

**SCHEME OF COURSES FOR B.TECH I YEAR  
COMMON TO ALL BRANCHES**

**B.Tech I year, I Semester  
(Common to all branches)**

<b>Sl. No.</b>	<b>Course No.</b>	<b>Subject</b>	<b>Credits</b>	<b>Teaching Schedule Hrs. LTP</b>	<b>Total</b>
1.	PH-101T	Engineering Physics-I (All Branches)	4	310	4
2.	CY-101T	Engineering Chemistry (EE, EC & EI)	4	310	4
3.	MA-101T	Engineering Mathematics-I (All Branches)	4	310	4
4.	HU-101T	Communicative English (EE, EC & EI)	3	210	3
5.	CS-101T	Computer Fundamentals & Programming (EE, EC & EI)	4	310	4
6.	ME-107 T	Engineering Graphics (CS, CH & ME)	2	120	3
7.	EE-101T	Basic Electrical Engineering (EE, EI & EC)	4	310	4
8.	EI-101T	Basic Electronics Engineering (ME, CS & CH)	4	310	4
9.	CY-103T	Environments Studies (CS, CH & ME)	2	300	3
10.	HU-103T	Fundamentals of Economics (ME, CS & CH)	2	300	3
11.	ME-101T	Manufacturing Techniques (EE, EC & EI)	2	200	2
12.	ME-105T	Basic Mechanical Engineering (CS, CH & ME)	4	310	4
		<b>Total</b>	<b>22</b> (CS, CH, ME) <b>/25</b> (EE, EI, EE)		<b>25/25</b>
<b>Laboratory Courses</b>					
13.	PH-101P	Engineering Physics Lab (CS, CH & ME)	2	003	3
14.	CY-101P	Engineering Chemistry Lab (EE, EI & EC)	2	003	3
15.	CS-101P	Computer Programming Lab (EE, EC & EI)	2	003	3
16.	EE-101P	Basic Electrical Engg. Lab (EE, EI & EC)	2	003	3
17.	EI-101P	Basic Electronics Engg. Lab (CS, CH & ME)	2	003	3
18.	ME-101P	Workshop Practice Lab (CS, CH & ME)	2	003	3
		<b>Total</b>	<b>6/6</b>		<b>9/9</b>
		<b>G. Total</b>	<b>28/31</b>		<b>34/34</b>

**SCHEME OF COURSES FOR B.TECH I YEAR  
COMMON TO ALL BRANCHES**

**B.Tech I year, II Semester  
(Common to all branches)**

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total
1.	PH-102T	Engineering Physics-II (All Branches)	4	310	4
2.	CY-101T	Engineering Chemistry (CH, CS & ME)	4	310	4
3.	MA-102T	Engineering Mathematics-II (All Branches)	4	310	4
4.	HU-101T	Communicative English (CS, CH & ME)	3	210	3
5.	CS-101T	Computer Fundamentals & Programming (CS, CH & ME)	4	310	4
6.	ME-107 T	Engineering Graphics (EE, EC & EI)	2	120	3
7.	EE-101T	Basic Electrical Engineering (CS, CH & ME)	4	310	4
8.	EI-101T	Basic Electronics Engineering (EE, EC & EI)	4	310	4
9.	CY-103T	Environments Studies (EE, EC & EI)	2	300	3
10.	HU-103T	Fundamentals of Economics (EE, EC & EI)	2	300	3
11.	ME-101T	Manufacturing Techniques (CS, CH & ME)	2	200	2
12.	ME-105T	Basic Mechanical Engineering (EE, EC & EI)	4	310	4
		<b>Total</b>	<b>25</b> (CS, CH, ME)/ <b>22</b> (EE, EI, EE)		<b>25/25</b>
<b>Laboratory Courses</b>					
13.	PH-101P	Engineering Physics Lab (EE, EC & EI)	2	003	3
14.	CY-101P	Engineering Chemistry Lab (CS, CH & ME)	2	003	3
15.	CS-101P	Computer Programming Lab (CS, CH & ME)	2	003	3
16.	EE-101P	Basic Electrical Engg. Lab (CS, CH & ME)	2	003	3
17.	EI-101P	Basic Electronics Engg. Lab (EE, EC & EI)	2	003	3
18.	ME-101P	Workshop Practice Lab (EE, EC & EI)	2	003	3
		<b>Total</b>	<b>31</b> (CS, CH, ME)/ <b>28</b> (EE, EI, EE)		<b>34/34</b>

## B.TECH SEMESTER-III ELECTRICAL ENGINEERING

### THEORY COURSES:

Sl. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	MA-201T	Engineering Mathematics-III	4	310	4
2.	EI-201T	Analog Electronics	4	310	4
3.	EE-201T	Network Analysis & Synthesis	4	310	4
4.	EE-203T	Electrical Machines-1	4	310	4
5.	EE-205T	Electrical Measurement	4	310	4
6.	EE-207T	Electrical Engineering Materials	4	310	4
<b>Total</b>			<b>24</b>		<b>24</b>

### LABORATORY COURSES:

Sl. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-203P	Electrical Machines-I	2	003	3
2.	EE-205P	Electrical Measurement	2	003	3
<b>Total</b>			<b>4</b>		<b>6</b>
<b>TOTAL (THEORY + LABORATORY)</b>			<b>28</b>		<b>30</b>

## B.TECH SEMESTER-IV ELECTRICAL ENGINEERING

### THEORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EI-202T	Linear Integrated Circuits	4	310	4
2.	EC-203T	Electromagnetic Theory	4	310	4
3.	EC-204T	Digital Electronics	4	310	4
4.	CS-204T	Computer Organisation	4	310	4
5.	EE-204T	Electrical Machines-II	4	310	4
6.	ME-212T	Industrial Management	4	310	4
<b>Total</b>			<b>24</b>		<b>24</b>

### LABORATORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-204P	Electrical Machines-II	2	003	3
2.	EC-204P	Digital Electronics	2	003	3
3.	EI-202P	Linear Integrated Circuit Lab	2	003	3
<b>Total</b>			<b>6</b>		<b>09</b>
<b>TOTAL (THEORY + LABORATORY)</b>			<b>30</b>		<b>33</b>

**B.TECH SEMESTER-V  
ELECTRICAL ENGINEERING**

**THEORY COURSES:**

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-301T	Control System(EC,EI & EE)	4	310	4
2.	EE-303T	Power Electronics(EC,EI & EE)	4	310	4
3.	EE-305T	Power System-I	4	310	4
4.	EE-307T	Instrumentation	4	310	4
5.	EI-301T	Microprocessor & their applications	4	310	4
6.	EC-202T	Signal & System	4	310	4
<b>Total</b>			<b>24</b>		<b>24</b>

**LABORATORY COURSES:**

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-303P	Power Electronics(EC,EI & EE)	2	003	3
2.	EC-309P	Instrumentation Lab	2	003	3
3.	EI-301P	Microprocessor Lab	2	003	3
<b>Total</b>			<b>6</b>		<b>12</b>
<b>TOTAL (THEORY + LABORATORY)</b>			<b>30</b>		<b>36</b>

## B.TECH SEMESTER-VI ELECTRICAL ENGINEERING

### THEORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-302T	Power System -II	4	310	4
2.	EE-304T	Power Plant Engineering	4	310	4
3.	EE-306T	Computer Simulation Of Power system	4	310	4
3.	EE-308T	Digital & Non Linear Control System	4	310	4
4.	EE-310T	Special Purpose Machines	4	310	4
5.	EC-312T	Elements of Communication Engg.	4	310	4
<b>Total</b>			<b>24</b>		<b>24</b>

### LABORATORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-302P	Control System(EE,EC & EI)	2	003	3
2.	EC-312P	Communication Lab	2	003	3
3.	EE-304P	Computer simulation of Electrical ckt Lab	2	003	3
<b>Total</b>			<b>6</b>		<b>9</b>
<b>TOTAL (THEORY + LABORATORY)</b>			<b>30</b>		<b>33</b>

## B.TECH SEMESTER-VII ELECTRICAL ENGINEERING

### THEORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-401T	Protection & Switchgear	4	310	4
2.	EE-403T	High Voltage Engineering	4	310	4
3.	EE-405T	Industrial Training	3	010	1
4.	HU-402T	Engineering Economics	3	310	4
5.	EE-407T	Seminar	2	020	2
6.		Pool Elective	4	310	4
7.		Open Elective	4	310	4
<b>Total</b>			<b>24</b>		<b>23</b>

### LABORATORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-401P	Protection & Switchgear	2	003	3
2.	EE-403P	Project-I	2	003	3
<b>Total</b>			<b>4</b>		<b>6</b>
<b>TOTAL (THEORY + LABORATORY)</b>			<b>28</b>		<b>29</b>

#### Pool Elective

1. Non Conventional Energy Sources (EE-411T)
2. Neural Networks & Fuzzy Logic (EE-413T)
3. Utilization of Electrical Power & Traction (EE-415T)

#### Open Elective

1. HU-449T Principal of Management
2. MA-491T Operations Research
3. CY-491T Charge Transfer in Plasma
4. HU-493T Introduction to Psychology
5. CY-401T Polymeric Materials and their Applications
6. PH-419T Futuristic Materials

## B.TECH SEMESTER-VIII ELECTRICAL ENGINEERING

### THEORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-402T	Electric Drives & Control	4	310	4
2.	EE-404T	Electrical Machine Design	4	310	4
3.	.....	Open Elective	4	310	4
4.	.....	Pool Elective	4	310	4
<b>Total</b>			<b>16</b>		<b>16</b>

### LABORATORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-404P	Power System	2	003	3
2.	EE-406P	Project-II	10	009	9
<b>Total</b>			<b>12</b>		<b>12</b>
<b>TOTAL (THEORY + LABORATORY)</b>			<b>28</b>		<b>28</b>

### POOL ELECTIVE

1. EE-406T E.H.V AC & DC Transmission
2. EE-408T Power Quality.
3. EE-410T Power System Operation & Control

### OPEN ELECTIVES:

1. HU-402T Engineering Economics
2. PH- 429T Material Imperfection and Applications
3. HU-409T Quantitative Methods in Economics
4. HU-407T Foreign Trade



**B.Tech. FIRST YEAR (FIRST SEMESTER)**

**PAPER CODE:PH-101T      Engineering Physics-I**

**Credits-4**

**LTP(310)**

**(All Branches)**

**UNIT-I**

**Interference:** Coherent sources, Theory of interference, displacement of fringes, Fresnel's biprism experiment, Interference in thin film, wedge shaped film, Newton's rings.

**UNIT-II**

**Diffraction:** Basic idea of Fresnel & Fraunhofer diffraction, single, double and n slit diffraction, diffraction grating, Rayleigh's criterion of resolution, resolving power of telescope, microscope and grating.

**UNIT-III**

**Polarization:** Phenomenon of double refraction, Malus law, Nicol prism, quarter wave and half wave plates, production and analysis of plane, circularly and elliptically polarized light, optical activity, specific rotation, Lorentz half shade and biquartz polarimeters.

**UNIT-IV**

**Wave Mechanics:** Elementary idea of quantization, black body radiation, Frank-Hertz experiment, Photoelectric effect. Wave particle duality, De Broglie concept of matter waves, Heisenberg's uncertainty principle, Schrodinger's wave equation, physical significance of wave function, applications of Schrodinger's wave equation: (i) Particle in one dimensional box. (ii) Potential Step (iii) Potential barrier-quantum mechanical tunneling (Basic idea).

**UNIT-V**

**Solid State Physics:** Structure of crystalline solid: Lattice translational vectors, unit cell, Bravais lattice, Miller indices and simple crystal structures.

Free electron model: Free electron gas in one and three dimensions, Fermi energy, Density of states, Heat capacity of the electron gas, failure of free electron model.

Band theory: Kronig Penny model, motion of electrons in one dimension according to the band theory, effective mass of an electron, concept of hole, distinction between metals, insulators and intrinsic semi-conductors.

**Reference Books:**

- 1) Geometrical & Physical Optics: B.K.Mathur
- 2) Introduction of Solid State Physics: C. Kittel
- 3) Solid State Physics: A.J. Dekkar
- 4) Quantum Mechanics: Singh and Bagdel
- 5) Optics: Ajai Ghatak
- 6) Quantum Mechanics: B.K. Agarwal & Hari Prakash
- 7) Optics: A.H. Flower
- 8) Geometrical & Physical: Zenkin's & White
- 9) Quantum Mechanics: Eisberg

**PAPER CODE:CY-101T**

**Credits:4**

**Engineering Chemistry**

**LTP(310)**

I Sem (EE, EI & EC)

II Sem (CS, CH & ME)

### UNIT-I

**Schrödinger equation:** origin of quantization; applications of particle in a box problem; hydrogen atom; properties of atomic orbitals; many electron atoms; molecular orbital theory; bonding and intermolecular forces.

### UNIT-II

**Thermodynamics:** Fundamental definition and concepts of thermodynamics; Work, heat and energy; First law:  $C_p$  and  $C_v$ ; Second law: entropy; Helmholtz and Gibbs Energy; chemical potential; Third law; phase equilibria; chemical equilibrium.

### UNIT-III

**Chemical kinetics:** Rate laws; elementary reaction and chain reaction.

### UNIT-IV

**Periodic table and periodic properties:** basis of periodic table, trends in size, electron affinity, ionization potential and electro negativity, Use of Ellingham diagram and thermodynamics in the extraction of elements; Transition metal chemistry: inorganic complexes, isomerism, nomenclature; bonding in transition metal complexes; valence bond and crystal field theory, magnetism, bonding aspects, structural distortion; Bioinorganic chemistry: storage and transport proteins; Catalysis: hydrogenation, hydroformylation and olefin metathesis.

### UNIT-V

**Organic Chemistry:** Hückel treatment of ethylene, butadiene and benzene, concept of aromaticity, configuration, molecular chirality and isomerism, conformation of alkanes and cycloalkanes, reactivity of carbonyl groups (additions, addition-eliminations, reactions due to acidic proton, reactivity of acid halide, ester and amide), functional group inter-conversions involving oxidation and reduction. Introduction to bio-organic chemistry: carbohydrates, amino acids proteins and nucleic acids. Polymer chemistry definition, classification of polymers, orientation of polymers, types of polymerization, Mechanism of addition and condensation polymerization, thermo plastic and thermo setting revius: Important thermosetting and thermoplastic polymers: eg. Bakelite, polyester, cellulose derivatives, PVC, Poly ethylene, Teflon, Polystyrene, Nylon Natural and synthetic rubbers.

