

## B Tech III SEMESTER

### 3EE1 POWER ELECTRONICS - I

- Unit1. **PN JUNCTION DIODES:** Open-circuited p-n junction and space charge region. The biased p-n junction, volt-ampere characteristics, cutin voltage and effect of temperature on V-I characteristics. Minority carrier density distribution in (i) a forward biased junction and (ii) a reverse biased junction. Diode capacitances. Junction diode switching times and characteristics. **OTHER DIODES:** Avalanche breakdown and zener breakdown. Working principles of zener diodes, photo-diodes, light emitting diodes, solar cell and varactor diodes.
- Unit2. **ANALYSIS OF DIODE CIRCUITS:** Diode as a circuit element, load line, small signal diode model and large signal diode model. Analysis of half wave and full wave single-phase rectifiers, peak inverse voltage. Various types of filters, their analysis and applications. Voltage multipliers, clipping and clamping circuits.
- Unit3. **BIPOLAR JUNCTION TRANSISTORS (BJTs):** p-n-p and n-p-n transistors, transistor current components. Common base (CB) and common emitter (CE) configurations: input & output characteristics, current gains: alpha & beta. Transistor operating regions: active region, saturation region and cutoff region. Common collector configuration. BJT biasing and dc models. Thermal stability and stabilization techniques. Small signal models: h-parameters and hybrid pie models. BJT as a switch. Minority carrier concentration in the base for cutoff, active and saturation conditions, transistor switching times and characteristics. Transistor ratings.
- Unit4. **FIELD EFFECT TRANSISTORS:** Construction, working, V-I characteristics and transfer characteristics of JFET. MOSFET: Enhancement type and depletion type: construction, working, V-I characteristics, and transfer characteristics. DC analysis of FETs. FET as a voltage variable resistor. FET small signal models. FET as a switch. CMOS.
- Unit5. **SMALL SIGNAL AMPLIFIERS:** Analysis of BJT and JFET amplifiers at low frequency: input and out resistances, voltage and current gains. Frequency response of common emitter transistor amplifier at high frequency. Miller's theorem and its dual. Cascaded BJT amplifiers. Darlington pair and Bootstrapped Darlington circuit.

### 3EE2 COMPUTER PROGRAMMING-I

- Unit1. **PROGRAMMING IN C:** Review of basics of C, structure & pointer type, variables, singly and doubly linked lists, I/O and text file handling, command line arguments.
- Unit2. **OOP FUNDAMENTALS:** Concept of class and object, attributes, public, private and protected members, derived classes, single & multiple inheritance,
- Unit3. **PROGRAMMING IN C++:** Enhancements in C++ over C in data types, operators and functions. Inline functions, constructors and destructors. Friend function, function and operator overloading.
- Unit4. Working with class and derived classes. Single and, multiple and multilevel inheritances and their combinations, virtual functions, pointers to objects.
- Unit5. Working with text files, templates, file handling in C++, Input output flags and formatting operations.

