2. Electric Power : S.L.Uppal (Khanna Pub).
3. Electrical Power : J.B.Gupta (S.K.Kataria and sons).
4. Power System engg. : B.R.Gupta .
5. Electric power system : B.M.Weedy , John Wiley and sons.
6. Transmission & distribution of electrical Engg. : H.Cotton .
7. Transmission & distribution of electrical Engg : Westing house and Oxford University Press , New Delhi.

E-309 POWER ELECTRONICS

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- INTRODUCTION
Introduction to Thyristors, Their static and dynamic characteristics, Turn-on and Turn - off methods and circuits, Ratings and protection of SCR'S, Other members of thyristor family, Series and parallel operation of thyristors, Firing circuits for SCRs.Commutation circuits

UNIT-II- PHASE CONTROLLED CONVERTERS
Principle of phase control, Single phase half wave circuit with different types of loads, Single phase and three phase semi converter and full converter bridge circuits with line commutation, Continuous and discontinuous conduction effect of source inductance on single phase and three phase full converters, Single phase and three phase dual converters and their operation with circulating and non circulating currents.

UNIT-III- DC CHOPPERS
Principle of chopper operation, Control strategies, Types of choppers, Step upand step down choppers, Types of choppers, Steady state time domain analysis with R, L, and E type loads, Voltage, Current and Load commutated choppers.

UNIT-IV- INVERTERS
Single phase VSI, Half bridge and full bridge inverters and their steady state analysis,Introduction of Series and parallel inverters, and Three phase bridge inverters with 180^0 and 120^0 modes. Single-phase PWM inverters. Current source inverters,CSI with R load (qualitative approach)

UNIT-V- AC VOLTAGE CONTROLLERS
Types of single-phase voltage controllers, Single-phase voltage controller with R and RL type of loads. Three phase voltage controller configurations R Load

UNIT-VI- CYCLOCONVERTERS
Principles of operation, Single phase to single phase step up and step down cycloconverters, three phase to single phase and three-phase to three-phase cycloconverters, Output voltage equation for a cycloconverter.

TEXT BOOKS

1. Dubey, G.K., Doradla, S.R., Joshi, A. and Sinha, R.M.K., Thyristorised Power Controllers, New Age international (P) Limited, Publishers (2004).
2. Rashid, M., Power Electronics, Prentice−Hall of India (2006) 3rd ed.
3. Bhimbra P.S. ,Power Electronics,Khanna Publisher

REFERENCE BOOK

1. Mohan, N., Underland, T. and Robbins, W. P., Power Electronics: Converter Applications and Design, John Wiley (2007) 3rd ed.

E-311 MICROPROCESSORS & INTERFACING

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

Part-A

UNIT-I- ARCHITECTURE OF 8085
Functional block diagram—Registers, ALU, Bus systems. Pin configuration, Timing and control signals, Machine cycle and timing diagrams.
Interrupts—Types of interrupt, interrupt structure

UNIT-II- PROGRAMMING OF 8085
Instruction format, Addressing modes, Instruction set. Development of assembly language programs

Part-B

UNIT-III- INTERFACING DEVICES
(a).The 8255 PPI chip: Architecture, pin configuration, control words, modes and Interfacing with 8085.
(b). The 8254 PIC chip: Architecture, pin configuration, control words, modes and Interfacing with 8085.

UNIT-IV- INTERRUPT AND DMA CONTROLLER
(a). The 8259 Interrupt controller chip: Architecture, pin configuration, control words, modes
(b). The 8257 DMA controller chip: Architecture, pin configuration, control words, modes

Part- C

UNIT-V- ARCHITECTURE OF 8086
Functional block diagram of 8086, details of sub-blocks such as EU, BIU, memory segmentation, physical address computations, pin configuration, program relocation,
Minimum and Maximum modes of 8086— Block diagrams and machine cycles.
Interrupts—Types of interrupt, interrupt structure

UNIT-VI- PROGRAMMING OF 8086
Instruction format, Addressing modes, Instruction set. Development of assembly language programs Assembler directives.

TEXT BOOKS :
1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd.
2. Microprocessor and applications – A.K.Ray.

REFERENCE BOOKS:
1. Microprocessors and interfacing : Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware & Applications :Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing : Badri Ram; TMH

EL-313 ELECTRICAL MACHINES-III- LAB

L	P	Cr	INTERNAL:30
0	2	1	EXTERNAL:20
			TOTAL:50

1. Open circuit & Short Circuit characteristics of alternator.
2. Determination of excitation required to maintain constant voltage in an alternator.
3. Determination of relationship between the terminal voltage and load current of an alternator keeping excitation and speed constant.
4. Determination of relationship between terminal voltage and load current of an alternator for varying power factor load, the speed and excitation remaining constant.
5. Determination of efficiency and regulation of an alternator from open circuit and short circuit test.
6. Determination of regulation of an alternator by ZPF method.
7. Measurement of X_d and X_q reactance of a 3 - phase alternator.
8. Parallel operation of poly phase alternators by dark lamp method.
9. Determination of the effect of variation of excitation of a synchronous motor.(V-curve)
10. Synchronous motor performance
    i) With constant excitation ii) With constant load

11. Separation of losses in single-phase transformer
12. Separation of losses in 3-phase induction motor
13. Performance characteristics of Schrage motor.
14. Synchronization of alternator with infinite bus.

Software based experiments (Develop Computer Program in 'C' language or use MATLAB or other commercial software)

15. To determine speed-torque characteristics of three phase slip ring induction motor and study the effect of including resistance, or capacitance in the rotor circuit.
16. To determine speed-torque characteristics of single phase induction motor and study the effect of voltage variation.
17. To determine speed-torque characteristics of a three phase induction motor by (i) keeping v/f ratio constant (ii) increasing frequency at the rated voltage.
18. To determine efficiency and regulation of transformer by open circuit and short circuit data.