### Suggested Books

1. P.W. Atkins, **Physical Chemistry** (7th Edition), Oxford University Press, 2006.
2. I. A. Levine, **Physical Chemistry**, McGrawHill, 2009
3. D.A. McQuarrie and J.D. Simon, **Physical Chemistry -a Molecular Approach**, Viva Books Pvt. Ltd., 1998.
4. R.T. Morrison and R.N. Boyd, **Organic Chemistry**, Prentice Hall of India Pvt. Ltd., 5th Ed, 1990
5. G. Solomons and C. Fryhle, **Organic Chemistry**, John Wiley & Sons (Asia) Pte Ltd.
6. J.D. Lee, **Concise Inorganic Chemistry**, (5th Edition), ELBS, 1996.
7. D. F. Shriver and P. W. Atkins, **Inorganic Chemistry**, Oxford University Press, 2006
8. F.W. Bill mayer, **Polymer Science**, Tata McGraw Hill.

**B.Tech. FIRST YEAR (FIRST SEMESTER)**

**PAPER CODE: MA-101T      ENGINEERING MATHEMATICS-I**  
**Credits: 4**

**LTP:310**

**(All Branches)**

**UNIT:I**

**Differential Calculus:** Limit, continuity and differentiability of functions of single variable. Successive, Differentiations, Leibnitz Theorem, Expansion of functions by Maclaurin's and Taylor's theorems.

Functions of several variables: Partial derivatives, Euler's theorem, change of variables, total differential coefficients, maxima and minima, Lagrange's method of multiplier.

**UNIT:II**

**Integral Calculus:** Fundamental and mean value theorems of integral calculus. Reduction formulae, Walli's formula, Beta and Gamma functions, Double and Triple integrals, change of orders of integrations. Area enclosed by plane curves, surfaces and volumes of revolutions.

**UNIT:III**

**Vectors and Matrices:** Differentiations and integrations of vectors. Gradient, Divergence and Curl. Vector identities, Green's, Gauss's and stoke's theorems with applications.

Types and algebra of matrices, rank, solution of simultaneous linear equations, Eigen values and Eigen vectors, diagonalisation of matrices, Cayley-Hamilton Theorem.

**References:**

1. E.Kreyszig: Advance Engineering mathematics, John Wiley & Sons, 2005.
2. B.V.Ramana: Higher Engineering Mathematics, Tata McGraw Hill Co. Ltd., 2008
3. R.K.Jain & S.R.K. Iyenger: Advance Engineering Mathematics, Narosa Publishing House, 2002.
4. J.C. Sharma: Vector Algebra, Students & Friends Co. Ltd. Agra.
5. J.K.Goel & K.P.Gupta: Matrix algebra, Students & Friends Co. Ltd. Agra.
6. H.K.Dan: Advanced Engineering Mathematics.

**PAPER CODE:HU 101T**

**COMMUNICATIVE ENGLISH**

**LTP:310**

**Credits:3**

**I Semester (EE, EC & EI)**

**II Semester (CS, CH & ME)**

**UNIT:I**

**(a)Pronunciation:** basic sounds of English (vowels and consonants) and word-stress.

**(b) Vocabulary:** word-formation (prefixes and suffixes),synonyms and antonyms.

**(c) Syntax:** parts of speech, active and passive voice, direct and indirect speech, tenses, basic sentence patterns, etc. The literary aspect will be dealt with through suitable texts such as poems, short stories and plays (chosen by the instructors). The main topics for discussion will be:

(a) What is literature?

(b) The nature of literary language (mainly “figurative “language)

(c) The literary forms or genres

(d) Literature and socio-cultural context

**UNIT:II**

Pre-Requisites of Scientific Writing: Salient features: BOCUST formula. Grammatical pre-requisites: Usage, Sentence fragments, questions tag. Modifiers, connectives Split infinitives, Dangling participle Gereunds, ellipsis coherence & unity: Method.

**UNIT I:**

**Introduction to Computers:** Basic definition, Generation, Classification of computers, Introduction to Computer architecture. **Number Systems:** Introduction, Classification- Decimal, Binary, Octal, Hexa Decimal, and their convertibility, Data representation, ASCII, BCD, Gray Code. **Input/Output:** Input System, Input device- Keyboard, Mouse, Joystic, Lighten, MCR MICR, Touch Screen, Graphic Tablet, Voice Input System, Output System, Output Devices- VDU, Printers, Plotters.

**UNIT II:**

**Planning The Computer Program:** Purpose of program planning, Algorithms, Flowcharts, Decision Tablets, Pseudo code. **Memory:** Introduction, Characteristic, Main Memory, secondary memory, Back- Up Memory, Cache Memory, Primary Memory, Semiconductor Memory, Memory Management Unit.

**UNIT III:**

**Basic Operating System Concept:** MS-DOS, WINDOWS, Introduction to basic commands Of DOS, Evolution of Operating Systems, Batch Processing, Spooling, Multiprogramming, Multiprocessing, Time Sharing, On Line Processing, Real-Time Processing, Introduction to Internet, Basic Terms related with internet.

**UNIT IV:**

**Computer Software:** Introduction to Software, Relationship between Hardware and Software, Types of Software, Acquiring software, Firmware.

**UNIT V:**

**Programming in C:** History, Introduction to C Programming, Language, Structure of C Programs, Compilation and Execution of C Programs, Debugging Techniques, Data Type and sizes, Declaration of Variables, Modifiers, Identifiers and Keywords, Symbolic constants, Storage Classes( Global, Automatic, External, Register, And Static), Enumerations, Command line Parameters, Macros, The C Preprocessors.

**UNIT 5:**

**Operators:** Unary Operators, Arithmetic and Logical Operators, Bit wise Operators, Assignment Operators, Expressions, Conditional Expressions, Precedence and order of evaluation. **Control Statements:** if-else, switch, break, continue, the comma operator, Goto statement. **Loops:** for, while, do-while. **Functions:** Built-in and user-defined, Function declaration, Definition and Function call, parameter passing, call by value, Call by reference, Recursive Functions, Multifile programs. **Arrays:** Linear Arrays, Multidimensional Arrays, Passing array to functions, Arrays of strings.

**UNIT 6:**

**Structure And Union:** Definition and differences, Self-referential Structure. **Pointers:** Introduction, Accessing the address of a variable, Declaring & Initializing pointers, Accessing a variable through in pointer, Pointers and Arrays, Pointers and character strings, Pointers and functions.

**References:**

- 1) Computers Fundamental by Rajaraman
- 2) Computers Fundamental by B. Ram.
- 3) Computers Fundamental by P.K. Sinha.
- 4) 'Programming in C' by E. Balagurusamy, TMIL.
- 5) 'Let Us C' by Yashwant Kanetkar, Narosa.
- 6) Exploring 'C' by Yashwant Kanetkar

**PAPER CODE:ME-101T MANUFACTURING TECHNIQUES**

**Credit:02**

**LTP:200**

**I Semester (EE, EC & EI)**

**II Semester (CS, CH & ME)**

**Unit:I**

**Carpentry:-**Wood, timber-exogenous & endogenous, Cross section of an exogenous tree, Seasoning of wood, Seasoning methods, defects (Both natural and that occurs during conversion), Brief description of carpentry tools, various carpentry process. Carpentry joints.

**Unit:II**

**Pattern & Pattern making:-**Pattern, types of pattern (Single piece, split, Match plate, Sweep, Loose piece, Gated patterns), Pattern making allowances, Design considerations in pattern making, pattern making materials, Core prints.

**Unit:III**

**Foundry:-**Moulding materials, types of foundry sands; characteristics of foundry sands; Binders & additives; moulding procedures: Floor moulding, Bench moulding, Pit moulding, Machine moulding, Green sand moulding, Dry sand moulding, CO<sub>2</sub>, Core making processes.

**Unit:IV**

**Foundry' tools & equipments:-** Tools used in foundry (hand tools); moulding machine- (Jolt machine, Squeezing machine, Sand Slinger, Push off machine), Furnaces (Pit furnace, cupola furnace).

**Unit:V**

**Welding:-**Welding: Pressure and non-pressure, arc welding (AC and DC arc welding, Introduction to Carbon arc welding, metal arc welding, TIG & MIG welding); Electric resistance welding (Spot, seam, projection, But, thermit welding), welding tools and equipments, Gas welding (oxyacetylene).

**Unit:VI**

**Bench work & fitting:-** Tools (holding tools, striking tools, cutting tools), various operations performed in fitting shop (in detail).

**Unit:VII**

**Machine tools: Definition, type:**Lathe specifications; Lathe operations in brief (facing, plain turning, step turning, taper turning, threading, drilling and boring). Milling machine (introduction & brief description of operations only).

**Unit:VIII**

**Jigs & Fixture:** Introduction, Location points, Basic Design of Jigs & Fixture, Types of Jigs & Fixture.

**Text Book:**

A text Book on workshop technology by B. S. Raghuvanshi

**Reference Book:**

Workshop technology by Hazara & Chaudhry,

Production technology by R.'K.Jain

**PAPER CODE:ME-107T**

**ENGINEERING GRAPHICS**

**LTP:120**

**Credits: 02**

**I Semester (CS, CH & ME)**

**II Semester (EE, EC & EI)**

**UNIT:I**

Importance of Engineering Drawing, Engineering Drawing Instruments and uses, Layout of Drawing sheet, Lettering and Dimensioning, Types of Lines. Scales: What is scale, Representative factor, Types of Scale: Plain, Diagonal and Vernier scales, Metric Measurements and conventions, Plain Scale, diagonal scale& vernier scale(forward & backward both).

**UNIT:II**

Conic Section, Definition, and different methods of construction of ellipse, hyperbola and parabola by Eccentricity method Construction of parabola and ellipse by Concentric circles method, Oblong method, Parallelogram method.

**UNIT:III**

Projections, Principle, types and conventions, Theory of Projections and orthographic projections:- Introduction, Types of projections, Orthographic projections, Planes of Projection, Four quadrants, Types of orthographic projections, (a) Projections of point and straight lines, (b) Projections of lines inclined to both the planes, Projection of planes, (a) Projection of solids (b) Projection of solids inclined to both H.P. & V.P. (of prisms pyramids etc).

**UNIT:IV**

Isometric Projections: Theory of isometric projection- Isometric lengths, Isometric scales:- Methods to draw Isometric view or projection, various positions of Isometric axes. Isometric projection with isometric lines, non-isometric lines and with curved & circular surfaces.

**Recommended Text Book**

- 1.A Text book of Engineering Drawing (Geometrical Drawing) by R.K. Dhawan
2. Engineering Drawing & Graphics, by K.Venugopal Rao
3. Engineering Drawing by P.S. Gil
4. Engineering Drawing by N. D. Bhatt

**Credits: 4****LTP: 3 1 0****I Semester (ME, CH & CS)****II Semester (EE, EC & EI)****UNIT I:**

**Introduction of Semiconductor Physics:** Band Theory of solids, Insulator, Semiconductor & Metals, Mobility and Conductivity, Electrons and holes in an intrinsic semiconductor, Carrier concentration in an intrinsic semiconductor, n-type material, p-type material, Donor and Acceptor impurities, Charge densities in a semiconductor, Hall-effect, Diffusion, the continuity equation, Fermi level in a semiconductor having impurities.

**UNIT II:**

**Junction Diode Characteristics:** p-n junctions, Forward bias, Reverse bias junction, V-I characteristics, Effect of temperature on a p-n junction diode, Maximum temperature operation, Reverse breakdown voltage, Capacitive effects in a p-n junction diode, Space charge capacitance, Diffusion capacitance, Diode Resistance, Static and Dynamic Resistance, Comparison of practical with ideal diode, load line analysis of a diode circuit.

**UNIT III:**

**Rectifying Circuits and DC Power supplies:** p-n junctions as an rectifier, form factor, average voltage and current, half wave & full wave rectifier, voltage regulation, Ripple factor, Bridge rectifier, Comparison of rectifier circuits, Filter circuits for power supplies, inductor filter, capacitor filter, Effect of capacitor series resistance, Peak inverse voltage of a half wave rectifier, LC filter, Comparison of filter circuits.

**UNIT 4:**

**Diode Applications:** Clippers, Series and parallel, Clampers, Zener diodes, Zener diode specification, Voltage regulator circuits, Design of a voltage regulator circuits, Effect of supply voltage variations, Zener diode breakdown mechanism, Voltage multiplier circuits, voltage doublers, voltage Tripler, Quadripler.

**UNIT 5:**

**Bipolar Junction Transistor:** The junction transistor, Transistor current components, transistor as an amplifier, Common base configuration. Early effect, the input and output characteristics, Common emitter configuration I/O characteristics, Active, Saturation, Cut-off regions for both configurations, common collector configuration, common base current gain, common emitter current gain.

**REFERENCES**

1. Integrated Electronics: Analog and Digital Circuits and System by Millman, Halkias and Parikh, TMH, Second Edition.
2. Electronic Devices and Circuits, An introduction by Allen Mottershead, TMH.
3. Electronic Devices and Circuits theory by Robert L. Boylestad, Louis Nashelsky,



**B.Tech. FIRST YEAR (SECOND SEMESTER)**

**PAPER CODE: MA-102T**

**ENGINEERING MATHEMATICS-II**

**Credits:4**

**LTP:310**

**(All Branches)**

**UNIT:I**

**Numerical Techniques:** Numerical solution of algebraic and transcendental equations by Bisection method, Secant method, Regula-Falsi and Newton-Raphson methods. Numerical integration by Gauss quadrature formula, Trapezoidal rule, Simpson's rule and Weddle's rule. Numerical solution of ordinary differential equations by Euler's method, Milne's method and Runge-Kutta method.

**UNIT:II**

**Probability and statistics:** Definitions of probability and simple theorems, conditional probability, Baye's Theorem, random variables, discrete and continuous distributions, Binomial, Poisson and normal distributions, correlation and linear regression.

**UNIT:III**

**Complex Analysis:** Analytic functions, C-R equations in Cartesian and polar forms, Harmonic functions, Milne-Thomson method, complex integration, Cauchy's theorem, Cauchy's integral formula. Liouville's and Morera's Theorems, Taylor's and Laurent's theorems. Residues: Cauchy's residue theorem, evaluation of real integrals of the type  $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$  and  $\int_{-\infty}^{\infty} f(x) dx$ .