### 3EE3 CIRCUIT ANALYSIS-I

- Unit1. **INTRODUCTION:** Introduction to circuit elements and their characteristics. Current and voltage reference. Response of single element, double element and triple element circuits. Resonance, selectivity & Q-factor in ac circuits.  
**NETWORK ANALYSIS:** Network voltages. Mesh & node systems of network equations and their comparison. Graph of network, tree, incidence matrix, fundamental circuit functions, cut sets, f-circuits analysis and f-cut set analysis, node and node pair analysis. Duality. Method of obtaining dual network.
- Unit2. **NETWORK THEOREMS:** Thevenis's, Norton's, Superposition, Reciprocity, Compensation, Millman's, Tellegen's, Maximum power transfer and Miller's theorems.
- Unit3. **POLYPHASE CIRCUITS:** General circuit relations: Three phase star, three phase delta, star and delta combination, four wire star connection, balanced three phase voltages and unbalanced impedances. Power and reactive volt-amperes in a 3-phase system. Power relations in AC circuits: Instantaneous power in AC circuits, power factor, apparent power, reactive power, power triangle, complex power.
- Unit4. **NON-SINUSOIDAL WAVES:** Complex periodic waves and their analysis by Fourier series. Different kinds of symmetry, determination of co-efficients. Average and effective values of a non-sinusoidal wave, power in a circuit of non-sinusoidal waves of current and voltage, form factor, equivalent sinusoidal wave and equivalent power factor. Response of linear network to non-sinusoidal periodic waves.
- Unit5. **TIME DOMAIN AND FREQUENCY DOMAIN ANALYSIS:** Response of networks to step, ramp, impulse, pulse and sinusoidal inputs. Time domain and frequency domain analysis of circuits. Shifting theorem, initial and final value theorems. Special signal waveforms with Laplace transform & applications to circuit operations.

### 3EE4 ELECTRICAL MACHINES-I

- Unit1. **ELECTROMECHANICAL ENERGY CONVERSION:** Basic principles of electromechanical energy conversion. Basic aspects and physical phenomena involved in energy conversion. Energy balance.
- Unit2. **DC GENERATORS:** Construction, Types of DC generators, emf equation, lap & wave windings, equalizing connections, armature reaction, commutation, methods of improving commutations, demagnetizing and cross magnetizing mmf, interpoles, characteristics, parallel operation. Rosenberg generator.
- Unit3. **DC MOTORS:** Principle, back emf, types, production of torque, armature reaction & interpoles, characteristics of shunt, series & compound motor, DC motor starting. Speed Control of DC Motor: Armature voltage and field current control methods, Ward Leonard method. Braking, losses and efficiency, direct & indirect test, Swinburne's test, Hopkinson test, field & retardation test, single-phase series motor.
- Unit4. **TRANSFORMERS:** Construction, types, emf equation. No load and load conditions. Equivalent circuits, Vector diagrams, OC and SC tests, Sumpner's back-to-back test, efficiency. voltage regulation, effect of frequency, parallel operation, autotransformers, switching currents in transformers, separation of losses.
- Unit5. **POLYPHASE TRANSFORMERS:** Single unit or bank of single-phase units, polyphase connections, Open delta and V connections, Phase conversion: 3 to 6 phase and 3 to 2 phase conversions, Effect of 3-phase winding connections on harmonics, 3-phase winding transformers, tertiary winding.

### 3EE5 ELECTRICAL MEASUREMENTS

- Unit1. **Measuring Instruments:** Moving coil, moving iron, electrodynamic and induction instruments- construction, operation, torque equation and errors. Applications of instruments for measurement of current, voltage, single-phase power and single-phase energy. Errors in wattmeter and energy meter and their compensation and adjustment. Testing and calibration of single-phase energy meter by phantom loading.
- Unit2. **Polyphase Metering:** Blondel's Theorem for n-phase, p-wire system. Measurement of power and reactive kVA in 3-phase balanced and unbalanced systems: One-wattmeter, two-wattmeter and three-wattmeter methods. 3-phase induction type energy meter. Instrument Transformers: Construction and operation of current and potential transformers. Ratio and phase angle errors and their minimization. Effect of variation of power factor, secondary burden and frequency on errors. Testing of CTs and PTs. Applications of CTs and PTs for the measurement of current, voltage, power and energy.
- Unit3. **Potentiometers:** Construction, operation and standardization of DC potentiometers – slide wire and Crompton potentiometers. Use of potentiometer for measurement of resistance and voltmeter and ammeter calibrations. Volt ratio boxes. Construction, operation and standardization of AC potentiometer – in-phase and quadrature potentiometers. Applications of AC potentiometers.
- Unit4. **Measurement of Resistances:** Classification of resistance. Measurement of medium resistances – ammeter and voltmeter method, substitution method, Wheatstone bridge method. Measurement of low resistances – Potentiometer method and Kelvin's double bridge method. Measurement of high resistance: Price's Guard-wire method. Measurement of earth resistance.
- Unit5. **AC Bridges:** Generalized treatment of four-arm AC bridges. Sources and detectors. Maxwell's bridge, Hay's bridge and Anderson bridge for self-inductance measurement. Heaviside's bridge for mutual inductance measurement. De Sauty Bridge for capacitance measurement. Wien's bridge for capacitance and frequency measurements. Sources of error in bridge measurements and precautions. Screening of bridge components. Wagner earth device.