NOTE: Atleast ten experiments are to be performed; atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EL-315 POWER ELECTRONICS LAB

L	P	Cr	INTERNAL:30
0	2	1	EXTERNAL:20
			TOTAL:50

1. To plot characteristics of Diode , Thyristor and Triac .
2. To plot characteristics of Transistor and MOSFET .
3. To Use R and R-C firing circuits , UJT firing circuit .
4. Study of complementary voltage commutation using a lamp flasher , Ring Counter .
5. Study of Thyristorised DC circuit breaker .
6. Study of AC voltage Regulator .
7. Study of full wave Converter .
8. Study of DC chopper .
9. Study of Series Inverter.
10. Study of Bridge Inverter .
11. Study of Single phase Cycloconverter .

NOTE: Atleast ten experiments are to be performed; atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

REFERANCE BOOK(s) :

O.P.Arora , — Power Electronics Laboratory – Experiments and organization — , Wheeler Publishing (A Division of A.H.Wheeler and Co.Ltd. Delhi).

E-317 MICROPROCESSORS AND INTERFACING LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Study of 8085 Microprocessor kit.
2. Write a program using 8085 and verify for :

a. Addition of two 8-bit numbers.
b. Addition of two 8-bit numbers (with carry).

3. Write a program using 8085 and verify for :

a. 8-bit subtraction (display borrow)
b. 16-bit subtraction (display borrow)

4. Write a program using 8085 for multiplication of two 8-bit numbers by repeated addition method. Check for minimum number of additions and test for typical data.
5. Write a program using 8085 for multiplication of two 8- bit numbers by bit rotation method and verify.
6. Write a program using 8085 for division of two 8-bit numbers by repeated subtraction method and test for typical data.
7. Write a program using 8085 for dividing two 8- bit numbers by bit rotation method and test for typical data.

8. Write a program using 8086 and verify for:

a. Finding the largest number from an array.
b. Finding the smallest number from an array.

9. Write a program using 8086 for arranging an array of numbers in descending order and verify.
10. Write a program using 8086 for arranging an array of numbers in ascending order and verify.
11. Write a program for finding square of a number using look-up table and verify. .
12. Write a program to interface microprocessor with 8253 to generate square wave. Use 8085/8086 microprocessor.
13. Write a program to interface microprocessor with 8253 to generate interrupt on terminal count. Use 8085/8086 microprocessor.
14. Write a program to interface a two digit number using seven-segment LEDs. Use 8085/8086 microprocessor and 8255 PPI.
15. Write a program to control the operation of stepper motor using 8085/8086 microprocessor and 8255 PPI.

NOTE: Atleast ten experiments are to be performed; atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

E-319 ANALOG ELECTRONICS CIRCUIT LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.
2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth
3. Design & realize inverting amplifier, non-inverting and buffer amplifier using 741 Op Amp.
4. Verify the operation of a differentiator circuit using 741 op amp and show that it acts as a high pass filter.
5. Verify the operation of a integrator circuit using 741 op amp and show that it acts as a low pass filter.
6. Design and verify the operations of op amp adder and subtractor circuits.
7. To design and realize Schmitt trigger using op amp 741.
8. Design & realize Wein -bridge oscillator using op amp 741.

9. To design & realize square wave generator using op amp 741.
10. To design & realize zero crossing detector using op amp 741.

NOTE: Atleast ten experiments are to be performed , atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

E-302 DIGITAL SYSTEM DESIGN

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- INTRODUCTION TO HDL
Design flow, Design Methodologies, Capabilities, Hardware abstraction, Model analysis. Basic VHDL elements—Identifiers, data objects, data classes, data types, Operators

UNIT -II- TYPES OF MODELLINGS
Behavioural modelling—Entity declaration, Architecture body, Various Sequential statements and constructs, Multiple processes, Postponed processes.
Dataflow modelling—Concurrent signal assignment statements, delta delay model, multiple drivers, block statement, concurrent assertion statement.
Structural modelling—Component Declaration, component instantiation, resolving signal values.

UNIT -III- COMBINATIONAL CIRCUIT DESIGN
VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc.

UNIT-IV- SUPPORTING CONSTRUCTS
Generics, Configuration, subprogram overloading, operator overloading, Package declaration, package body, design libraries, visibility, Introduction to Test bench, Subprograms: Application of Functions and Procedures.

UNIT -V- SEQUENTIAL CIRCUITS DESIGN
VHDL Models and Simulation of Sequential Circuits such as flip-flops,
Shift Registers, Counters etc.

UNIT -VI- PROGRAMMABLE LOGIC DEVICES
ROM, PLA, PAL, GAL, CPLD and FPGA. Designing using ROM, PLA and PAL

TEXT BOOKS:

1. A VHDL Primmer : Bhasker; Prentice Hall 1995.
2. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).

REFERENCE BOOKS:

1. IEEE Standard VHDL Language Reference Manual (1993)
2. Digital Design and Modelling with VHDL and Synthesis : KC Chang; IEEE Computer Society Press.
3. Digital System Design using VHDL : Charles. H.Roth ; PWS (1998).
4. VHDL-Analysis & Modelling of Digital Systems : Navabi Z; McGraw Hill.
5. VHDL-IV Edition :Perry; TMH (2002)
6. Introduction to Digital Systems : Ercegovac. Lang & Moreno; John Wiley (1999).
7. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)

EL-304 CONTROL SYSTEM ENGINEERING

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- INTRODUCTORY CONCEPTS:
System/Plant model, types of models, illustrative examples of plants and their inputs and outputs, servomechanism, regulating system, Synchros, AC and DC techo-generators, servomotors, stepper motors, & their applications, magnetic amplifier.
Linear time-invariant (LTI) system, time-varying system, causal system, open loop control system, closed loop control system, illustrative examples of open-loop and feedback control systems, continuous time and sampled data control systems. Effects of feedback on sensitivity (to parameter variations), stability, external disturbance (noise), overall gain etc. Introductory remarks about non-linear control systems.