**References:**

1. E.Balagurusamy: Numerical Methods, Tata McGraw Hill, 2008.
2. Devi Prasad: An introduction to Numerical analysis, Narosa Publishing House, 2006.
3. J.B.Conway: Functions of one complex variable, springer verlag, International Students Edition Narosa Publishing House, 1980.
4. A.M.Goon, M.K.Gupta & B.Das Gupta: Basic Statistics, The world Pren Pvt. Ltd., Calcutta, 1991.
5. L.V.Alhfors: Complex analysis, Tata McGraw Hill, 1979.

**PAPER CODE:EE-101T**

**BASIC ELECTRICAL ENGINEERING**

**LTP:310**

**Credits: 4**

**I Semester (EE, EC & EI)**

**II Semester (CS, CH & ME)**

**UNIT I:**

**Basic Concept:** Definitions & units, Introduction to Basic Laws, Circuit Elements, KVL, KCL, Ideal & Real Sources, Dependent & Independent Sources, Conversion of Voltage Source into Current Source & vice Versa, Controlled and Uncontrolled Sources, Loop and Nodal Method of analysis, Star to Delta Transformation & vice-versa.

**UNIT II:**

**Magnetic Circuit:** MMF, Flux, Reluctance, Magnetic Effect of Electrical Current, Hysteresis & Eddy Current Losses.

**UNIT III:**

**Network Theorems:** Superposition, Thevenin, Norton, Maximum Power Transfer & Reciprocity Theorems.

**UNIT IV:**

**Steady-State Response:** Steady-State Response of Circuit to Sinusoidal functions, Phasor Representation of Sinusoids, Concept of Complex Impedance, Series & Parallel AC Circuits, Series & Parallel resonance

**UNIT V:**

**Balanced Three-Phase Circuit:** Generation of Three Phase Voltage, Star/Delta Connected Supply, Balanced Load Circuits, Line and Phase Voltage & current Relations. Concept of Three Phase Power.

**UNIT VI:**

**Transient:** Response of RC, RL & RLC Circuit to DC Excitation only (simple problem).

**UNIT VII:**

**Instruments:** Introduction to MI,MC Instruments, Extension of range, Dynamometer Type Wattmeter, Simple problems based on these instruments.

**Books:**

- 1) Basic Circuit Theory by L.P.Huelsman, PHI.
- 2) Hughes Electrical Technology by M.Smith, Addison-Wesley Pub
- 3) Electrical Technology by B.L.Theraja.
- 4) Electrical Engineering Fundamentals by V.Deltoro, PHI

**B.Tech. FIRST YEAR (SECOND SEMESTER)**

**PAPER CODE:PH-102T**

**ENGINEERING PHYSICS-II**

**Credit:4**

**LTP:310**

**(All Branches)**

**UNIT:I**

**Dielectric Properties of Materials:** Polarization of dielectrics, dielectric constant, electric susceptibility, non-uniform polarization, electric displacement vector, Lorentz local field, Polarizability, Clausius-Mosotti relation, frequency dependence of dielectric constant.

**UNIT:II**

**Magnetic Properties of Materials :** Magnetization, three magnetic vectors (B,M & H), susceptibility and permeability, Dia, Para, and ferromagnetism, Magnetic domains, hysteresis, Ferro electricity & Piezoelectricity.

**UNIT:III**

**Maxwell's Equations:** Displacement Current, Maxwell's equation in vacuum & medium (Integral and Differential forms), Poynting theorem, Poynting vector.

**UNIT:IV**

**Electromagnetic Waves:** Wave equation, plane waves, Propagation of electromagnetic waves through non-conducting medium, reflection and transmission.

**UNIT:V**

**Superconductivity:** Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Type I and Type II superconductors, BCS theory (Qualitative), high temperature superconductors. Characteristics of superconductors in superconducting state, applications of superconductors.

**UNIT:VI**

**Nuclear Physics:** Basic properties and constituents of nucleus, mass defect, packing fraction and binding energy, semi empirical mass formula, elementary idea of nuclear forces and their characteristic properties, Nuclear fission, important components and working of nuclear fission reactor, Basic Concept of nuclear fusion reactors.

**Books:**

- 1) Electricity and Magnetism: Berkley Physics Course-II.
- 2) Electromagnetic waves & Radiating systems: Jordan and Keith.
- 3) Solid State Physics: C.Kittel
- 4) Nuclear Physics: I. Kaplan
- 5) Modern Physics: A.Beiser
- 6) Electrodynamics: d.Griffith.

**PAPER CODE:CY-103T**

**ENVIRONMENTAL STUDIES**

**LTP:300**

**Credits:2**

**I Semester (CS, CH & ME)**

**II Semester (EE, EC & EI)**

Multidisciplinary nature of environmental studies, Ecosystems, Biodiversity and its conservation, Indicators of environmental pollution, Environment and human health. Consumption of natural resources and environmental degradation of forests, water, coal, minerals, energy, and land. Sustainable development, Environmental policy and legislation, Environmental impact assessment. Pollution of lakes, rivers, ground water, coasts, and oceans, Science and technology for drinking water and wastewater treatment and issues in management of systems. Solid and hazardous waste management: causes, effects and control measures. Air and noise pollution, science and engineering of pollution control, Global Issues including climate change, global warming, acid rain, ozone layer depletion, nuclear hazards, Disaster management, industrial accidents, floods, earthquakes, cyclones and landslides, Green house effect etc.

**Suggested Books**

1. W.P. Cunningham and M.A. Cunningham, **Principles of Environmental Science**, Tata McGraw-Hill Publishing Company, New Delhi, 2002.
2. J.A. Nathanson, **Basic Environmental Technology**, Prentice Hall of India, New Delhi, 2002.
3. S.J. Arceivala, and S.R. Asolekar, **Wastewater Treatment for Pollution Control and Reuse** (3rd Edition), Tata McGraw Publishing Co. Ltd., New Delhi, 2006.
4. S.R. Asolekar, and R. Gopichandran, **Preventive Environmental Management: An Indian Perspective**, Foundation Books Pvt. Ltd., New Delhi, 2005. Some selected book-chapters, monographs and journal papers

**PAPER CODE:HU-103T**

**FUNDAMENTALS OF ECONOMICS**

**LTP:300**

**Credits:2**

**I Semester (CS, CH & ME)**

**II Semester (EE, EC & EI)**

**UNIT:I**

**Microeconomics:** What is Economics? basic economic problems and nature of economics; demand and supply; consumer choice; individual and market demand; production and cost of production; profit maximization and perfect competition; market structure-monopoly, monopsony, monopolistic competition, and oligopoly; externalities and public goods; factor markets-land, labour and capital market.

**UNIT:II**

**Macroeconomics:** National income accounting-income, expenditure and components of GDP; consumption and saving; investment spending and demand for money; financial systems-central bank, money, credit, financial markets and asset prices; income and spending; money, interest and income; fiscal and monetary policies; economic growth and accumulation; aggregate supply-wages, prices and unemployment; inflation.

**Suggested Books:**

1. R.S. Pindyck and D.L. Rubinfeld. **Microeconomics** (7th Edition), Pearson Prentice Hall, New Jersey, 2009.
2. R. Dornbusch, S. Fischer, and R. Startz. **Macroeconomics** (9th Edition), McGraw-Hill Inc. New York, 2004.

PAPER CODE:ME-105T

BASIC MECHANICAL ENGINEERING

LTP:310

Credits: 04

I Semester (CS, CH & ME)

II Semester (EE, EC & EI)

### A. THERMODYNAMICS:

#### UNIT: I

**Fundamental Concepts and definitions:** Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view. Density, specific volume, pressure, temperature. Thermodynamic equilibrium, property, state, path, process, cyclic process, Energy and its form, work and heat, Enthalpy.

#### UNIT: II

**Zerth Law:** Concepts of temperature, zeroth law.

**First Law:** First law of thermodynamics. Concept of processes, flow processes and control volume, flow work, steady flow energy equation, Mechanical work in a steady flow of process.

**Second Law:** Essence of second law, Thermal reservoir, Heat engines. COP of heat pump and refrigerator, Statements of second law. Carnot cycle, Clausius inequality, Concept of Entropy.

#### UNIT: III

**Properties of steam and thermodynamics cycles:** Properties of steam, use of property diagram, Steam-Tables, processes involving steam in closed and open systems. Rankine cycle.

Introduction to I.C. Engines-two & four stroke S.I. and C.I. engines. Otto cycle, Diesel cycle.

### B. MECHANICS

#### UNIT: IV

**Force system and Analysis:**

**Basic Concept:** Laws of motion. Transfer of force to parallel position. Resultant of planer force system. Free Body Diagrams, Equilibrium and its equation, Centre of gravity, Moment of Inertia.

**Friction:** Introduction, Laws of coulomb friction, Equilibrium of bodies involving dry friction-Belt Friction.

#### UNIT: V

**Stress and Strain Analysis:**

**Simple stress and strain:** Introduction, Normal shear stresses, stress-strain diagrams for ductile and brittle materials, elastic constants, one dimensional loading of members of varying cross sections, strain Energy.

#### UNIT: VI

**Newton's Second Law:** D' alemberts Principle-problems (for horizontal & inclined surface). Analysis of lift, motion problem. Motion of several connection bodies, Motion of two bodies connected by as tiring, when one body is lying on horizontal surface and other is hanging free, when one body is lying on inclined plane and other is hanging free case (i) Smooth inclined surface case (ii) Rough inclined surface of co-efficient of friction ' $\mu$ ' (only problems).

**Work Power & Energy:** work-Units of work-Problems (horizontal & inclined surface). Power Derivation of the expression for power required to drive a body, problems energy, Types of energy problems. Laws of conservation of energy. Newton's law of conservation of momentum. Plastic impact & Elastic impact. Driving a pile into ground-problems. Motion of connected bodies, work done by spring.

**Books:**

- 1) Thermodynamics by P.K. Nag.
- 2) Thermodynamic by P.L. Ballaney.
- 3) Engineering Mechanics & Strength of Materials by R.K.Bansal (Chapter 6, 7 & 9)  
Lakshmi Publications, New Delhi.
- 4) Holman, J.P.: Thermodynamics, MC Graw Hill book Co. NY.
- 5) Yadav R.: Thermodynamics and Heat Engines. Vol I & II (SI Edition) Central  
Publishing House Allahabad.
- 6) Yadav R.: Steam & Gas Turbines.
- 7) Engineering Mechanics by S.S. Bhavikatti & K.G. Rajashekarappa (Chapter 9 & 10)  
New Age Publications, New Delhi
- 8) F.L. Singer: Strength of Materials.
- 9) Timoshenko: Strength of Materials.

**Subject: Analog Electronics**  
**Branches: EC, EI, CSIT and EE**

**Code: EI-201 T**  
**Sem: III semester**

**Credits:4**  
**L P T: 3 1 0**

**Unit 1:- Transistor as an amplifier:** Transistor Biasing and thermal stabilization: The operating point, Biasing Circuits, fixed bias, bias stability, self bias or emitter bias, fixing of Q-point using graphically & analytical methods, stabilization against variation in  $I_{CO}$ ,  $V_{BE}$ ,  $\beta$ : Bias compensation Diode for  $I_{CO}$ ,  $V_{BE}$ .

**Unit 2:- The Transistor at low frequencies:** Two port devices and the hybrid model. The h-parameter, determination of h-parameter from input and output characteristics. Analysis of a transistor amplifier circuit using h-parameters; the emitter follower (its modelling), miller's theorem and its dual, cascading transistor amplifier (up to 2 stages), simplified hybrid model, high input resistance transistor circuit e.g. Darlington, Emitter follower.

**Unit 3:- Field effect transistors:** General description on FET, JFET operations, and its characteristic, MOSFET, the FET small signal model, CS and CD amplifiers at high and low frequencies.

**Unit 4:- Feedback amplifiers:** Classification of amplifiers, feed back concepts, transfer gain with feedback, general characteristics of negative feedback amplifier, input and output resistances for voltage series, current series, current shunt, voltage shunt feedback, analysis of feedback amplifier (voltage series, current series, current shunt, voltage shunt feedback).

**Unit 1:- Power amplifier:** Class A large signal amplifier, second harmonic distortion, higher order harmonic generation, the transfer audio power amplifier, efficiency, class B, class C, class AB and push-pull amplifier.

## REFERENCES

1. Integrated Electronics Analog and Digital circuits and systems, J. Millman, Halkias and Prikh, TMD.
2. Electronics Devices and Circuit Theory; Robert Boylestad & Nashlasky (PHI).
3. Electronics Devices and Circuit: Allen mottershed (TMH).



B-TECH. SEMESTER-III  
**NETWORK ANALYSIS AND SYNTHESIS**  
EE-201T

FOR EE, EC & EI BRANCHES	L	T	P	TOTAL
	3	1	0	4

**Unit – I:**

**Graph Theory :** Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Nodal methods of analysis.

**Unit – II:**

**Network Theorems (Applications to ac networks):** Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

**Unit – III:**

**Laplace transforms:** Introduction to Laplace Transform

**Unit-IV:**

**Fourier Series:** Introduction to Fourier Analysis.

**Unit – V:**

**Network Functions :** Concept of Complex frequency , Transform Impedances, Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot.

**Unit – VI :**

**Two Port Networks:** Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & II Representation.

**Unit – VII :**

**(a) Network Synthesis :** Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

**(b) Filters:** Image parameters and characteristics impedance, passive and active filter fundamentals, low pass, highpass, (constant K type) filters, and introduction to active filters.

**Text Books:**

1. Networks and Systems, D. Roy Chowdhury, New Age International Publishers
2. Network Analysis and Synthesis, C.L. Wadhwa, New Age International Publishers
3. Circuit and Networks: Analysis and synthesis, A. Sudhakar & S.S. Palli 4<sup>th</sup> edition. Tata Mc Graw Hill Education Pvt. Ltd.
4. Circuit theory, Dr. Abhijit Chakrabarty, Dhanpat Rai & Co Pvt. Ltd.

**Reference Books:**

1. Network Analysis, M.E. Valkenburg, Pearson Education .
2. Fundamental of Electric circuit theory, D. Chattopadhyay & P.C. Rakshit, S. Chand.
3. Engineering Circuit Analysis, W.H. Hyat, J.E. Kemmerly & S.M. Durbin, The Mc Graw Hill Company.
4. Electric Circuit, M. Nahvi & J.A. Edminister, Schum's outline series, The Mc Graw Hill Company.
5. Electric Circuit Analysis, S. Sivanagaraju, G. Kishor, C.Srinivasa Rao, Cengage Learning
6. Fundamental of Electric Circuits, Charles K. Alexander, Mathew. N.O. Sadiu, Tata Mc Graw Hill Education.
7. Engineering Circuit Analysis, W.H. Hayt, J.E. Kemmerly, S.M. Durbin, The Mc Graw Hill Companies
8. Introduction to Electric Circuits, Richard C. Dorf, James A. Svoboda, Wiley India Edition.