### 3EE6 MATHEMATICS-III

- Unit1. **LAPLACE TRANSFORM:** Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to wave and diffusion equations, digital transforms.
- Unit2. **FOURIER TRANSFORM:** Discrete Fourier transform, Fast Fourier transform, Complex form of Fourier transform and its inverse applications, Fourier transform for the solution of partial differential equations having constant coefficients with special reference to heat equation and wave equation.
- Unit3. **FOURIER SERIES:** Expansion of simple functions in Fourier series, half range series, change of interval, harmonic analysis.  
**CALCULUS OF VARIATION:** Functional, strong and weak variations, simple variation problems, Euler's equation
- Unit4. **COMPLEX VARIABLES:** Analytic functions, Cauchy–Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy's theorem, Cauchy's integral formula.
- Unit5. **COMPLEX VARIABLES:** Taylor's series, Laurent's series, poles, Residues. Evaluations of simple definite real integrals using the theorem of residues. Simple contour integration.

### 3EE7 POWER ELECTRONICS LAB-I

1. Study the following devices: (i) Analog & digital multimeter (ii) Function/ Signal generators (iii) Regulated d. c. power supplies (constant voltage and constant current operations)
2. Study of digital storage CRO and store a transient on it.
3. Study of analog CRO, CRO probes, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.
4. Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
5. Plot V-I characteristic of zener diode and study zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
6. Plot frequency response curve for audio amplifier and to determine gain bandwidth product.
7. Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of  $I_{dss}$  &  $V_p$
8. Plot gain- frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
9. Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
10. Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
11. Study half wave rectifier and effects of filters on wave. Also calculate ripple factor.
12. Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.

### 3EE8 COMPUTER PROGRAMMING LAB-I

1. Write a program to find the greatest between four numbers.
2. Write a program to prepare mark sheet of students using structures.
3. Write a C program to read several different names and addresses, re-arrange the names in alphabetical order and print name in alphabetical order using structures.
4. Write a program to implement concatenation of two strings using pointers.
5. Write a program to create a singly link list of ten students names and implement add node, delete node and isemptylist operations.
6. Write a program to search a pattern in a given string.
7. Write a Program to read add, subtract and multiply integer matrices.
8. Write a program to calculate the power function ( $m^n$ ) using the function overloading technique; implement it for power of integer and double.
9. Implement file creation and operate it in different modes: seek, tell, read, write and close operations.
10. Using multiple inheritance, prepare students' mark sheet. Three classes containing marks for every student in three subjects. The inherited class generate mark sheet.
11. Write a program to print the following output using FOR loop.

```
      1                1
     2 2            2 2
    3 3 3          3 3 3
   4 4 4 4        4 4 4 4
  5 5 5 5 5      5 5 5 5 5
```

### **3EE9 ELECTRICAL CIRCUIT LAB**

1. Draw the circuit symbols.
2. Verify theorems for A. C. & D. C. circuits.

#### **PSPICE PROGRAMS FOR CIRCUIT ANALYSIS:**

3. DC-analyze resistor networks to determine node voltages, components voltages, and component currents.
4. Analyze resistor networks that have several voltage and current sources and variable load resistors.
5. Transient –analyze RC & RL circuits to produce tables of component voltage & current levels for a given set of time instants & to produce graphs of voltages & currents versus time.
6. AC-analyze impedance networks to determine the magnitude & phase of node voltages, components voltages and component currents.
7. Determine the magnitude & phase and component voltages and currents in resonant circuits & produce voltage and current v/s frequency graphs.