UNIT-II- MATHEMATICAL MODELLING
Concept of transfer function, relationship between transfer function and impulse response, order of a system, block diagram algebra, signal flow graphs: Mason's gain formula & its application, characteristic equation, derivation of transfer functions of electrical and electromechanical systems. Transfer functions of cascaded and non-loading cascaded elements. Introduction to state variable analysis and design

UNIT-III- TIME DOMAIN ANALYSIS
Typical test signals, time response of first order systems to various standard inputs, time response of 2nd order system to step input, relationship between location of roots of characteristics equation, w and wn, time domain specifications of a general and an under-damped 2nd order system, steady state error and error constants.Effect of adding pole-zero to a system, controllers.

UNIT-IV- STABILITY ANALYSIS
Stability in time domain: Necessary and sufficient conditions for stability, Hurwitz stability criterion, Routh stability criterion and relative stability, Root Locus technique for stability.

UNIT-V-FREQUENCY DOMAIN ANALYSIS:
Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots, stability, Gain-margin and Phase Margin, relative stability, frequency response specifications.

UNIT-VI-COMPENSATION:
Necessity of compensation, compensation networks, application of lag and lead compensation.

TEXT BOOK :
1. Control System Engineering : I.J.Nagrath & M.Gopal; New Age
2. Modern Control Engg : K.Ogata; PHI.

REFERENCE BOOKS :
1. Automatic Control Systems : B.C.Kuo, PHI.
2. Control Systems - Principles & Design : Madan Gopal; Tata Mc Graw Hill.
3. Modern Control Engineering.R.C.Dorl & Bishop; Addison-Wesley

EL-306 CONVENTIONAL AND CAD OF ELECTRIC MACHINES

L P Cr **INTERNAL:40**
4 0 4 **EXTERNAL:60**
TOTAL:100

UNIT-I- GENERAL
General features and limitations of electrical machine design, modern trends in design of electric machines, cooling of machines, cooling system, Enclosures for rotating machines, cooling of turbo alternators: air cooling, hydrogen cooling and direct cooling of alternator

UNIT-II- MAGNETIC CIRCUITS
Mmf calculations for air gap and iron parts of electrical machines, gap contraction and gap expansion factors, Mmf for teeth, Real and Apparent flux densities, Leakage flux and reactance calculation, calculation of magnetizing current, Design of Electro-magnet

UNIT-III- DESIGN OF TRANSFORMER
Classification of transformer, Construction: Transformer Core, Winding, Tank, insulation, Bushings, Tapping and Tap Changing, Conservator and Breather, Buchholz Relay, Design detail: Output of Transformer, optimum design, Design of core, choice of flux density, design of winding, selection of type of winding, design of insulation, Window space factor, window dimension, design of yoke, overall dimensions, simplified steps for transformer design, Regulation, mechanical forces, no load current, Change of parameters with change of frequency, temperature rise of transformer, design of tank with tubes, cooling of transformer, Design Problems

UNIT-IV- DESIGN OF DC MACHINES
Classification, constructional details and applications, Output equation, choice of average gap density, choice of ampere conductors per meter, Selection of number of poles, core length, armature diameter, pole proportions, Length of air gap, armature reaction, effect of armature reaction, reduction of effects of armature reaction, Choice of armature winding, number of armature coils, number of armature slots, slot dimensions, Armature voltage drop, depth of armature core, design of field system, Design of commutator, losses and efficiency, Design problems

UNIT-V- DESIGN OF 3-Φ INDUCTION MOTOR
Constructional detail, output equation, choice of average flux density in air gap, choice of ampere conductors per meter, Main dimensions, stator winding, shape of stator slots, number of stator slots, area of stator slots, stator teeth, stator core, Rotor design: length of air gap, design of squirrel cage induction motor, number of rotor slots, design of rotor bars and slots, design of end rings, Design of wound rotor, no load current, dispersion coefficient, methods of improving starting torque, design problems

UNIT-VI-DESIGN OF SYNCHRONOUS MACHINE
Constructional detail, output equation, choice of specific magnetic loading, choice of specific electric loading, Design of salient pole machines, main dimensions, short circuit ratio, effect of SCR on machine performance, length of air gap, Armature winding, number of armature slots, turns per phase, Elimination of harmonics, estimation of air gap length, losses, Design of turbo alternators, stator design, rotor design, Design problem

UNIT-VII-COMPUTER AIDED DESIGN
Advantages of digital computer, computer aided design-Different approaches, Program developed for design of electric machines

TEXT BOOK:
1. A course in Electrical Machine Design: A.K. Sawhney, Khanna Publication

REFERENCE BOOKS:
1. Theory , Performance and design of alternating current machine by M.G.Say , ELBS
2. Theory , Performance and design of direct current machines by A.E.Clayton 3rd Edition 1967.

EL-308 ADVANCED MICROPROCESSOR AND MICROCONTROLLER

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT-I- THE 8086 ARCHITECTURE
Pin Diagram of 8086 and description of sub-blocks such as EU and BIU and of various registers , description of address computations and memory segmentation , program relocation , addressing models , instruction formats

UNIT-II- INSTRUCTION SET OF 8086
Instruction execution timing , Assembler instruction format , data transfer instructions , arithmetic instruction , branch instruction , looping instruction , NOP and HLT instructions , flag manipulation instructions , logical

instructions , Shift and Rotate instructions , Directives and Operators , Simple example such as copying a block of data , finding maximum from an array of numbers , using Look Up Table technique etc.