**Subject: Engineering Mathematics-III**

**Code: MA-201 T**

**Credits: 4**

**Branches: EC, EI EE and CSIT**

**SEM: III Semester**

**L P T: 3 1 0**

Note: A setting of eight questions will be there covering all the units proportionally out of which any five are to be attempted.

UNIT:1 **Ordinary Differential Equations:** First order equations (linear and non-linear). Linear equations of second and higher orders with constant and variable coefficients. Solution of second order equations by removing first derivative, changing of dependent and independent variables and method of variation of parameters.

UNIT:2 **Special Functions & Partial Diff. Eqns:** Power Series solutions of second order equations by Frobenius method. Legendre polynomials and Bessel's functions of first kind and their properties method of separation of variable for heat, wave and Laplace equations: Their solutions and related application.

UNIT:3 **Integral Transforms:** Laplace transform, existence theorem, Laplace transform of derivatives and integrals, Laplace transform of special functions. Inverse Laplace transform, convolution theorem. Applications of Laplace transform and its inverse to solve ordinary and partial differential equation. Introduction to Fourier transforms. Fourier series, half range sine and cosine series, related applications.

#### References

1. J.N.Sharma: Differential Equations, Krishna Prakashan Media (P) Ltd., Meerut.
2. B.V.Raman: higher Engineering Mathematics, Tata McGraw Hill Co., Ltd., 2008.
3. R.K.Jain & S.R.K. Iyenger: Advance Engineering Mathematics, Narosa Publishing House, 2002.
4. A.R.Vashistha: Integral Transforms Krishna Prakashan Media (P) Ltd., Meerut.
5. G.G.Simmons: Differential Equations, Tata McGraw Hill Co. Ltd., 1981.

**Subject: Electronic Measurement & Instrumentation**

**Code: EI-203T**

**Credits: 4**

**Branches: EC,EI**

**Sem: III Sem**

**L P T: 3 1 0**

**Unit 1:- Measurement & measurement system:** Methods of measurement, Direct & Indirect types of measurement systems, Mechanical, Electrical: Classification of Instruments, Null type, deflection type; Mode operation: Analog, Digital.

**Unit 2:- Characteristics of Instrumentation & measurement System:**Static & Dynamic characteristics, Noise, Linearity hysteresis, Threshold, Dead Time & Dead Zone, Loading Effect, Input & Output Impedance.

**Unit 3:- Errors in measurements**

**Unit 4:- Dynamic response of Instruments & measuring Systems:** Dynamic response, First order system, second order System

**Unit 5:- Bridges:** DC Bridge-Wheatstone Bridge, Kelvin Bridge, measurement of low & High Resistance; AC Bridge-General equation of bridge balance, General form of AC Bridge, Maxwell's Bridge. Hay's Bridge, Wein Bridge, Schering Bridge.

**Unit 6:- Potentiometers:** DC Basic Circuit, Laboratory type, Standardization of Potentiometers; AC: Drysdale polar potentiometers, Gall-Tinsley AC Potentiometer (Working & Construction both).

**Unit 7:- Analog Ammeter & Voltmeter**

**Unit 8:- Measurement of Power & Wattmeter:** Power in DC & AC Circuit, Electrodynamic Wattmeter, Measurement of Power in 3 Phase circuit, 3 Phase Wattmeter, Measurement refractive power.

**Unit 9:- CRO:** Observation of waveform on CRO, Measurement of Large & frequency (Lissajous figure).

### **REFERENCE BOOKS**

Electronic Measurement & Instrumentation Published, Dhanpat Rai & Sons, By:- A.K. Sawhney.

B-TECH. SEMESTER-III  
**ELECTRICAL MACHINE-I**  
EE-203T

L	T	P	TOTAL
3	1	0	4

**UNIT – I:**

**Electromechanical Energy Conversion Principles:**

Principle of energy conversion.

**UNIT-II:**

**Single Phase Transformer:**

Construction & principle of ideal two winding transformer, no-load current waveform, plotting of no-load current waveform from B-H curve, phasor diagrams at no-load and at load conditions , rating, equivalent circuit ,tests, voltage regulation, losses and efficiency, auto transformer, parallel operation of single phase transformer.

**UNIT-III:**

**Three Phase Transformer**

Types of connections , 3 to 2 phase & 3 to 6 phase conversions.

**UNIT-IV:**

**D.C. Machines:**

Construction of DC Machines, Armature winding, Emf and torque equation , Armature Reaction , Commutation , Interpoles and Compensating Windings, Self excitation of shunt generator, Performance, Types & Characteristics of D.C. generators.

**UNIT-V:**

**D.C. Machines (Contd.):-**

Performance & Characteristics of D.C. motors ,Starting of D.C. motors ; 3 point and 4 point starters , Speed control of D.C. motors: Field Control , armature control and Voltage Control (Ward Leonard method); Efficiency and Testing of D.C.machines (Hopkinson's Test ,Swinburn's Test & Direct load test)

**Text Books:**

1. I.J. Nagrath & D.P.Kothari," Electrical Machines", Tata McGraw Hill
- 2 .Husain Ashfaq ," Electrical Machines", Dhanpat Rai & Sons
- 3 . A.E. Fitzgerald, C.Kingsley Jr and Umans,"Electric Machinery" 6th Edition McGraw Hill, International Student Edition.
- 4 . B.R. Gupta & Vandana Singhal, "Fundamentals of Electrical Machines, New Age International.

**Reference Books:**

5. Irving L.Kosow, "Electric Machine and Transformers", Prentice Hall of India.
6. M.G. Say, "The Performance and Design of AC machines", Pit man & Sons.
- 7 . Bhag S. Guru and Huseyin R. Hizirogulu, "Electric Machinery and Transformers" Oxford University Press, 2001.

B-TECH. SEMESTER-III  
**ELECTRICAL MEASUREMENT**  
EE-205T

L	T	P	TOTAL
3	1	0	4

**UNIT I:**

**(1)Philosophy Of Measurement:**

Methods of Measurement, Measurement System, Classification of instrument system, Characteristics of instruments & measurement system, Errors in measurement & its analysis, Standards.

**(2)Analog Measurement of Electrical Quantities :**

Electrodynamic ,Thermocouple, Electrostatic & Rectifier type Ammeters & Voltmeters , Electrodynamic Wattmeter, Three Phase Wattmeter, Power in three phase system , errors & remedies in wattmeter and energy meter.

**UNIT II:**

Instrument Transformer and their applications in the extension of instrument range, Introduction to measurement of speed, frequency and power factor.

**UNIT III:**

**Measurement of Parameters:**

Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q Meter.

**UNIT IV:**

**(1) AC Potentiometer:** Polar type & Co-ordinate type AC potentiometers , application of AC Potentiometers in electrical measurement

**(2) Magnetic Measurement:** Ballistic Galvanometer , flux meter , determination of hysteresis loop, measurement of iron losses.

**Text Book:**

1. E.W. Golding & F.C. Widdis, "Electrical Measurement &Measuring Instrument", A.W. Wheeler& Co. Pvt. Ltd. India.
2. A.K. Sawhney,"Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons , India .

**Reference Books:**

3. Forest K. Harries,"Electrical Measurement",Wiley Eastern Pvt. Ltd. India .
4. M.B. Stout ,"Basic Electrical Measurement" Prentice hall of India,India.
5. W.D.Cooper," Electronic Instrument & Measurement Technique " Prentice Hall International.
6. Rajendra Prashad ,"Electrical Measurement &Measuring Instrument" Khanna Publisher.
7. J.B. Gupta, "Electrical Measurements and Measuring Instruments", S.K. Kataria & Sons.

B-TECH. SEMESTER-III  
**ELECTRICAL ENGINEERING MATERIALS**  
EE-207T

L	T	P	TOTAL
3	1	0	4

**UNIT – I:**

**Crystal Structure of Materials:**

**A.** Bonds in solids, crystal structure, co-ordination number, atomic packing factor, Miller Indices, Bragg's law and x-ray diffraction, structural Imperfections, crystal growth

**B.** Energy bands in solids, classification of materials using energy band.

**UNIT-II:**

**Dielectric Material:**

Dielectric Constant, Polarization, Atomic Interpretation of Dielectric Constants of Mono-atomic Gases, Poly-Atomic Molecules & Poly-Atomic Gases, Internal Fields in Solids & Liquids, Static Dielectric Constant of Solids, Ferro-Electric Materials, Spontaneous Polarization Piezoelectricity, Frequency Dependence of Electrical Polarizability, Complex Dielectric Constant, Dielectric Relaxation, Dielectric Losses.

**UNIT – III:**

**Conductivity of Metals:**

Electron theory of metals, factors affecting electrical resistance of materials, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, superconductivity and super conducting materials, Properties and applications of electrical conducting and insulating materials, mechanical properties of metals.

**UNIT – IV:**

**Mechanism of Conduction in semiconductor materials:**

Types of semiconductors, current carriers in semiconductors, Hall effect, Drift and Diffusion currents, continuity equation, P-N junction diode, junction transistor, FET & IGFET, properties of semiconducting materials.

**UNIT – V:**

**Magnetic Properties of Material:**

Origin of permanent magnetic dipoles in matters, Classification Diamagnetism, Paramagnetism, Ferromagnetism, Antiferromagnetism and Ferrimagnetism, magnetostriction, properties of magnetic materials, soft and hard magnetic materials, permanent magnetic materials.

**Text Books :**

- 1 A.J. Dekker, "Electrical Engineering Materials" Prentice Hall of India
- 2 R.K. Rajput, "Electrical Engg. Materials," Laxmi Publications.
- 3 C.S. Indulkar & S.Triruvagdan "An Introduction to Electrical Engg. Materials, S.Chand & Co.

**Reference Books :**

1. Solymar, "Electrical Properties of Materials" Oxford University Press.
2. Ian P. Hones, "Material Science for Electrical and Electronic Engineering," Oxford University Press.
3. G.P. Chhalotra & B.K. Bhat, "Electrical Engineering Materials" Khanna Publishers.
4. T. K. Basak, "Electrical Engineering Materials" New age International.

**Subject: Electromagnetic Theory**  
**Branches: EE**

**Code: EC-203T**      **Credits: 4**  
**SEM: IV Semester**      **L P T: 3 1 0**

**Unit 1:- Elements of Vector Calculus:** Co-ordinate system, differential volume, surface 7 line elements, gradient, divergence, curl and del-operator.

**Unit 2:- Review of static electric field:** Coulomb's Law, Electric field-intensity, electric flux and flux density, Gauss's Law, conservation properties of electrostatic field, electric potential, Energy and work in electric field, Current, current density and conductor capacitance & dielectric materials, polarization relative permittivity, multiple dielectric capacitors, energy stored in a capacitor.

**Unit 3:- Review of magnetic field:** Faraday's law, Lenz's law, bio-savart law, Ampere's law, Magnetic flux density, Vector magnetic potential, stokes theorem, magnetic force, Displacement current, self, internal and mutual inductance.

**Unit 4:- Maxwell's Laplace's and Poisson's Equation and Boundary condition:** Introduction and its applications.

**Unit 5:- Electromagnetic waves:** Introduction and solutions for partially-conducting perfect dielectric and good conductor mediums, skin depth, interface conditions at normal incidence, oblique incidence and Snell's laws, perpendicular and parallel polarization, standing wave, power and the pointing vectors.

**Unit 6:- Transmission Lines:** Wave equation for ideal transmission line, characteristics impedance, propagation & reflection, VSWR, impedance, transformation, smith chart, parallel and co-axial transmission lines, Impedance Matching, single and double stub matching, impedance matching single and double stub matching, impedance measurement, Motion of charged particles in an Electric & Magnetic Field.

## **REFERENCES**

1. Electromagnetic; john D. Kraus TMH
2. Schaum's outline series on Electromagnetic; Joseph A. Edinister ,Tata Mc Graw hill inc.
3. Engineering Electromagnetics; Haytt, Kemmerly.
4. Electromagnetic wave and radiating system; John, Balmin
5. Engineering Electromagnetics; William Haytt

**Subject: Linear Integrated Circuits Code: EI-202T**

**Credits: 4**

**Branches: EC, EI, and EE**

**SEM: IV Semester**

**L P T: 3 1 0**

**Unit 1:- Differential Amplifiers:** Introduction, Differential amplifier circuit configuration, D.C. and A.C. analysis of dual-input balanced output, single input-balanced output, dual input unbalanced output, single input-on balanced output, differential amplifier configuration, FET differential Amplifier, an introduction, differential amplifier with swamping resistors, cascaded differential amplifier stages, cascade or CE-CB configuration.

**Unit 2:- Operational Amplifiers:** Introduction, Block diagram representation of typical Op-Amplifier, level transistor stage of op-amp, transistor current mirrors and active loads, output stage of op-amp, transfer characteristic of output stage, constant current bias, Thermal stability.

**Unit 3:- Interpretation of data sheets and characteristics of an op-amp:** Interpreting a typical set of data sheets, electrical parameters like, input offset voltage, input offset current, input bias current, CMMR, Slew rate etc. The ideal op-amp, equivalent circuit of an op-amp, ideal voltage transfer curve, open loop op-amp. Configuration.

**Unit 4:- An Op-Amp. With negative feedback:** Block diagram representation of feedback configuration, voltage series and voltage shunt feedback amplifier, concentrating on voltage gain, input & output resistances, bandwidth with feedback expressions, voltage follower circuits.

**Unit 5:- Frequency response of an op-Amp.:** Frequency response, compensating networks, high frequency op-amp., equivalent circuit, open loop voltage gain as a function of frequency.

**Unit 6:- Applications of Op-Amp. & Linear I.C.'s:** Summing amplifier, scaling and averaging amplifier, instrumentation amplifier integrator, differentiator, differential amp. Realization using one and two op-amp.

- (i) Active filters; Advantages of active filters over passive filters, First order low pass Butterworth filter design, Second order L.P. Butterworth filter, first and second order H.P. Butterworth filters. Higher order filtered an introduction; band pass and band reject filters. All pass filter design, introduction to oscillators.