#### **PROGRAMS FOR CIRCUIT ANALYSIS:**

8. Calculate the resistance of a conductor, given its dimensions & resistivity or determine the change in conductor resistance when the temp changes.
9. D.C.-analyze resistor networks to determine all junction voltages, component voltages, and component currents.
10. Transient –analyze RC & RL circuits to produce tables of component voltage & current levels for a given set of time instants.
11. Convert Y-connected resistor networks to delta-connected circuits

### **3EE10 ELECTRICAL MACHINE LAB-I**

1. Speed control of D.C. shunt motor by (a) Field current control method & plot the curve for speed vs field current. (b) Armature voltage control method & plot the curve for speed vs armature voltage.
2. Speed control of a D.C. Motor by Ward Leonard method and to plot the curve for speed vs applied armature voltage.
3. To determine the efficiency of D.C. Shunt motor by loss summation (Swinburne's) method.
4. To determine the efficiency of two identical D.C. Machine by Hopkinson's regenerative test.
5. To perform O.C. and S.C. test on a 1-phase transformer and to determine the parameters of its equivalent circuit its voltage regulation and efficiency.
6. To perform back-to-back test on two identical 1-phase transformers and find their efficiency & parameters of the equivalent circuit.
7. To perform parallel operation of two 1-phase transformers and determine their load sharing.
8. To determine the efficiency and voltage regulation of a single-phase transformer by direct loading.
9. To perform OC & SC test on a 3-phase transformer & find its efficiency and parameters of its equivalent circuit.
10. To perform parallel operation of two 3-phase transformers and determine their load sharing.
11. To study the performance of 3-phase transformer for its various connections, i.e. star/star & star/delta/delta/star and delta/delta and find the magnitude of 3<sup>rd</sup> harmonic current.

### **3EE11 ELECTRICAL MEASUREMENT LAB**

1. Study working and applications of (i) C.R.O. (ii) Digital Storage C.R.O. & (iii) C.R.O. Probes
2. Study working and applications of Meggar, Tong-tester, P.F. Meter and Phase Shifter.
3. Measure power and power factor in 3-phase load by (i) Two-wattmeter method and (ii) One-wattmeter method.
4. Calibrate an ammeter using DC slide wire potentiometer.
5. Calibrate a voltmeter using Crompton potentiometer.
6. Measure low resistance by Crompton potentiometer.
7. Measure Low resistance by Kelvin's double bridge.
8. Measure earth resistance using fall of potential method.
9. Calibrate a single-phase energy meter by phantom loading at different power factors.
10. Measure self-inductance using Anderson's bridge.
11. Measure capacitance using De Sauty Bridge.
12. Measure frequency using Wein's bridge.

### **B Tech IV SEMESTER**

#### **4EE1 POWER ELECTRONICS-II**

- Unit1. **FEEDBACK AMPLIFIERS:** Classification, Feedback concept, transfer gain with feedback. General characteristics of negative feedback amplifiers. Analysis of voltage series, voltage shunt, current series and current shunt feedback amplifiers. Stability criterion.
- Unit2. **OSCILLATORS:** Classification of oscillators and Criterion for oscillation. RC-phase shift, Hartley, Colpitts, tuned collector, Wein Bridge and crystal oscillators. Astable, monostable and bistable multivibrators. Schmitt trigger.
- Unit3. **OP-AMP AND ITS APPLICATIONS:** Operational amplifier: inverting and non-inverting modes. Characteristics of ideal op-amp. Offset voltage and currents. Basic op-amp applications. Differential Amplifier and common mode rejection ratio. Differential DC amplifier and stable ac coupled amplifier. Integrator and differentiator. Analog computation, comparators, sample and hold circuits, logarithmic & antilog Amplifiers and Analog multipliers.
- Unit4. **INTEGRATED CIRCUITS:** Precision AC/DC converters-precision limiting, Precision half wave and full wave rectifiers. Active average and peak detectors, A to D and D to A converters. IC 555 timer and its application. Regulated power supplies, Series and shunt voltage regulators, Brief idea of Monolithic regulator.
- Unit5. **POWER AMPLIFIERS:** Class –A large signal amplifiers, second harmonic distortion, higher order harmonic generation, Transformer coupled audio power amplifier, collector efficiency. Pushpull amplifier: Class A, Class B and Class AB operations. Comparison of performance with single ended amplifiers