UNIT-III- MICROCONTROLLER
Comparison between Microcontroller and Microprocessor , Block Diagram of 8051 ,Pin diagram and Details , I/O Structure , memory organization , special function registers , external memory , 8032 / 8052 Enhancements , reset operation

UNIT-IV- INSTRUCTION SET
Addressing modes , arithmetic , logical data transfer , Boolean variable , program branching instructions

UNIT-V-TIMER OPERATION
Timer Mode, Register, Timer control Register, Timer Modes and over flow flag, clocking sources, start, stopping and controlling timers, programs for generating various frequency square waves.
SERIAL PORT OPERATION: Serial Port Control register, Modes and operation, serial port band rate , multiprocessor communication , initialization and programming of serial port

UNIT-VI- INTERRUPT
Organization, processing interrupts, program design using interrupts, serial port, interrupt , external interrupt.

TEXT BOOK:
1. THE 8051 MICROCONTROLLER ; Scott Mackenzie , Prentice Hall ,Eagle Wood Cliff .
2. Yu – Chang Liu & Glenn A. Gibson Microcomputer Systems : the 8086 / 8088 Family : Architecture , programming and design .

REFERENCE BOOKS:
1. Brey , ―Intel Microprocessors,8086,8088,80186,80286/Pentium‖
2. Triekel and Singh ,‖The 8088 & 8086 Microprocessor- Programming , interfacing.
3. Bhupinder singh chabra ‖, The intel 8086/8088 Microprocessors architecture programming, Design and interfacing,‖ Dhanpat Rai & sons.
4. Kennneth J. Ayala ,‖8051 Microcontroller architecture, programming and applications‖,2nd edition 1996, Penram international publishers, India
5. www. Atmel.com.

EL-310 ELECTRICAL POWER GENERATION

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT-I- INTRODUCTION
Energy sources , their availability , recent trends in power generation , interconnected generation of power plants .

UNIT-II- POWER GENERATION PLANNING
Load forecasting, Load curves , Load duration curve , base load and peak load power plants , connected load , maximum demand , demand factor , group diversity factor , load factor , significance of load factor , plant factor, capacity factor , selection of unit size , number of units , reserves , cost of power generation , depreciation , tariff .

UNIT-III- CONVENTIONAL ENERGY SOURCES
THERMAL POWER PLANT: Selection of Site , capacity calculations , classification , schematic diagram and working, boilers, coal handling, feed water treatment

HYDROELECTRIC PLANT: Hydrology , hydrographs, mass curves, selection of Site , classification , schematic diagram and working, turbines; classification & characteristics

NUCLEAR POWER PLANT: Selection of Site , schematic diagram and working, reactors

DIESEL POWER STATIONS: schematic diagram and working,

GAS TURBINE PLANT: schematic diagram and working,

UNIT-IV- NON CONVENTIONAL ENERGY SOURCES
Wind , solar , tidal , ocean and geo thermal sources of energy , Fuel cell , magneto-hydro dynamic (MHD) system, small hydro plants

UNIT-V- ELECTRIC ENERGY CONSERVATION AND MANAGEMENT
Energy Management, energy audit , energy efficient motors , co-generation .

TEXT BOOKS :
1. Electric power generation , B.R.Gupta .
2. Power Plant Engineering : G.D.Rai
3. Power plant engg.: Wakil

REFERENCE BOOKS :
1. A course in electric power system , Soni , Gupta , Bhatnagar , Dhanpat Rai and Sons .
2. Power System Engineering , Nagrath and Kothari , TMH , New Delhi .
3. Electric Power : S.L.Uppal (Khanna Publishing) .

EL-312 POWER SYSTEMS-II

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT-I- FAULT CALCULATIONS
Per unit system, Percentage system, calculation of symmetrical & unsymmetrical fault currents in power system network using the symmetrical components, use of current limiting reactors

UNIT-II- PROTECTIVE DEVICES
Fuse: Introduction, types & applications.
Protective relays: Basic operating principal, types of relays , Distance and Inverse definite minimum type relays, phase & amplitude comparators, development of static relays, basic elements of a static relay Circuit Breakers: Principal, Types, Ratings & Applications

UNIT-III- PROTECTIVE SCHEMES
Protection of feeders, protection of generators & transformers, carrier current protection , protection against surges ,surge diverters, surge absorbers ,use of ground wires on transmission lines, methods of grounding method, Insulation coordination

UNIT-IV
Current trends in protective relays, Microprocessor & PC based relaying. Introduction to PLC

TEXT BOOKS :
1. Switchgear and protection – S.S.Rao : Khanna Pub.
2. Power System Engg. I.J. Nagrath and D.P.Kothari(TMH)

REFERENCE BOOKS :
1. Protective Relays- Their Theory and Practice Vol. I&II : W.Van Warrington
2. Advanced Power system analysis and dynamics :L.P.Singh, Wiley eastern N.Delhi.
3. Digital Protection : protective relay from Electro-Mechanical to Microprocessor- L.P.Singh,Wiley Eastern.
4. Power System Protection and switchgear- B.Ravinder Nath and M.Chander,Wiley Eastern ,N.Delhi .
5. A course in electrical power- Soni, Gupta and Bhatnagar – Dhanpat Rai & sons.
6. Power System Engg. V.K. Mehta.

EL-314 CONTROL SYSTEM ENGG LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. To study A.C. servo motor and to plot its torque speed characteristics.
2. To study D.C. servo motor and to plot its torque speed characteristics.
3. To study the magnetic amplifier and to plot its load current v/s control current characteristics for :
   (a) series connected mode
   (b) parallel connected mode.
4. To plot the load current v/s control current characteristics for self exited mode of the magnetic amplifier.
5. To study the synchro & to:
   (a) Use the synchro pair (synchro transmitter & control transformer) as an error detector.
   (b)Plot stator voltage v/s rotor angle for synchro transmitter i.e. to use the synchro transmitter as position transducer.
6. To use the synchro pair (synchro transmitter & synchro motor) as a torque trans mitter.
7. (a) To demonstrate simple motor driven closed loop position control system.
   (b) To study and demonstrate simple closed loop speed control system.
8. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots .
9. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing number of steps, direction of rotation & speed.
10. To implement a PID controller for level control of a pilot plant.
11. To implement a PID controller for temperature control of a pilot plant.
12. To study the MATLAB package for simulation of control system design.