**Unit 5:- 555 timer, 566 (VCO), P.L.L., - I.C.'s**

## **REFERENCES**

1. Op-amps & linear integrated ckts by: - R.A. Gayakwad-PHI (India).
2. Operational amplifiers and linear integrated Ckts by Coughlin, Driscoll-PHI (India).
3. Linear integrated ckts by D. Roy Chaudhary, Shail Jain/New age international (P) Ltd, India.



**Subject:** *Digital Electronics*

**Code:** *EC-204 T*

**Credits:** *4*

**Branches:** *EC, EI EE and CSIT*

**SEM:** *IV Semester*

**L P T:** *3 1 0*

**Unit 1:- Basic concept of Boolean algebra:** Different rules for arithmetic operation, minimisation of switching functions with theorem and K-Map up to five variables, reduction techniques, prime and essential implicants, concepts of don't care condition, min. and max. Terms SOP, POS variables, entered mapping VEM, plotting & reading theory, QM methods.

**Unit 2:- digital logic families:** TTL, RTL, DTL, ECL, Totem pole and open collector concept, comparison of logic families.

**Unit 3:- Combinational Logic:** Design of combinational logic circuit using different chips/gates. Code converter: BCD-gray, excess three, encoders, decoders, multiplexers, demultiplexers, 7-segment decoder/driver, ROM, PLA, full and half adder/subtractor, parallel adder/subtractor, look ahead carry generator, parity bit checker/generator, implementation of Boolean function with mux and decoder.

**Unit 4:- Sequential logic circuit:** Concept of memory storage, Latches, Flip Flops, JK, SR, T, D, Master slave, characteristic table truth table, concept of flip flop, conversion techniques, race around condition, Triggering of flip flop, classification of sequential machines, oscillators, analysis of synchronous sequential circuits, design steps for sequential circuits, state diagram, state reduction minimization of the next state decoder, o/p decoder designing.

**Unit 5:- Design of single mode and multimode counter:** Ripple & ring, Registers, Shift register, Shift register sequences, Ring counter using shift register and memories type of register universal and directional.

## **REFERENCES**

1. Digital logic and computer design by MORRIS MANO (PHI)
2. Digital principles and applications by MALVING & LEACH, McGraw-Hill Book Co.
3. Fundamental of digital electronics by BARITTEE, TMH

**Subject: Industrial Management**  
**Branches: EC, EI, EE, and CSIT**

**Code: ME-212T**  
**Semester: IV Sem**

**Credits 04**  
**LPT: 3 1 0**

1. Work study, method study & work measurement including time study, work sampling, production study, PMTS, MTM, importance of time standards, rating & allowance. Work study, incentive schemes, job description, analysis & evaluation.
2. Plant maintenance, preventive maintenance, maintenance strategy, value engineering. Ergonomics, safety health & environmental protection, work physiology job stress & fatigue, ergonomics of manual material handling.
3. Market research, principle of marketing, customers viewpoint & selective selling, functions & scope of marketing, sales forecasting techniques.
4. Performance measures of a Production system, Production, Productivity, Efficiency, Effectiveness, Quality, Flexibility, Agility etc.
5. Organization, organization structure, department on functional charts for business & industrial organization centralized & decentralized organizations, manpower planning, requirement & forecasting, recruitment training & placement.
6. Role of IT in Systems - MIS, FMS, Japanese intherenes; JIT, Kanban, Decision, Support Systems.

Text Book:

1. Engineering Management by: Fraidoon Mazda

Reference:

2. Marketing Management by: Philip Kotler

**Subject: Computer Organization**

**Code: CS-204 T Credits: 4**

**Branches: EC, EI, CSIT**

**SEM: IV Semester L P T: 3 1 0**

**1.Introduction:** - Review of digital logic gates, Design of adder and subtractor using gates & K-MAP, functioning of multiplexer, de-multiplexer, flip-flop.

**2.Arithmetic for Computer:-** Introduction to number system, negative numbers, addition & subtraction, logical operation, constructing and A.L.U., multiplications & division, floating point arithmetic.

**3.Processor Design:-** Processor organisation, Processor Level, information representation, instruction format, Addressing modes (Implied Mode, Immediate mode, register indirect mode, auto increment or Auto decrement mode, direct addressing mode, indirect addressing mode, relative addressing mode, index addressing mode), instruction types.

**4. Control Design:** - Control memory address sequencing, micro instruction interpretation, CPU control unit, basic concepts of micro programmed control, micro program sequencer for a control memory, micro instruction formats.

**5.Memory Organization:-** Classification memories, Memory Hierarchy, Optimization of memory hierarchy, Virtual Memory, Dynamic Address Translation Scheme addressing scheme for main memory, segmented memory system, paged segment memory, memory management policies, High speed memories, characteristics of cache memory, Cache memory organisation, Block replacement policies, interleaved memories, associated memories.

**6. System Organization:** - Bus arbitration, Programmed I/O (IO addressing, IO instruction), DMA (Types & procedures), interrupts (procedure, interrupt selection, vectored interrupts), Concurrency Control, System management.

## **REFERENCES**

1. Computer Architecture and Organization, By John P. Hayes, Me Graw Hill.
2. Computer organization and design, by John L. Hennessy 7 David A. Petterson, Morgan Kaufman.
3. Computer System Architecture, by M. Morris Mano, PHI

**Subject: Linear Integrated Circuit Lab**

**Code: EI-202P**

**Credits: 2**

**Branches: EC, EI and EE**

**SEM: IV Semester**

**L P T: 0 0 3**

***List of Experiments***

1. To perform inverting, non-inverting amplifier and voltage follower using 741 IC.
2. To perform integrator and differentiator using 741.
3. To determine parameters of 741 IC a) input bias current, b) input off-set current, c) input off-set voltage d) slew rate.
4. To perform the comparator circuit using 741 IC.
5. To perform the square wave generator circuits using 741 IC.
6. To perform the Wein Bridge Oscillator circuit using 741 IC.

B-TECH. SEMESTER-IV  
**ELECTRICAL MACHINE-II**  
EE-204T

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**Synchronous Machine I:**

Constructional features, methods of excitation, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, O. C. & S. C. tests, Voltage Regulation using Synchronous Impedance Method, MMF Method, Potier's Triangle Method, Parallel Operation of synchronous generators, operation on infinite bus, synchronizing power and torque & power output equation.

**UNIT-II:**

**Synchronous Machine II:**

Two Reaction Theory, Power flow equations of cylindrical and salient pole machines, operating characteristics

**Synchronous Motor:**

Starting methods, Effect of varying field current at different loads, V- Curves, Hunting & damping, synchronous condenser

**UNIT-III:**

**Three phase Induction Machine :**

Constructional features, Rotating magnetic field, Principle of operation, Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, no load & blocked rotor tests, efficiency, methods of starting, methods of speed control of induction motor: pole changing, stator voltage control, stator frequency control, cascading, V/F method of speed control, rotor voltage injection method, cogging, crawling.

**Text Books:**

1. D.P.Kothari & I.J.Nagrath, "Electric Machines", Tata Mc Graw Hill
2. Ashfaq Hussain "Electric Machines" Dhanpat Rai & Company
3. Fitzgerald, A.E., Kingsley and S.D. Umans "Electric Machinery", MC Graw Hill.

**Reference Books:**

4. P.S. Bimbhra, "Electrical Machinery", Khanna Publisher
5. P.S. Bimbhra, "Generalized Theory of Electrical Machines", Khanna Publishers
6. M.G. Say, "Alternating Current Machines", Pitman & Sons

B-TECH. SEMESTER-IV  
**ELEMENTS OF ELECTRICAL MACHINES**  
EE-202T

L	T	P	TOTAL
3	1	0	4

Branches : EC, EI & ME

**UNIT-I:**

**TRANSFORMER:**

Principle & construction of single phase transformer, EMF equation, phasor diagram, equivalent circuit diagram, SC test, OC test, efficiency.

**UNIT-II:**

**DC MACHINES:**

Principle & construction of DC generator, types of windings, types of DC generator, OCC, load characteristics, principle & construction of DC motor, back EMF, torque equation, load characteristics.

**UNIT-III:**

**INDUCTION MOTORS:**

Principle and construction of 3-phase induction motor, concept of slip, phasor diagram. Equivalent circuit diagram, T-S characteristics.

**UNIT-IV:**

**SYNCHRONOUS MACHINES:**

Principle and construction of synchronous machines, EMF equation, OCC & SCC, synchronous impedance, principle of synchronous motor, V-curve, synchronous condenser.

**Text Books:**

Electrical Technology by B.L. Theraja

P.S. Bimbhra, "Electrical Machinery", Khanna Publisher

**Subject:** *Microprocessor & their Applications*

**Code:** *EI-301T*

**Credits:** *4*

**Branches:** *EC, EI, EE, ME and CSIT*

**SEM:** *V Semester*

**L P T:** *3 1 0*

**Unit 1:- General features of Microprocessor:** Microprocessor architecture and its operation, Memory, Memory Organisation, Memory Mapped I/O mapped I/O Scheme.

**Unit 2:- Architecture of 8085 Microprocessor:** 8085 Microprocessor pin configuration, Internal architecture and its operation, Control signals, Flag register, Timing control unit, Decoding, Execution of an instructions and memory interfacing. Timing instruction cycle, Opcode Fetch, memory and input output read/write cycle of an instruction set.

**Unit 3:- Programming Techniques of 8085 Microprocessor:** How to write and execute a simple program timing and execution of the instructions, Addressing modes, programming techniques, programming technique for looping, counting and indexing, counter programs and timing delay program and timing calculations, stack operation and subroutine programs.

**Unit 4:- Interrupts of 8085 Microprocessor:** Hardware and software interrupts, interrupts call locations, RIM, SIM, RST 7.5, 6.5 and 5.5.

**Unit 5:- Programmable interfaces of 8085 microprocessor:** Programmable peripheral interface 8255, programmable interval timer 8253/8254, DMA controller 8257, and interrupt controller 8259.

**Unit 6:- Microprocessor Applications:** Delay subroutine, seven segment display, water level indicator, microprocessor based traffic control.

**Unit 7:- Introduction of 8086 microprocessor:** Internal Architecture organisation, Maximum mode and minimum mode, instruction set, initialization instructions, constructing the machine codes for 8086 instruction. Assembler directives, addressing modes, procedure and macros, re-entrant and recursive procedures.

**Unit 8:-** 8087 Coprocessor, Features and internal organization, RS-232, RS-442, IEEE-488, Features and architecture of 80186, 80286, 80386 & 80486.

## **REFERENCES BOOKS**

1. Microprocessor Architecture programming and application with 8085/8080 by Ramesh S. Gaonkar.
2. Fundamentals of Microprocessor & Microcontroller by B. Ram.
3. Microprocessor and interfacing Programming and Hardware by Douglas V. Hall.
4. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386 80486, Pentium and Pentium pro-processor, Architecture, Programming and interfacing by Berry b. Bery.

**Subject: Microprocessor Lab**

**Code: EI-301P**

**Credits: 2**

**Branches: EC, EI, EE, ME and CSIT**

**SEM: V Semester**

**L P T: 0 0 3**

1. Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
2. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
3. To perform multiplication and division of two 8 bit numbers using 8085.
4. To find the largest and smallest number in an array of data using 8085 instruction set.
5. To write a program to arrange an array of data in ascending and descending order.
6. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set.
7. To write a program to initiate 8251 and to check the transmission and reception of character.
8. To interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six different modes.
9. To interface DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave.
10. Serial communication between two 8085 through RS-232 C port.

Note :-In addition, Institutes may include two more experiments based on the expertise



B-TECH. SEMESTER-V  
**CONTROL SYSTEM**  
EE-301T

L	T	P	TOTAL
3	1	0	4

**Branches** : EE, EC & EI

**Unit-I:**

**The Control System:**

Open loop & closed control; servomechanism, Physical systems. Principle of feedback Transfer functions, Block diagram algebra, Signal flow graph, Mason's gain formula Reduction of parameter variation and effects of disturbance by using negative feedback.

**Unit-II:**

**Time Response analysis:**

Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants, Design specifications of second order systems: basic concept of P, PD, PI, PID controllers.

**Unit-III:**

**Stability and Algebraic Criteria:**

Concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations.

**Root Locus Technique:**

The root locus concepts, construction of root loci

**Unit-IV:**

**Frequency response Analysis:**

Frequency response, correlation between time and frequency responses, polar plots, Bode plots

**Stability in Frequency Domain:**

Frequency Domain specifications, Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles.

**Text Books:**

1. Nagrath & Gopal, "Control System Engineering", 4th Edition, New age International.
2. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
3. B.C. Kuo & Farid Golnaraghi, "Automatic Control System" Wiley IndiaLtd, 2008.
4. D.Roy Choudhary, "Modern Control Engineering", Prentice Hall of India.

**Reference Books:**

5. Norman S. Mise, Control System Engineering 4th edition, Wiley Publishing Co.
6. Ajit K Mandal, "Introduction to Control Engineering" New Age International, 2006.
7. R.T. Stefani, B.Shahian, C.J.Savant and G.H. Hostetter, "Design of Feedback Control Systems" Oxford University Press.
8. N.C. Jagan, "Control Systems", B.S. Publications,2007.

**B-TECH. SEMESTER-V**  
**POWER SYSTEM-I**  
EE-305T

L	T	P	TOTAL
3	1	0	4

**Unit-I:**

**Power System Components:**

Single line Diagram of Power system, Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator

**Supply System:**

Different kinds of supply system and their comparison, choice of transmission voltage

**Transmission Lines:**

Configurations, types of conductors, resistance of line, skin effect, Kelvin's law. Proximity effect

**Unit-II:**

**Over Head Transmission Lines**

Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines, Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading

**Unit-III:**

**Corona and Interference:**

Phenomenon of corona, corona formation, calculation of potential gradient, corona loss, factors affecting corona, methods of reducing corona and interference. Electrostatic and electromagnetic interference with communication lines

**Overhead line Insulators:**

Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency

**Unit-IV:**

**Mechanical Design of transmission line:**

Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers

**Insulated cables:**

Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables

**Text Books:**

1. W. D. Stevenson, "Element of Power System Analysis", McGraw Hill,
2. C. L. Wadhwa, "Electrical Power Systems" New age international Ltd. Third Edition
3. Asfaq Hussain, "Power System", CBS Publishers and Distributors,
4. B. R. Gupta, "Power System Analysis and Design" Third Edition, S. Chand & Co.
5. M. V. Deshpande, "Electrical Power System Design" Tata Mc Graw Hill.