#### **4EE2 DIGITAL ELECTRONICS**

- Unit1. **NUMBER SYSTEMS AND CODES:** Radix and Radix conversions, sign, magnitude & complement notation. Weighted and non-weighted codes, BCD codes, self-complementing codes, cyclic codes, error detecting and correcting codes, ASCII & EBCDIC codes. Alphanumeric codes. Fixed point and floating point arithmetic. BCD arithmetic.

- Unit2. **BOOLEAN ALGEBRA AND DIGITAL LOGIC GATES:** Features of Boolean algebra, postulates of Boolean algebra, theorems of Boolean algebra. Fundamental logic gates, derived logic gates, logic diagrams and Boolean expressions. Converting logic diagrams to universal logic. Positive, negative and mixed logic. **MINIMIZATION TECHNIQUES:** Minterm, Maxterm, Karnaugh's maps, simplification of logic functions with K-map, conversions of truth tables in SOP & POS forms, incompletely specified functions, variable mapping, Quinn-Mcklusky method.
- Unit3. **SWITCHING CIRCUITS AND LOGIC FAMILIES:** Diode, BJT, FET as switch. Different types of logic families: RTL, TTL, open collector TTL, three state output logic, TTL subfamilies, MOS, CMOS, ECL IIL.
- Unit4. **COMBINATION SYSTEMS:** Combinational logic circuit design, Half and full adder & subtractors. Binary serial and parallel adders, BCD adder. Binary multiplier, comparator, decoders, encoders, multiplexer, de-multiplexer, Code converters.
- Unit5. **SEQUENTIAL SYSTEMS:** Latches, Flip-Flop: R-S, D, J-K, T, Master slave. Flip-flop conversions. Counters: asynchronous & synchronous counter. Counter design, counter applications. Registers: buffer & shift register.

### 4EE3 ELECTRICAL MACHINES-II

- Unit1. **INTRODUCTION:** General equation of induced emf, AC armature windings: concentric and distributed winding, chording, skewing, effect on induced emf. Armature and field mmf, effect of power factor and current on armature mmf, harmonics. Rotating fields.
- Unit2. **INDUCTION MOTORS:** Construction of squirrel cage & slip ring induction motor, basic principles, flux and mmf waves, induction motor as a transformer. Equivalent circuits, torque equation, torque-slip curves, no load & block rotor tests, circle diagram, performance calculation. Effect of rotor resistance. Cogging, Crawling. Double cage squirrel cage induction motor, induction generator, induction regulator.
- Unit3. **STARTING & SPEED CONTROL OF INDUCTION MOTORS:** Various methods of starting & speed control of squirrel cage & slip ring motor, cascade connection, braking.  
**Single-Phase Induction Motor:** Revolving field theory, starting methods, equivalent circuits.
- Unit4. **SYNCHRONOUS GENERATOR:** Construction, types, excitation systems, principles. Equation of induced emf, flux and emf waves, theory of cylindrical rotor and salient pole machines, two-reactance theory, phasor diagrams, power developed, voltage regulation, OC & SC tests, zero power factor characteristics, potier triangle and ASA method of finding voltage regulation, synchronization, parallel operation, hunting and its prevention.
- Unit5. **SYNCHRONOUS MOTORS:** types, construction, principle, phasor diagrams, speed torque characteristics, power factor control, V-curves, starting methods, performance calculations, applications, synchronous condenser, synchronous induction motor.