NOTE: At least ten experiments have to be performed in the semester; at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-304-C.

EL-316 ADVANCED MICROPROCESSOR AND MICROCONTROLLER LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Study OF 8086 Microprocessor kit , its operation and commands .
2. Write a well documented program for copying 12 bytes from source to destination on 8086 Microprocessor kit .
3. Write a program for 8086 for division of a defined double word (stored in a data segment) by another double word and verify .
4. Write a well documented program for finding square root of given number on 8086 Microprocessor kit.
5. Write a program using 8086 for finding square of a given number and verify .
6. Write a program using 8086 and verify for : a) Finding largest number from an array b) Finding smallest number from an array .
7. Write a program using 8086 for arranging an array of numbers in descending order and verify .
8. Write a program using 8086 for arranging a array of numbers in ascending order and verify .
9. Write a program for 8086 for finding square of a number using look up table and verify .
10. Write a program to interface a two digit number using 7 segment LEDs , use 8086 microprocessor and 8255 PPI
11. Write a program to control the operation of stepper motor using 8086 microprocessor and 8255 PPI .

NOTE: At least 10 Experiments are to be performed , with at least 7 from above list , remaining 3 may be performed from above list or designed and set by concerned institution as per scope of syllabus .

E-318 DIGITAL SYSTEM DESIGN LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. half adder b. full adder
3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. multiplexer b. demultiplexer
4. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. decoder b. encoder
5. Write a VHDL program for a comparator and check the wave forms and the hardware generated
6. Write a VHDL program for a code converter and check the wave forms and the hardware generated
7. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
8. Write a VHDL program for a up/down counter and check the wave forms and the hardware generated
9. Write a VHDL program for a mode-n counter and check the wave forms and the hardware generated
10. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
    a. register b. shift register
11. Write a VHDL program for ALU of microcomputer and check the wave forms and the hardware generated
12. Implement any three (given above) on FPGA/CPLD kit

NOTE: Ten experiments are to be performed out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EL-320 POWER SYSTEMS LAB

L P Cr **INTERNAL:30**
0 2 1 **EXTERNAL:20**
TOTAL:50

1. To draw operating characteristics of DMT/IDMT relay.
2. To draw operating characteristics of differential relay.
3. To study Bucholtz Relay .
4. Testing of Transformer oil .
5. To find ABCD Parameters of a model of transmission line .
6. To observe Ferranti effect in a model of transmission line .
7. To study the microcontroller based differential relay for the protection of transformer.
8. To study electromechanical type negative sequence relay.
9. To study electromechanical type over current relay.
10. To study electromechanical type directional over current relay.
11. To study electromechanical type earth fault relay.
12. To determine the string efficiency of suspension type insulators with and without guard ring.
13. To study microcontroller based distance relay.
14. To study microcontroller based under voltage relay.
15. To plot Annual / monthly / daily load demand of near by area.
16. To draw single line diagram of distribution system of HVPNL of near by area of college concerned.

NOTE: Ten experiments are to be performed out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

E-402 DIGITAL SIGNAL PROCESSING

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

UNIT-I- DISCRETE-TIME SIGNALS:
Signal classifications, frequency domain representation, time domain representation, representation of sequences by Fourier transform, properties of Fourier transform, discrete time random signals, energy and power theorems

UNIT-II- DISCRETE-TIME SYSTEMS : Classification, properties, time invariant system, finite impulse Response (FIR) system, infinite impulse response (IIR) system.

UNIT-III- SAMPLING OF TIME SIGNALS:
Sampling theorem, application, frequency domain representation of sampling, and reconstruction of band limited signal from its samples, discrete time processing of continuous time signals, changing the sampling rate using discrete time processing

UNIT-IV- Z-TRANSFORM
Introduction, properties of the region of convergence, properties of the Z-transform, inversion of the Z-transform, applications of Z-transform

UNIT-V- BASICS OF DIGITAL FILTERS
Fundamentals of digital filtering, various types of digital filters, design techniques of digital filters : window technique for FIR, bi-linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP, DSP algorithm implementation consideration. Applications of DSP

UNIT-VI- MULTIRATE DIGITAL SIGNAL PROCESSING
Introduction to multirate digital signal processing, sampling rate conversion, filter structures, multistage decimator and interpolators, digital filter banks.

TEXT BOOKS :
1. Digital Signal Processing : Proakis and Manolakis; PHI
2. Digital Signal Processing: Salivahanan, Vallavaraj and Gnanapriya;TMH

REFERENCE BOOKS:
1. Digital Signal Processing: Alon V. Oppenhelm;PHI
2. Digital Signal processing(II-Edition): Mitra, TMH

EL-404 ELECTRIC DRIVES

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

UNIT-I- ELECTRICAL DRIVES
Introduction , classification , advantages , characteristics of electric motors , choice of electrical drive machines , status of AC and DC drives

UNIT-II- CONTROL OF ELECTRICAL DRIVES
Modes of Operation , closed loop control of drives , sensing of current and speed , Microprocessor based control of electric drives

UNIT-III- DYNAMICS OF ELECTRICAL DRIVES
Fundamental Torque equation , multi-quadrant operation , equivalent values of drive parameters , load torque components , types of load

UNIT-IV- SELECTION OF MOTOR POWER RATING
Heating and cooling , determination of motor rating , continuous , short time and intermittent duty rating , load equalization and determination of moment of inertia of the fly wheel

UNIT-V- DC MOTOR DRIVES
Starting , acceleration control , braking , transient analysis , converter fed DC drive and chopper fed DC drive

UNIT-VI- INDUCTION MOTOR DRIVES
Starting , acceleration control , braking , transient analysis ,static control techniques – stator frequency control , stator voltage control , rotor resistance control ,v/f control, slip power recovery, vector control

UNIT-VII- PMBLDC AND PMSAC DRIVES
Permanent magnet brushless DC drive , permanent magnet sine fed drives , switched reluctance machine drives .