**Reference Books:**

6. M. V. Deshpandey, "Elements of Power System Design", Tata McGraw Hill,
7. Soni, Gupta & Bhatnagar, "A Course in Electrical Power", Dhanpat Rai & Sons,
8. S. L. Uppal, "Electric Power", Khanna Publishers
9. S.N.Singh, " Electric Power Generation, Transmission & distribution." PHI Learning

**Subject:** *Signals and Systems*

**Code:** *EC-202T*

**Credits:** *4*

**Branches:** *EE*

**SEM:** *V Semester*

**L P T:** *3 1 0*

**Unit 1:-** Fourier analysis of signals, Amplitude, Phase and Power spectrum, Orthogonality of functions, Types of signals, Fourier transform of some useful functions, Singularity functions & its properties, Dirac Delta function & its properties, Sampling function, Laplace transform of some useful functions.

**Unit 2:-** Convolution of signals, Graphical & analytical methods of convolution, sampling theorem, Nyquist rate & Nyquist interval, Aliasing, Aperture effect, Recovery from sampled signal, natural sampling, flat top sampling. Time convolution theorem, Frequency convolution theorem.

**Unit 3:-** Power & Energy signals, Energy & Power spectral densities of signals, Cross correlation, Auto correlation.

**Unit 4:-** Systems & Filters: Linear system, Time invariant & LTI system, Impulse response, Causal systems, Filter characteristics of linear systems, Low pass filter High pass filters, Band pass filters, Band pass, Band stop filters.

**Unit 5:-** Random variables and probability theory, PDF, CDF and their properties, Normal and Gaussian distribution.

## **REFERENCES BOOKS**

1. Modern Digital & Analog System by B.P. lathi
2. Communication systems by Singh & Spare
3. Communication systems by Simon Haykins
4. Digital communication systems by Taub & Schilling
5. Probability theory and Queuing methods

**B-TECH. SEMESTER-V**  
**POWER ELECTRONICS**  
EE-303T

L	T	P	TOTAL
3	1	0	4

**Branches** : EE, EC & EI

**Unit-I: Power semiconductor Devices:** Power semiconductor devices their symbols and static characteristics. Characteristics and specifications of switches, types of power electronic circuits. Operation, steady state & switching characteristics & switching limits of Power Transistor. Operation and steady state characteristics of Power MOSFET and IGBT

**Thyristor :**

Operation, V- I characteristics, two transistor model, methods of turn-on. Operation of GTO, MCT and TRIAC.

**Unit-II: Power Semiconductor Devices(Contd):**Protection of devices. Series and parallel operation of thyristors. Commutation techniques of thyristor ,R, R-C, UJT & Static Firing Circuits

**DC Choppers:**Principles of step-down chopper, step down chopper with R-L load ,Principle of step-up chopper, and operation with RL load, classification of choppers

**Unit-III: Phase Controlled Converters:**Single phase half wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode. Single phase fully controlled and half controlled bridge converters.

Performance Parameters. Three phase half wave converters. Three phase fully controlled and half controlled bridge converters, Effect of source impedance, Single phase and three phase dual converters.

**Unit-IV: AC Voltage Controllers:**Principle of On-Off and phase controls. Single phase ac voltage controller with resistive and inductive loads. Three phase ac voltage controllers (various configurations and comparison only)

Single phase transformer taps changer.

**Unit-V: Inverters:** Single phase series resonant inverter. Single phase bridge inverters. Three phase bridge inverters Voltage control of inverters. Harmonics reduction techniques. Single phase and three phase current source inverters.

**Unit-VI: Cycloconverters:** 1-  $\phi$  & 3-  $\phi$  Cyclo-converters, mid-point & bridge type cyclo-converters, advantage of cyclo-converters.

**Text Books:**

1. Power Electronics by A.K.Gupta , Dhanpat Rai publishers.
2. M.H.Rashid, "Power Electronics:Circuits,Devices & Applications",Prentice Hall of India Ltd.3<sup>rd</sup> Edition,2004.
3. M.D. Singh and K.B.Khanchandani, "Power Electronics"Tata MC Graw Hill, 2005
4. V.R. Moorthy, " Power Electronics : Devices, Circuits and Industrial Applications" Oxford University Press,2007.

**Reference Books:**

4. M.S. Jamil Asghar, "Power Electronics" Prentice Hall of India Ltd., 2004
5. Chakrabarti & Rai, "Fundamentals of Power Electronics &Drives"Dhanpat Rai & Sons.
6. Ned Mohan, T.M.Undeland and W.P.Robbins, "Power Electronics:Converters, Applications and Design", Wiley India Ltd,2008.
7. S.N.Singh, "A Text Book of Power Electronics" Dhanpat Rai & Sons

**B-TECH. SEMESTER-V**  
**INSTRUMENTATION**  
EE-307T

L	T	P	TOTAL
3	1	0	4

**Unit-I:**

**Transducer – I:** Definition, advantages of electrical transducers, classification, characteristics, factors affecting the choice of transducers, Potentiometers, Strain gauges, Resistance thermometer, Thermistors, Thermocouples, LVDT, RVDT

**Unit-II:**

**Transducer – II :** Capacitive, Piezoelectric Hall effect and opto electronic transducers. Measurement of Motion, Force pressure, temperature, flow and liquid level.

**Unit-III:**

**Telemetry :** General telemetry system, land line & radio frequency telemetering system, transmission channels and media, receiver & transmitter. Data

**Acquisition System:** Analog data acquisition system, Digital data acquisition system, Modern digital data acquisition system.

**Unit-IV:**

**Display Devices and Recorders:** Display devices, storage oscilloscope, spectrum analyzer, strip chart & x-y recorders, magnetic tape & digital tape recorders.

**Recent Developments:** Computer aided measurements, fibre optic transducers, microsensors, smart sensors, smart transmitters.

**Unit-V:**

**Process Control :** Principle, elements of process control system, process characteristics, proportional (P), integral (I), Derivative (D), PI, PD and PID control modes. Electronic, Pneumatic & digital controllers.

**UNIT VI: Cathode Ray Oscilloscope :** Basic CRO circuit (Block Diagram), Cathode ray tube (CRT) & its components, application of CRO in measurement, Lissajous Pattern.

**Text Books:**

1. A.K.Sawhney, "Advanced Measurements & Instrumentation", Dhanpat Rai & Sons
2. B.C. Nakra & K.Chaudhry, "Instrumentation, Measurement and Analysis", Tata Mc Graw Hill 2nd Edition.
3. Curtis Johns, "Process Control Instrumentation Technology", Prentice Hall

**Reference Books:**

4. E.O. Decblin, "Measurement System – Application & design", Mc Graw Hill.
5. W.D. Cooper and A.P. Beltried, "Electronics Instrumentation and Measurement Techniques" Prentice Hall International
6. Rajendra Prasad, "Electronic Measurement and Instrumentation Khanna Publisher
7. M.M.S. Anand, "Electronic Instruments and Instrumentation Technology" PHI Learning.

**B-TECH. SEMESTER-VI**  
**POWER SYSTEM-II**  
EE-302T

L	T	P	TOTAL
3	1	0	4

**Unit-I:**

**Representation of Power System Components:**

Synchronous machines, Transformers, Transmission lines, One line diagram, Impedance and reactance diagram, per unit System

**Symmetrical components:**

Symmetrical Components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks.

**Unit-II:**

**Insulation Coordination :**

Introduction, Definitions, Determination of Insulation, Impulse Level and Insulation Level of Sub Station Equipment – Lightning Arrester Selection and Location

**Unit-III:**

**Traveling Waves:**

Wave equation for uniform Transmission lines, velocity of propagation, surge impedance, reflection and transmission of traveling waves under different line loadings. Bewlay's lattice diagram, protection of equipments and line against traveling waves

**Unit-IV:**

**Neutral grounding:**

Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices

**Unit-V:**

**Electrical Design of Transmission Line:**

Design consideration of EHV transmission lines, choice of voltage, number of circuits, conductor configuration, insulation design, selection of ground wires.

**Text Books:**

1. W.D. Stevenson, Jr. "Elements of Power System Analysis", Mc Graw Hill.
2. C.L. Wadhwa, "Electrical Power System", New Age International.
3. Chakraborty, Soni, Gupta & Bhatnagar, "Power System Engineering", Dhanpat Rai & Co.
4. T.K Nagsarkar & M.S. Sukhija, "Power System Analysis" Oxford University Press, 2007.

**Reference Books:**

5. L. P. Singh; "Advanced Power System Analysis & Dynamics", New Age International
6. Hadi Sadat; "Power System Analysis", Tata McGraw Hill.
7. D.Das, "Electrical Power Systems" New Age International, 2006.
8. J.D. Glover, M.S. Sharma & T.J. Overbye, "Power System Analysis and Design" Thomson, 2008.
9. P.S.R. Murthy "Power System Analysis" B.S. Publications, 2007.
10. Stagg and El-Abiad, "Computer Methods in Power System Analysis" Tata Mc Graw Hill
11. Kothari & Nagrath, "Modern Power System Analysis" Tata Mc. Graw Hill.

**Subject:** *Element of Communication Engineering*      **Code:** *EC-312T*      **Credits:** *4*

**Branches :***EE*      **SEM:** *VI Semester*      **L P T:** *3 1 0*

**Unit 1:- Modulation Process:** Definition of amplitude modulation, frequency modulation & phase modulation, DSB-AM, DSB-SC-AM, using linear modulation and non linear modulation.

**Unit 2:- Linear Modulation:** Collector modulator or plate modulator and base modulator.

**Unit 3:- Non linear modulation:** Balanced modulating & ring modulator

**Unit 4:- Generation of frequency modulation:** Indirect method of FM i.e. Armstrong method of frequency modulation direct method of FM: reactance modulator.

**Unit 5:- Demodulation/detection process:** Demodulation of AM waves, diode detection 1, average detection and 2. Envelop detection, superhetrodyne receiver.

**Unit 6:- Demodulation of FM or frequency discriminators:** Single tuned discriminators, double tuned discriminators, foster seely discriminators, ratio detectors, and phase locked loop (PLL) demodulator.

**Unit 7:- Noise:** SNR (signal to noise ratio), noise figure, noise temperature of a cascaded system, S/N in DSB-SC receiver, S/Nin SSB-SC receiver, S/N in FM receiver, pre-emphasis and de-emphasis.

### **Reference Books**

1. Communication systems - B.P. Lathi
2. Communication system - Simon Haykin
3. Principles of communication - George Kennedy
4. Communication system - R.P. Singh & S.D. Spare
5. Principles of communication system - Taub Shilling

B-TECH. SEMESTER-VI  
**COMPUTER SIMULATION OF POWER SYSTEM**  
EE-306T

L	T	P	TOTAL
3	1	0	4

**Unit-I:**

**Symmetrical fault analysis:**

Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machines under transient conditions

**Unit-II:**

**Unsymmetrical faults:**

Analysis of single line to ground fault, line-to-line fault and Double Line to ground fault on an unloaded generators and power system network with and without fault impedance. Formation of Zbus using singular transformation and algorithm, computer method for short circuit calculations

**Unit-III:**

**Load Flows:**

Introduction, bus classifications, nodal admittance matrix ( *BUS Y* ), development of load flow equations, load flow solution using Gauss Siedel and Newton-Raphson method, approximation to N-R method, line flow equations and fast decoupled method

**Unit-IV:**

**Power System Stability:**

Stability and Stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by-step method. Factors affecting steady state and transient stability and methods of improvement

**Text Books:**

1. Advanced Power System Analysis and Dynamics by L.P. Singh.
2. Computer Methods in Power System Analysis by G.W. Stagg & Al. Abiad.



**B-TECH. SEMESTER-VI**  
**POWER PLANT ENGINEERING**  
**EE-304T**

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**INTRODUCTION:**

Planning of electricity supply, prediction of load and energy demand forecast techniques.

**UNIT-II:**

**THERMAL STATION:**

Detailed description of thermal plant-coal handling plant, boiler,economizer,preheater, electrostatic precipitator, ash disposal.

**UNIT-III:**

**HYDRO-STATION:**

Types of turbines, types of dams, description of hydro plant.

**UNIT-IV:**

**NUCLEAR STATION:**

Nuclear fuels, nuclear reaction, types of reactors, description of nuclear plant.

**Text Books:**

1. Power Plant Engineering by B.R.Gupta.
2. Power System analysis by W.D Stevenson Granger MGH.
3. Power System Engineering by Nagrath and Kothari TMH.

B-TECH. SEMESTER-VI  
**DIGITAL & NON-LINEAR CONTROL SYSTEM**  
EE-308T

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**Signal Processing in Digital Control:**

Basic digital control system, advantages of digital control and implementation problems, basic discrete time signals, z-transform and inverse z-transform, modeling of sample-hold circuit., pulse transfer function, solution of difference equation by z-Transform method.

**UNIT-II:**

**Design of Digital Control Algorithms:**

Steady state accuracy, transient response and frequency response specifications, digital compensator design using frequency response plots and root locus plots.

**UNIT-III:**

**State Space Analysis and Design:**

State space representation of digital control system, conversion of state variable models to transfer functions and vice versa, solution of state difference equations, controllability and observability, design of digital control system with state feedback.

**UNIT-IV:**

**Stability of Discrete System:**

Stability on the z-plane and Jury stability criterion, bilinear transformation, Routh stability criterion on rth plane.

Lyapunou's Stability in the sense of Lyapunou, stability theorems for continuous and discrete systems, stability analysis using Lyapunor's method.

**Text Books:**

1. B.C.Kuo, "Digital Control System",Saunders College Publishing.
2. M.Gopal, "Digital Control and State Variable Methods", Tata McGraw Hill.

**Reference Books:**

3. J.R.Leigh, "Applied Digital Control", Prentice Hall, International
4. C.H. Houpis and G.B.Lamont, "Digital Control Systems:Theory, hardware, Software",MGH.

**B-TECH. SEMESTER-VI**  
**SPECIAL PURPOSE MACHINE**  
EE-310T

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**INDUCTION MOTOR:**

Deep bar & double cage type three phase induction motor, single phase induction motors-double field revolving theory & cross field theory, types of single phase induction motor-capacitor start/run motor, shaded pole, hysteresis motor.

**UNIT-II:**

**LINEAR INDUCTION MOTOR:**

Principle, magnetic levitation, types of LIM.

**UNIT-III:**

**COMMUTATOR MACHINES:**

Universal motors-single phase and three phase, effect of motor EMF injection in induction motor, introduction to Schrage motor & repulsion motor.