TEXT BOOKS :
1. Fundamentals of electrical drives: G.K.Dubey , Prentice Hall.
2. Electric Drives : Concepts and applications , V.Subrahmaniyam , TMH , New Delhi .

REFERANCE BOOKS :
1. Power Semiconductor controlled drives : G.K.Dubey , Prentice Hall
2. Kusko ,A. , Solid State DC Motor drives , MIT Press , Cambridge , Mass USA 1969 .
3. Pillai S.K. , A First Course in electric drives , Wiley Eastern , New Delhi .
4. Chillikan , M., Electric Drives , MIR Publishers , MOSCOW 1970 .
5. Bose B.K. , Power Electronics and AC drives , Prentice Hall , New Delhi 1991 .

EL-406 POWER SYSTEM OPERATION AND CONTROL

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT-I- AUTOMATIC GENERATION CONTROL
Definitions of control area-Single area control-Modelling of speed governing system-Turbine Model-Generator load model, Excitation systems Modelling, Role of AVR's, Block diagram representation of an isolated system –Steady state analysis-Dynamic response-Proportional and Integral control and its block diagram representation-Load frequency control and economic despatch control, Two area load frequency control-tie line bias control, Load frequency control with generation rate constraints-Speed governor dead band and its effect on AGC

UNIT-II-OPTIMAL SYSTEM OPERATION
Introduction-Optimal operation of Generators in Thermal Power Station-heat rate curve-cost curve-Incremental fuel and Production cost, input-output characteristics, Optimum generation allocation with line losses neglected ,Unit commitment, Optimum generation allocation including effect of transmission losses –Loss coefficients, General transmission line loss formulae, Optimal scheduling of hydrothermal system

UNIT-III-REACTIVE POWER & VOLTAGE CONTROL
Overview of reactive power control-Reactive power control in transmission systems-advantages and disadvantages of compensating equipments

TEXT BOOKS:
1. Modern Power System Analysis-I.J.Nagrath &D.P.Kothari ,Tata Mcgraw Hill
2. Electric Power System – C.L.Wadhwa NewAge International
3. Power System Analysis-Hadi Saadat-TMH Publication

REFERENCE BOOKS
1. Voltage stability by Taylor
2. Power system control and stability:P.Kundur:MGH
3. Electric Energy System Theory: OI Elgerd; TMH

4.Computer Aided Power System Analysis: S.I. Ahson, D.P. Kothari and A.K. Mahalanabis; TMH
5.Power System Analysis and Design: B.R. Gupta, Wheelers Publication.
6.EHV-AC/DC Transmission System; S.Rao: Khanna Pub.
7.PGO and C:Wood and Wallenberg, John Wiley and sons.

EL-408 ADVANCED CONTROL SYSTEMS

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT-I- STATE VARIABLE TECHNIQUES
State variable representation of systems by various methods, Solution of state equations-state transition matrix Transfer function from state variable model, Controllability and observability of state variable model

UNIT-II- SECOND ORDER SYSTEMS AND STATE PLANE
Phase portrait of linear second systems. Method of isoclines, phase portrait of second order system with non linearities, limit cycle, singular points.

UNIT-III- DESCRIBING FUNCTION ANALYSIS
Definition, limitation, use of describing function for stability analysis, describing function of ideal relay, relay with hysteresis and dead zone, saturation/coulomb friction and backlash

UNIT-IV- LINEAR APPROXIMATIONS OF NON LINEAR SYSTEMS
Taylor series, Liapunov‘s second method

UNIT-V- SAMPLED DATA SYSTEMS
Sampling process, impulse modulation, mathematical analysis of sampling process, application of Laplace transform, Shannon‘s theorem, reconstruction of sampled signal, zero order and first order hold, Z transform, definition, evaluation of Z transform, inverse Z transform, pulse transfer function, limitations of Z transform, state variable formulation of discrete time systems. Solution of discrete time state equations, stability, definitions, Schur-Cohn stability criterion, Jury‘s test of stabiliy, extension of Routh-Hurwitz criteron to discrete time systems

TEXTBOOKS
1. M. Gopal: Digital Control and State Variable Methods, TMH.

REF Books
1. M. Gopal: Modern Control Theory, Wiley International
2. K. Ogata : Discrete time control system, PHI
3. B.C. Kuo : Digital control systems
4. J.E. Slotine and W.P. Li: Applied Non-Linear Control, Prentice Hall, USA
5. Isodori : Non-Linear control Systems, Pub: Springer-Verlag

EL-426 POWER SYSTEM STABILITY AND FACTS

L	P	Cr	
4	0	4	

INTERNAL:40
EXTERNAL:60
TOTAL:100

UNIT-I- POWER SYSTEM STABILITY PROBLEM
Rotor angle stability, voltage stability, short term and long term stabilities, swing equation and its solution techniques

UNIT-II- SYNCHRONOUS MACHINES AND ITS MODELLING
Power transformation, flux linkage equations, voltage equation, formulation using state-space equations, normalizing voltage and torque eqns., equivalent circuit of synchronous m/c, the flux linkage state-space model. Linearization of the flux linkage model, Simplified linear model block diagram, state-space representation of simplified model

UNIT-III- DYNAMIC STABILITY
State-space representation, stability of a dynamic system, analysis of stability, Eigen properties of the state matrix, Small signal stability of a single m/c infinite bus system, Effect of excitation systems, power system stabilizer, system state matrix with armature winding

UNIT-IV- TRANSIENT STABILITY
An elementary view of transient stability, numerical integration methods, simulation of power system dynamic response

UNIT-V- VOLTAGE STABILITY
Basic concept related o voltage stability, voltage collapse, voltage stability analysis, prevention of voltage collapse.

UNIT-VI- FLEXIBLE AC TRANSMISSION SYSTEM
FACTS definitions, review of FACTS devices, series compensation in transmission systems, cascade connection of components-shunt and series compensation.

UNIT-VII- SUB-SYNCHRONOUS OSCILLATORS
Turbine generator torsional characteristics, characteristics of series capacitor compensated transmission system, Self excitation, torsional interaction, counter measure to SSR problems, ferro resonance.

TEXTBOOKS:
1. Power System Stability and Control by Prabha Kumar: MGH
2. Power System Control and Stability by Anderson and Fouad: Galgotia Publications

REFERENCE BOOKS
1. Extra high voltage AC Transmission Engg. By Rokosh Das Begamudre
2. Electrical energy theory: An Introduction by O.I. Elgerd: TMH

EL-410 COMPUTER APPLICATION TO POWER SYSTEM

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

UNIT-I- LOAD FLOW STUDIES
Introduction, bus admittance matrix, formation of Y-bus, tree graph, co-tree, primitive networks, bus incidence matrix, formulation of Y-bus using singular transformation, load flow equations, approximate load flow study, Gauss-Siedel method for load flow study, algorithm and flowchart for computer application to load flow studies, using G-S method, Newton Raphson method for load flow studies, algorithm and flowchart for computer application to load flow studies using N.R. method, Decoupled load flow studies, fast decoupled load flow. Comparison between G-S and N.R. methods, Load flow study of distribution system. Sparsity in power System

UNIT-II- DIGITAL TECHNIQUES IN FAULT CALCULATIONS
Review of symmetrical components, sequence networks for synchronous machines, transforms and transmission lines, bus impedance matrix, algorithm for formulation of bus. All types of modifications short circuit studies: Single line to ground fault, line to line fault, double line to ground fault and symmetrical fault. Consideration of pre-fault currents

UNIT-III- COMPUTER CONTROL AND AUTOMATION
Introduction to energy control centres, various states of a power system, SCADA systems and RTU

TEXTBOOKS:

1. Computer Methods in Power System: G.W. Stagg and A.H. E.I-Abiad, M.G.H
2. Power System Analysis: Hadi Saadat, TMH
3. Power System Engg.: I.J. Nagrath and D.P. Kothari, TMH

REFERENCE BOOKS:

1. Advanced Power System analysis and dynamics: L.P. Singh, Wiley Eastern Ltd.
2. Electrical energy system Theory: An introduction by O.I. Elgerd, TMH
3. Elements of power system analysis: W.D. Stevenson. MGH
4. Power system Engineering: B.R. Gupta.

EL-412 UTILIZATION OF ELECTRIC POWER AND TRACTION

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

UNIT-I- ILLUMINATION

Basic laws of illumination, illumination due to a strip and circular disc, light sources and their characteristics, sources of light, design of lighting schemes, incandescent lamp, sodium lamp, mercury lamp and fluorescent lamp, comparison of various lamps.

UNIT-II- ELECTRIC HEATING

Principle and application of resistance, induction , dielectric heating and temperature control

UNIT-III- ELECTRIC WELDING

Resistance welding, arc welding, welding generator and welding transformer, properties of arcing electrode

UNIT-IV- ELECTROLYTING PROCESS

Principles and applications of electrolysis, Faraday‘s law of electrolysis, electroplating, charging and discharging, capacity and efficiency of battery, defects in battery.

UNIT-V- ELECTRIC TRACTION

Advantages of electric traction, requirements of an ideal traction system, train movement, mechanism of train movement, traction motors, traction motor control, multi unit control, braking of electric motors, thyristor control of electric traction

REFERENCE BOOKS

1. Utilization of electric energy: Open Shaw Taylor; ELBS
2. Art and Science of Utilization of Electrical energy: H.Pratab; Dhanpat Rai
3. Generation, distribution and utilization of electric power: C.L. Wadhwa; Khanna Publications

EL-414 HIGH VOLTAGE ENGINEERING

L	P	Cr	INTERNAL:40
4	0	4	EXTERNAL:60
			TOTAL:100

UNIT-I- INTRODUCTION

Recent trends in high voltage transmission.

UNIT-II- CONDUCTION AND BREAKDOWN

Conduction and breakdown in gases, liquids and solod dielectrics, insulator breakdown, insulation characteristics of long air gaps

UNIT-III- VOLTAGE GRADIENTS ON CONDUCTORS
Electrostatic fields of sphere gaps, fields of line charges and their properties, charge-potential relations for multi conductor lines, surface voltage gradients on conductors, distribution of voltage gradient on some conductors of bundle.

UNIT-IV- CORONA
Corona and corona loss, corona loss formula, attenuation of traveling waves due to corona, audible noise generation and characteristics, corona pulses-their generation and properties, properties of pulse, radio interference.

UNIT-V- LIGHTNING
Lightning, lightning stroke mechanism, principle of lightning protection, tower foot resistance, insulator flash over and withstand voltage, lightning arrestors and their characteristics.

UNIT-VI- H.V. TESTING AND LAB EQUIPMENTS
Standard wave shapes for testing, wave shaping circuits: principles and theory; impulse generator, generation of A.C high voltage for testing, generation of direct voltage, measurement of high voltage, general layout of H.V. lab.