**UNIT-IV:**

**CROSS FIELD THEORY:**

Cross field generator-Amplidyne and metadyne.

**UNIT-V:**

**SPECIAL MACHINES:**

Stepper motor-variable reluctance type and hybrid type, ac & dc servomotors, switched reluctance motor, permanent magnet motor.

**Text Books:**

1. "Performance and Design of AC commutator motors" by O.E.Taylor, A H Wheeler.
2. "Generalized Theory of Electrical Machines" by P.S.Bimbhra, Khanna pub.

**Subject: Control system Lab**

**Code: EE-302P**

**Credits: 2**

**Branches: EI, EE & EC**

**SEM: VI Semester**

**L P T: 003**

**1. DC SPEED CONTROL SYSTEM**

- (a) To study D.C. speed control system on open loop and close loop.
- (b) To study of Transient performance, another time signal is added at the input of control Circuit.
- (c) To study how eddy current braking is being disturbance rejected by close and open loop.

**2. DC MOTOR POSITION CONTROL**

- (a) To study of potentiometer displacement constant on D.C. motor position control.
- (b) To study of D. C. position control through continuous command.
- (c) To study of D.C. position control through step command.
- (d) To study of D.C. position control through Dynamic response.

**3. AC MOTOR POSITION CONTROL**

- (a) To study of A.C. motor position control through continuous command.
- (b) To study of error detector on A.C. motor position control through step command.
- (c) To study of A.C. position control through dynamic response.

**4. MAGNETIC AMPLIFIER**

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

**5. SYNCHRO TRANSMITTER / RECEIVER**

- (a) To study of Synchro Transmitter in term of Position v/s Phase and voltage magnitude with respect to Rotor Voltage Magnitude/Phase.
- (b) To study of remote position indication system using Synchro-transmitter/receiver.

**6. PID CONTROLLER**

- (a) To observe open loop performance of building block and calibration of PID Controls.
- (b) To study P, PI and PID controller with type 0 system with delay.
- (c) To study P, PI and PID controller with type 1 system.

**7. LEAD LAG COMPENSATOR**

- (a) To study the open loop response on compensator.
- (b) Close loop transient response.

**8. LINEAR SYSTEM SIMULATOR**

- (a) Open loop response
  - (i) Error detector with gain, (ii) Time constant, (iii) Integrator
- (b) Close loop system
  - (I) First order system (II) Second order system (III) Third order system

**9. Introduction to MATLAB (Control System Toolbox), Implement at least any two experiment in MATLAB.**

- a. Different Toolboxes in MATLAB, Introduction to Control Systems Toolbox.
- b. Determine transpose, inverse values of given matrix.
- c. Plot the pole-zero configuration in s-plane for the given transfer function.
- d. Determine the transfer function for given closed loop system in block diagram representation.
- e. Plot unit step response of given transfer function and find peak overshoot, peak time.
- f. Plot unit step response and to find rise time and delay time.
- g. Plot locus of given transfer function, locate closed loop poles for different values of k.
- h. Plot root locus of given transfer function and to find out  $S$ ,  $W_d$ ,  $W_n$  at given root & to discuss stability.
- i. Plot bode plot of given transfer function.
- j. Plot bode plot of given transfer function and find gain and phase margins
- k. Plot Nyquist plot for given transfer function and to compare their relative stability
- l. Plot the Nyquist plot for given transfer function and to discuss closed loop stability, gain and phase margin.

**Note:-In addition, Institutes may include more experiments based on the expertise**

B-TECH. SEMESTER-VII  
**PROTECTION AND SWITCHGEAR**  
EE-401T

L	T	P	TOTAL
3	1	0	4

**Unit I:**

**Introduction to Protection System:** Introduction to protection system and its elements, functions of protective relaying, protective zones, primary and backup protection, desirable qualities of protective relaying, basic terminology.

**Relays:** Electromagnetic, attracted and induction type relays, thermal relay, gas actuated relay, design considerations of electromagnetic relay.

**Unit-II:**

**Relay Application and Characteristics:** Amplitude and phase comparators, over current relays, directional relays, distance relays, differential relay

**Static Relays:** Comparison with electromagnetic relay, classification and their description, over current relays, directional relay, distance relays, differential relay.

**Unit-III:**

**Protection of Transmission Line:** Over current protection, distance protection, pilot wire protection, carrier current protection, protection of bus, auto re-closing,

**Unit-IV:**

**Circuit Breaking:** Properties of arc, arc extinction theories, re-striking voltage transient, current chopping, resistance switching, capacitive current interruption, short line interruption, circuit breaker ratings.

**Testing Of Circuit Breaker:** Classification, testing station and equipments, testing procedure, direct and indirect testing

**Unit-V:**

**Apparatus Protection:** Protection of Transformer, generator and motor.

**Circuit Breaker:** Operating modes, selection of circuit breakers, constructional features and operation of Bulk Oil, Minimum Oil, Air Blast, SF<sub>6</sub>, Vacuum and d. c. circuit breakers.

**Text Books:**

1. S. S. Rao, "Switchgear and Protection", Khanna Publishers.
2. B. Ravindranath and M. Chander, Power system Protection and Switchgear, Wiley Eastern Ltd.

**Reference Books:**

3. B. Ram and D. N. Vishwakarma, "Power System Protection and Switchgear", Tata Mc. Graw Hill
4. Y. G. Paithankar and S R Bhide, "Fundamentals of Power System Protection", Prentice Hall of India.
5. T.S.M Rao, "Power System Protection: Static Relays with Microprocessor Applications" Tata Macgraw Hill".
6. A.R. Van C. Warrington , " Protective Relays- Their Theory and Practice, Vol. I & II" Jhon Willey & Sons.

B-TECH. SEMESTER-VII  
**HIGH VOLTAGE ENGINEERING**  
EE-403T

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**Break Down In Gases:**

Ionization processes, Townsend's criterion, breakdown in electronegative gases, time lags for breakdown, streamer theory, Paschen's law, break down in non-uniform field, breakdown in vacuum.

**Break Down In Liquid Dielectrics:**

Classification of liquid dielectric, characteristic of liquid dielectric, breakdown in pure liquid and commercial liquid.

**Break Down In Solid Dielectrics:**

Intrinsic breakdown, electromechanical breakdown, breakdown of solid, dielectric in practice, breakdown in composite dielectrics.

**UNIT-II:**

**Generation of High Voltages and Currents:**

Generation of high direct current voltages, generation of high alternating voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

**UNIT-III:**

**Measurement of High Voltages and Currents:**

Measurement of high direct current voltages, measurement of high alternating and impulse voltages, measurement of high direct, alternating and impulse currents, Cathode Ray Oscillographs for impulse voltage and current measurements.

**UNIT-IV:**

**Non-Destructive Testing:**

Measurement of direct current resistively, measurement of dielectric constant and loss factor, partial discharge measurements

**High Voltage Testing:**

Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, testing of transformers, testing of surge arresters, radio interference measurements.

**Text Book:**

1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering, Tata Mc-Graw Hill.

**Reference Books:**

2. E. Kuffel and W. S. Zaengal, High Voltage Engineering", Pergamon Press.
3. M. P. Chaurasia , "High Voltage Engineering", Khanna Publishers
4. R. S. Jha, "High Voltage Engineering", Dhanpat Rai & sons
5. C. L. Wadhwa, "High Voltage Engineering", Wiley Eastern Ltd.
6. M. Khalifa, ' High Voltage Engineering Theory and Practice,' Marcel Dekker.
7. Subir Ray, ' An Introduction to High Voltage Engineering' Prentice Hall of India

B-TECH. SEMESTER-VII  
NON CONVENTIONAL ENERGY SOURCES  
EE-411T

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**INTRODUCTION:**

Power Crisis, future energy demand, role of Private sectors in energy management,

**UNIT-II:**

**MHD generation:**

Working principle, open and closed cycles, MHD systems, advantages, parameters governing power output.

**UNIT-III**

**Solar power plant:**

Conversion of solar heat to electricity, Solar energy collectors, Photovoltaic cell, power generation, future prospects of solar energy use.

**UNIT-IV:**

**Wind Energy:**

Windmills, power output with combined operation of wind turbine generation and isolated generating system, technical choices & economic size.

**UNIT-V:**

**Geothermal Energy:**

Earth energy, heat extraction, vapor turbine cycle, difficulties & disadvantages

**UNIT-VI:**

**Tidal energy:**

Tidal phenomenon, tidal barrage, tidal power Schemes.

**UNIT-VII:**

**Ocean Thermal Energy:**

Introduction, energy conversion, problems.

**UNIT-VIII:**

**Chemical Energy Sources:**

Fuel cells, classifications, hydrogen production, hydrogen energy, utilization of hydrogen gas.

**UNIT-IX:**

**Thermoionic generator:**

Basic principle Thermoionic generator.

**Text Books:**

1. Non-conventional energy sources by G.D. Rai, Khanna Publisher.

B-TECH. SEMESTER-VII  
**NEURAL NETWORKS & FUZZY LOGIC**  
EE-413T

L	T	P	TOTAL
3	1	0	4

**Unit-I:**

**Neural Networks-1(Introduction & Architecture):**

Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory

**Unit-II:**

**Neural Networks-II (Back propagation networks):**

Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

**Unit-III:**

**Fuzzy Logic-I (Introduction):**

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

**Unit-IV:**

**Fuzzy Logic –II (Fuzzy Membership, Rules)**

Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

**Unit-V:**

**Fuzzy Neural Networks:**

L-R Type fuzzy numbers, fuzzy neutron, fuzzy back propogation(BP), architecture, learning in fuzzy BP, inference by fuzzy BP, applications.

**Text Books:**

1. Kumar Satish, “Neural Networks” Tata Mc Graw Hill
2. S. Rajsekaran & G.A. Vijayalakshmi Pai, “Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications” Prentice Hall of India.

**Reference Books:**

3. Siman Haykin, ”Neural Netowrks”Prentice Hall of India
4. Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.



B-TECH. SEMESTER-VII  
**UTILIZATION OF ELECTRICAL ENERGY & TRACTION**  
EE-415T

L	T	P	TOTAL
3	1	0	4

**Unit-I:**

**Electric Heating:**

Advantages and methods of electric heating, Resistance heating, Electric arc heating, Induction heating, Dielectric heating

**Unit-II:**

**Electric Welding:**

Electric Arc Welding, Electric Resistance welding, Electronic welding control

**Electrolyte Process:**

Principles of electro deposition, Laws of electrolysis, applications of electrolysis

**Unit-III:**

**Illumination:**

Various definitions, Laws of illumination, requirements of good lighting Design of in door lighting and outdoor lighting systems

**Refrigeration and Air Conditioning:**

Refrigeration systems, domestic refrigerator, water cooler Types of air conditioning, Window air conditioner

**Unit-IV:**

**Electric Traction - I**

Types of electric traction, systems of track electrification Traction mechanics- types of services, speed time curve and its simplification, average and schedule speeds Tractive effort, specific energy consumption, mechanics of train movement, coefficient of adhesion and its influence

**Unit-V:**

**Electric Traction – II**

Salient features of traction drives Series – parallel control of dc traction drives (bridge transition) and energy saving Power Electronic control of dc and ac traction drives Diesel electric traction.

**Text Books:**

1. H.Partab,“Art and Science of Electrical Energy” Dhanpat Rai & Sons.
2. G.K.Dubey,“Fundamentals of Electric Drives” Narosa Publishing House

**Reference Books:**

3. H. Partab, “ Modern Electric Traction” Dhanpat Rai & Sons.
4. C.L. Wadhwa, “ Generation, Distribution and Utilization of Electrical Energy” New Age International Publications.

B-TECH. SEMESTER-VIII  
**ELECTRIC DRIVES & CONTROL**  
EE-402T

L	T	P	TOTAL
3	1	0	4

**Unit-I:**

**Fundamentals of Electric Drive:** Electric Drives and its parts, advantages of electric drives  
Classification of electric drives Speed-torque conventions and multi-quadrant operations  
Constant torque and constant power operation Types of load, Load torque: components, nature  
and classification.

**Unit-II:**

**Dynamics of Electric Drive:** Dynamics of motor-load combination; Steady state stability of  
Electric Drive; Transient stability of electric Drive.

**Selection of Motor Power rating:**

Thermal model of motor for heating and cooling, classes of motor duty, determination of motor  
power rating for continuous duty, short time duty and intermittent duty. Load equalization

**Unit-III:**

**Electric Braking:**

Purpose and types of electric braking, braking of dc, three phase induction and synchronous  
motors

**Dynamics During Starting and Braking:** Calculation of acceleration time and energy loss  
during starting of dc shunt and three phase induction motors, methods of reducing energy loss  
during starting. Energy relations during braking, dynamics during braking

**Unit-IV:**

**Power Electronic Control of DC Drives:** Single phase and three phase controlled converter fed  
separately excited dc motor drives (continuous conduction only), dual converter fed separately  
excited dc motor drive, rectifier control of dc series motor. Supply harmonics, power factor and  
ripples in motor current Chopper control of separately excited dc motor and dc series motor.

**Unit-V:**

**Power Electronic Control of AC Drives: Three Phase induction Motor Drive:** Static Voltage  
control scheme, static frequency control scheme (VSI, CSI, and cyclo – converter based) static  
rotor resistance and slip power recovery control schemes.

**Three Phase Synchronous motor:**

Self controlled scheme

**Special Drives:**

Switched Reluctance motor, Brushless dc motor. Selection of motor for particular applications

**Text Books:**

1. G.K. Dubey, "Fundamentals of Electric Drives", Narosa publishing House.
2. S.K.Pillai, "A First Course on Electric Drives", New Age International.

**Reference Books:** 3. M.Chilkin, "Electric Drives", Mir Publishers, Moscow.

4. Mohammed A. El-Sharkawi, "Fundamentals of Electric Drives", Thomson Asia, Pvt. Ltd.  
Singapore.

5. N.K. De and Prashant K.Sen, "Electric Drives", Prentice Hall of India Ltd.

6. V.Subrahmanyam, "Electric Drives: Concepts and Applications", Tata McGraw Hill.

B-TECH. SEMESTER-VIII  
**ELECTRICAL MACHINE DESIGN**  
EE-404T

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**Basic Considerations:**

Basic concept of design, limitation in design, standardization, modern trends in design and manufacturing techniques, Classification of insulating materials. Calculation of total mmf and magnetizing current. Transformer Design: Output equation design of core, yoke and windings, overall dimensions, Computation of no load current to voltage regulation, efficiency and cooling system designs

**UNIT-II:**

**Design of rotating machines – I:**

Output equations of rotating machines, specific electric and magnetic loadings, factors affecting size of rotating machines, separation of main dimensions, selection of frame size. Core and armature design of dc and 3-phase ac machines

**UNIT-III:**

**Design of rotating machines – II:**

Rotor design of three phase induction motors. Design of field system of DC machine and synchronous machines. Estimation of performance from design data.