TEXTBOOKS:
1. E.H.V. AC Transmission: R.D. Begamudre, Wiley Eastern Ltd.
2. H.V. Engineering: V. Kamaraju and M.S. Naidu. TMH

E-416 DIGITAL SIGNAL PROCESSING LAB

L	P	Cr	INTERNAL:30
0	2	1	EXTERNAL:20
			TOTAL:50

Perform the experiments using MATLAB:

1. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
2. To develop program for discrete convolution.
3. To develop program for discrete correlation.
4. To develop program for amplitude modulation.
5. To understand noise effected signal and get filtered signal.
6. To understand stability test.
7. To understand sampling theorem.
8. To design analog filter(low-pass, high pass, band-pass, band-stop).
9. To design digital IIR filters(low-pass, high pass, band-pass, band-stop).
10. To design FIR filters using windows technique.
11. To design a program to compare direct realization values of IIR digital filter
12. To develop a program for computing parallel realization values of IIR digital filter.
13. To develop a program for computing cascade realization values of IIR digital filter
14. To develop a program for computing inverse Z-transform of a rational transfer function.
15. To understand DFT and IDFT.

NOTE: At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

EL-418 ELECTRIC DRIVES LAB

L	P	Cr	INTERNAL:30
0	2	1	EXTERNAL:20
			TOTAL:50

1. Speed control of D.C motor using dc chopper.
2. Speed control of D.C motor using single-phase converter.
3. Speed control of D.C motor using 3-phase converter.
4. Speed control of D.C motor using single-phase dual converter.
5. Inverter fed single- phase Induction motor drive
6. CSI fed induction motor drive.
7. Speed control of single- phase Induction motor using ac regulator.
8. Regenerative braking of dc motor using single-phase converter.
9. Speed control of single- phase Induction motor using cycloconverter.
10. Static rotor resistance control method.

NOTE: 1. At least 10 experiments have to be performed with atleast 7 from above list, remaining 3 may either be performed from above list or designed and set by concerned institution as per scope of syllabus.

Department of Electrical Engineering

Scheme 2010

Mapping of courses with Employability/ Entrepreneurship/ Skill development

Name of the Course	Course Code	Mapping with Employability/ Entrepreneurship/ Skill development
Physics-I	HAS-101	Employability
Mathematics-I	HAS-103	Employability
Essentials of Communication	HAS-111	Employability
Electrical Technology	E-105	Employability
Fundamentals of Computer & Programming With C	CE-101	Employability
Engineering Drawing	MU-103	Skill development
Physics Lab-I	HAS-109	Skill development
Fundamentals of Computer & Programming With C Lab	CE-103	Skill development
Electrical Technology Lab	E-109	Skill development
Workshop-I	WS-101	Skill development
Physics-II	HAS-102	Employability
Mathematics-II	HAS-104	Employability
Fundamental of Management	MGMT- 101	Entrepreneurship
Elements of Electronics Engg.	E-101	Employability
Chemistry	HAS-105	Employability
Environmental Studies	HAS-107	Employability
Basics of Mechanical Engg	MU-101	Employability
Physics Lab-II	HAS-110	Skill development
Basics of Mechanical Engg Lab	MU-102	Skill development
Workshop-II	WS-102	Skill development
Mathematics - III	HAS-201	Employability
Electrical Engineering Materials &	E-203	Employability

Semiconductor Devices		
Network Analysis And Synthesis	E-205	Employability
Electrical Machines-1	EL-207	Employability
Electrical Measurement And Measuring Instruments	E-209	Employability
Analog Electronics	E-211	Employability
Network Analysis And Synthesis Lab	E-213	Skill development
Electrical Machines-I Lab	EL-215	Skill development
Electrical Measurement And Measuring Instruments Lab	E-217	Skill development
Analog Electronics Lab	E-219	Skill development
Workshop -III	EL-221	Skill development
Principle & Application Of Economics	E-202	Entrepreneurship
Electronics Instrumentation	E-204	Employability
Computational Techniques	E-206	Employability
Digital Electronics	E-208	Employability
Electrical Machines-II	EL-210	Employability
EMT	E-212	Employability
Computational Technique Lab	E-214	Skill development
Digital Electronics Lab	E-216	Skill development
Electrical Machine-II Lab	E-218	Skill development
Workshop-4	EL-220	Skill development
Electrical Machine-III	EL-301	Employability
Principle Of Communication Engg.	EL-303	Employability
Analog Electronic Circuits	E-305	Employability
Power System-I	EL-307	Employability
Power Electronics	E-309	Employability
Microprocessors And Interfacing	E-311	Employability

Electrical Machine-III Lab	EL-313	Skill development
Power Electronics Lab	E-315	Skill development
Microprocessors and Interfacing Lab	E-317	Skill development
Analog Electronics Circuit Lab	E-319	Skill development
Workshop	EL-321	Skill development
Digital System Design	E-302	Employability
Control Sytems Engg.	EL-304	Employability
Conventional & Cad Of Electric Machine	EL-306	Employability
Advanced Microprocessor & Microcontroller	EL-308	Employability
Electric Power Generation	EL-310	Employability
Power System-2	EL-312	Employability
Control Systems Engg. Lab	EL-314	Skill development
Advanced Microprocessor & Microcontroller Lab	EL-316	Skill development
Digital System Design Lab	E-318	Skill development
Power System Lab	EL-320	Skill development
Workshop-6	EL-322	Skill development
Industrial Training	E-401	Skill development
Digital Signal Processing	E-402	Employability
Electric Drives	EL-404	Employability
Power System Operation And Control	EL-406	Employability
Power System Stability And Facts	EL-426	Employability
Advanced Control System	EL-408	Employability
Computer Applications To Power System	EL-410	Employability
Utilization Of Electrical Energy	EL-412	Employability
High Voltage Engineering	EL-414	Employability
Digital Signal Processing Lab	E-416	Skill development

Electric Drives Lab	EL-418	Skill development
Project/Industrial Project	EL-420/ EL-422	Skill development
Workshop-8	EL-424	Skill development