**UNIT-IV:**

Computer Aided Design

Philosophy of computer aided design, advantages and limitations.

Computer aided design approaches analysis, synthesis and hybrid methods.

Concept of optimization and its general procedure.

Flow charts and 'c' based computer programs for the design of transformer, dc machine, three phase induction and synchronous machines.

**Text Books:**

1. K. Sawhney, "A Course in Electrical Machine Design" Dhanpat Rai & Sons.
2. K.G. Upadhyay, "Conventional and Computer Aided Design of Electrical Machines" Galgotia Publications.

**Reference Books:**

- 3.M.G. Say, "The Performance and Design of AC Machines" Pitman & Sons.
- 4.A.E. Clayton and N.N. Hancock, "The Performance and Design of D.C.Machines" Pitman & Sons.
- 5.S.K. Sen, "Principle of Electrical Machine Design with Computer Programming" Oxford and IBM Publications.

B-TECH. SEMESTER-VIII  
**EHVAC & DC TRANSMISSION**  
EE-406T

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**Introduction :** Need of EHV transmission, standard transmission voltage, comparison of EHV ac & dc transmission systems and their applications & limitations, surface voltage gradients in conductor, distribution of voltage gradients on sub-conductors, mechanical considerations of transmission lines, modern trends in EHV AC and DC transmission

**UNIT-II:**

**EHV AC Transmission :** Corona loss formulas, corona current, audible noise – generation and characteristics corona pulses their generation and properties, radio interference (RI) effects, over voltage due to switching, ferroresonance, reduction of switching surges on EHV system, principle of half wave transmission.

**UNIT-III:**

**Extra High Voltage Testing:** Characteristics and generation of impulse voltage, generation of high Ac and Dc voltages, measurement of high voltage by spheregaps and potential dividers.  
**Consideration for Design of EHV Lines:** Design factors under steady state limits, EHV line insulation design based upon transient over voltages. Effects of pollution on performance of EHV lines.

**UNIT-IV:**

**EHV DC Transmission – I:** Types of dc links, converter station, choice of converter configuration and pulse number, effect of source inductance on operation of converters. Principle of dc link control, converter controls characteristics, firing angle control, current and excitation angle control, power control, starting and stopping of dc link.

**UNIT-V:**

**EHV DC Transmission – II:** Converter faults, protection against over currents and over voltages, smoothing reactors, generation of harmonics, ac and dc filters, Multi Terminal DC systems (MTDC): Types, control, protection and applications.

**Text Books :**

- 1.R. D. Begamudre, “Extra High Voltage AC Transmission Engineering” Wiley Eastern.
- 2.K. R. Padiyar, “HVDC Power Transmission Systems: Technology and System Reactions” New Age International.
- 3.J. Arrillaga, “ High Voltage Direct current Transmission” IFFE Power Engineering Series 6, Peter Peregrinus Ltd, London.
- 4.M. S. Naidu & V. Kamaraju, “High Voltage Engineering” Tata Mc Graw Hill.

**Reference Books:**

- 5.M. H. Rashid , “ Power Electronics : Circuits, Devices and Applications” Prentice Hall of India.
- 6.S. Rao, “EHV AC and HVDC Transmission Engineering and Practice” Khanna Publisher.
- 7.“EPRI, Transmission Line Reference Book, 345 KV and above” Electric Power Research Institute. Palo Alto, California, 1982.

B-TECH. SEMESTER-VIII  
**POWER QUALITY**  
EE-408T

L	T	P	TOTAL
3	1	0	4

**Unit-I:**

**Introduction to Power Quality:**

Terms and definitions of transients,

Long Duration Voltage Variations: under Voltage, Under Voltage and Sustained Interruptions;

Short Duration Voltage Variations: interruption, Sag, Swell; Voltage Imbalance; Notching D C offset, waveform distortion; voltage fluctuation; power frequency variations.

**Unit-II:**

**Voltage Sag:**

Sources of voltage sag: motor starting, arc furnace, fault clearing etc; estimating voltage sag performance and principle of its protection; solutions at end user level- Isolation Transformer, Voltage Regulator, Static UPS, Rotary UPS, Active Series Compensator.

**Unit-III:**

**Electrical Transients:**

Sources of Transient Over voltages- Atmospheric and switching transients- motor starting transients, pf correction capacitor switching transients, ups switching transients, neutral voltage swing etc; devices for over voltage protection.

**Unit-IV:**

**Harmonics:**

Causes of harmonics; current and voltage harmonics: measurement of harmonics; effects of harmonics on – Transformers, AC Motors, Capacitor Banks, Cables, and Protection Devices, Energy Metering, Communication Lines etc. harmonic mitigation techniques.

**Unit-V:**

**Measurement and Solving of Power Quality Problems:** Power quality measurement devices- Harmonic Analyzer , Transient Disturbance Analyzer, wiring and grounding tester, Flicker Meter, Oscilloscope, multimeter etc.

**Introduction to Custom Power Devices:**

Network Reconfiguration devices; Load compensation and voltage regulation using DSTATCOM; protecting sensitive loads using DVR; Unified power Quality Conditioner. (UPQC)

**Text Books:**

1. Roger C Dugan, McGrahan, Santoso & Beaty, “Electrical Power System Quality” McGraw Hill
2. Arinthom Ghosh & Gerard Ledwich, “Power Quality Enhancement Using Custom Power Devices” Kluwer Academic Publishers
3. C. Sankaran, “ Power Quality” CRC Press.

**B-TECH. SEMESTER-VIII**  
**POWER SYSTEM OPERATION & CONTROL**  
EE-410T

L	T	P	TOTAL
3	1	0	4

**UNIT-I:**

**Introduction :**

Structure of power systems, Power system control center and real time computer control, SCADA system. Level decomposition in power system. Power system security. Various operational stages of power system. Power system voltage stability

**UNIT-II:**

**Economic Operation :**

Concept and problems of unit commitment. Input-output characteristics of thermal and hydro-plants. System constraints. Optimal operation of thermal units without and with transmission losses, Penalty factor, incremental. transmission loss, transmission loss formula (without derivation). Hydrothermal scheduling long and short terms. Concept of optimal power flow

**UNIT-III:**

**Load Frequency Control :**

Concept of load frequency control, Load frequency control of single area system: Turbine speed governing system and modeling, block diagram representation of single area system, steady state analysis, dynamic response, control area concept, P-I control, load frequency control and economic dispatch control. Load frequency control of two area system: Tie line power modeling, block diagram representation of two area system, static and dynamic response

**UNIT-IV:**

**Automatic Voltage Control :**

Schematic diagram and block diagram representation, different types of Excitation systems & their controllers.

**Voltage and Reactive Power control :**

Concept of voltage control, methods of voltage control-control by tap changing transformer. Shunt Compensation, series compensation, phase angle compensation

**UNIT-V:**

**State Estimation:**

Detection and identification, Linear and non-linear models.

**Flexible AC Transmission Systems:**

Concept and objectives

FACTS controllers: Structures & Characteristics of following FACTs Controllers.

TCR, FC-TCR, TSC, SVC, STATCOM, TSSC, TCSC, SSSC, TC-PAR, UPFC

**Text Books:**

1. D.P. Kothari & I.J. Nagrath, "Modern Power System Analysis" Tata Mc Graw Hill, 3<sup>rd</sup> Edition.
2. P.S.R. Murty, "Operation and control in Power Systems" B.S. Publications.
3. N. G. Hingorani & L. Gyugyi, " Understanding FACTs" Concepts and Technology of Flexible AC Transmission Systems"
4. J. Wood & B.F. Wollenburg, " Power Generation, Operation and Control " John Wiley & Sons.

**Open-Elective, (Final Year)**

**Code: HU-449 T**

**Subject : Principle of Management**

**Credits 4(3-1-0)**

**UNIT 1:** Management as a discipline: Definition, nature, scope, functions, managerial Skills, Management. Thought-Historical Prospective, Social Responsibility, of Business.

**UNIT2:** Planning: Concept and purpose, planning process, Management, By Objectives (MBO), Decision making.

**UNIT3:** Organization: Concept and purpose of organisation, types of organisation, bases of Departmentation, concept of Authority and Responsibility, Span of Management, Line and Staff Authority, Functional Authority, Delegation of Authority, Centralization and Decentralization of Authority, Coordination Staffing.

**UNIT4:** Directing: Leadership Concept, Ingredients, Traits, Styles, Roles Communication Concept. Types, Process Barriers, Making Communication effective, Importance.

**UNIT5:** Controlling: Concept, Provides, Requirements, for adequate control, controlling and earning, Budgeting control Importance, Management Audit, Management in future.

**Subject: Operation Research**  
**Branches: EI**

**Code: MA-491T**  
**Semester :VII**

**Credits: 4**  
**LPT:310**

**UNIT 1: Introduction:** Definition of O.R. and its scope, modeling in O.R. General methods for solving O.R. models. The Monte-carlo technique, main characteristic of O.R. main phases of O.R. Linear programming problems. Graphical method for solve L.P.P., Two phase Method, Big-M Method, problems of tie.

**UNIT 2: Assignment Model :** Mathematical formulation of assignment model, Reduction theorem, problems of maximization & minimization. Hungarian process, travelling salesman problems.

**UNIT 3: Transportation Model :** Mathematical formulation of transportation problem. Definition of BFS, IBFS, Optimum solution. Algorithms of N-W rule, Least-cost & VAM and their problem

**UNIT 4: Sequencing :** Introduction, principle assumptions processing of jobs through two, three & m machine's.

**UNIT 5: Game Theory :** Characteristic of Games. Basic definitions, minimax criterion and optimal strategy. Equivalence of rectangular Games, Dominance process, Arithmetic method for solving zero-sum-two person Games. Graphical and simplex methods for solving the games.

**UNIT 6: Replacement:** Replacement of item that fail completely.

**UNIT 7: Inventory :** Elementary Inventory Models, Inventory models with price breaks.

List of Pool Elective:

1. EI-402 PCB Design & Technology
2. EI-456 Aircraft Instrumentation
3. EC-458 Digital Image Processing
4. EC-460 Microwave Integrated circuit



**Semiconductors :**

Introduction of semiconductors. intrinsic and extrinsic, II-VI and III-V semiconductors and its alloys, Advantages and necessity of the tailoring of semiconductor, Semiconductors and its alloys used of LED and other devices, Utility of semiconducting alloys like GaAs, GaN, GaP etc.

**Superconductors:**

Fundamental Phenomena associated with superconductors. Type I & II superconductors, Meissner Ochenfeld effects, Josephson effects, fundamental of BCS theory. Novel High Temperature Superconductors. High temperature superconductors, TlBa CaCuO single and bilayer. Electron superconductors NdCuO etc. Doping effects in superconductors, Organic superconductors, fullerenes. Application of the superconductors in science, medical and commercial sectors.

**Material for Magnetic media:**

Material useful for magnetic recording head, magnetic disk, magnetic tape media, Magneto optic recording materials. Holography, data storage materials.

**Holography:**

Fundamentals of holography, Difference between conventional photography and holography. Techniques to make a hologram. Advantages of holography over other techniques.

**Introduction of following with applications :**

Fibre optics, Lasers, Ceramics, Dielectric Characterization of Materials

**Books:**

- 1) Superconductivity Today: T.V. Ramakrishnan & C.N.R. Rao Wiley Eastern Pvt. Ltd, New Delhi, 1992
- 2) Solid State Physics: Ashcroft/Mermin

**Quantitative Methods in Economics (HU-409T)**  
**L P T (3 1 0) CREDIT-4**

- UNIT:1**      **Statistics:** Definition, Importance, Scope and Limitations of statistics, primary and secondary data. Classification of Meaning objectives and types of classification. Frequency Distribution-Discrete, Grouped and continuous frequency distributions. Fundamentals of frequency distribution.
- UNIT:2**      **Measures of Central Tendencies:** arithmetic mean, Median, Mode, Geometric Mean and Harmonic Mean, Demerits and Uses of all methods.
- UNIT:3**      **Measures of Dispersion:** Mean deviation Method about Mean, Median and Mode, Merits and Demerits of Mean Deviation. Coefficient of M.D. Standard Deviation (S.D.) Method with simple short-cut and step deviation methods. Merits and Demerits of S.D. Coefficient of S.D.
- UNIT:4**      **Correlation:** Introduction, Types of Correlation, Karl Pearson's Coefficient of Correlation. Interpretation of 'r'. Probable Error, Uses of Probable Error.
- UNIT:5**      **Linear Regression Analysis:** Introduction, Two method of Linear Regression Analysis:- (1) Line of Regression of Y on X and (2) Line of Regression and X on Y. Why two lines of regression Coefficient of Regression. Relation between the coefficient of correlation and Regression.
- UNIT:6**      **Index Number:** Definition, Uses and Types of Index Numbers, Methods of Construction Index Numbers-(1) Simple Aggregate Method (2) Weighted Aggregate Method (3) Fisher's Ideal Index Numbers (4) const of living Index Numbers (5) Chain Base Index Numbers. Base Shifting. Limitations of Index Numbers.

**Foreign Trade (HU-407T)**  
**L P T (3 1 0) CREDIT-4**

- UNIT:1**      **Nature of foreign Trade:** Meaning, Nature, Scope and Distinct Features of International Transactions.
- UNIT:2**      **Theories of International Trade:** The Classical Theory:-Absolute Advantage Model of Adam Smith, comparative Advantage Model of David Ricardo, the Neo-classical Analysis:-International trade Equilibrium under Constant cost, Increasing Cost and Decreasing cost conditions.
- UNIT:3**      **Tariffs and Quota:** types and Effect of tariffs and Quotas, Quota vs. Tariff.
- UNIT:4**      **International Monetary fund (I.M.F.):** Nature, Objectives and functions of I.M.F. International Monetary System, since the demise of Bretton Woods System.
- UNIT:5**      **International Financial Institutions:** World Bank (IBRD, International Financial Corporation (I.F.C.), International Development Association (I.D.A.).
- UNIT:6**      **India's Trade Policy:** Trends of Exports and Imports of India since independence, Composition of India's Foreign Trade.