### 4EE4 COMPUTER PROGRAMMING-II

- Unit1. **UNIX-** Introduction to following basic commands (excluding shell programming): who, touch, cat, cp, rm, mv, ls, unmask, pwd, mkdir, rmdir, bc, expr, factor, logname, id, uname, try, date, banner, dspace, du, ulimit, passwd, cal, wc, sort, cut, grep, dd, head, pg, lp, tail, compress, man, tee.
- Unit2. **VI EDITOR:** Text entry and command modes, cursor movement commands, string replacement commands and set commands.

- Unit3. **JAVA:** Variation from C++ to JAVA. Introduction to JAVA bytecode, virtual machine, application, application & applets of Java, integer, floating point, characters, Boolean, literals, and array declarations.
- Unit4. **OPERATORS AND CONTROL STATEMENTS:** Arithmetic operators, bitwise operators, relational operators, Boolean logic operators, the assignment operators, ?: operators, operator precedence. Switch and loop statements.
- Unit5. **PACKAGE AND INTERFACES:** Packages, access protection, importing & defining packages. Defining and implementing interfaces. I/O APPLET: I/O basics, reading console I/O, input and print stream classes, applet fundamental and string handling, mouse and keyboard interfaces, awt tools and controls.

#### **4EE5 CIRCUIT ANALYSIS-II**

- Unit1. **IMPEDANCE AND ADMITTANCE FUNCTIONS:** The concept of complex frequency, transform impedance and admittance, series and parallel combinations.  
**NETWORK FUNCTIONS:** Terminals and terminal pairs, driving point impedance transfer functions, poles and zeros. Restrictions on pole and zero location in s-plane. Time domain behavior from pole and zero plot. Procedure for finding network functions for general two terminal pair networks.
- Unit2. **NETWORK SYNTHESIS:** Hurwitz polynomial, positive real functions, reactive networks. Separation property for reactive networks. The four-reactance function forms, specification for reactance function. Foster form of reactance networks. Cauer form of reactance networks. Synthesis of R-L and R-C networks in Foster and Cauer forms.
- Unit3. **TWO PORT GENERAL NETWORKS:** Two port parameters (impedance, admittance, hybrid, ABCD parameters) and their inter relations. Equivalence of two ports. Transformer equivalent, inter connection of two port networks. The ladder network, image impedance, image transfer function, application to L-C network, attenuation and phase shift in symmetrical T and pi networks.
- Unit4. **TWO PORT REACTIVE NETWORK (FILTERS):** Constant K filters. The m-derived filter. Image impedance of m-derived half (or L) sections, composite filters. Band pass and band elimination filters. The problem of termination, lattice filters, Barlett's bisection theorem. Introduction to active filters.
- Unit5. **COUPLED CIRCUITS:** Conductively coupled circuits. Mutual impedance, magnetic coupling, mutual inductance, co-efficient of magnetic coupling, circuit directions and sign of mutual inductance, mutual inductance between portions of the same circuit, mutual inductance between parallel branches, transferred impedance. Transformer equivalent inductively and conductively coupled circuits; Resonance in Single tuned and Double tuned circuits, effect of coefficient of coupling.

#### **4EE6 ADVANCED MATHEMATICS**

- Unit1. **NUMERICAL ANALYSIS:** Finite differences - Forward backward and central difference. Newton's forward and backward differences interpolation formulae. Sterling's formulae, Lagrange's interpolation formula. Solution of non-linear equations in one variable by Newton Raphson and Simultaneous algebraic equation by Gauss and Regula Falsi method. Solution of simultaneous equations by Gauss elimination and Gauss Seidel methods. Fitting of curves (straight line and parabola of second degree) by method of least squares.

- Unit2. **NUMERICAL ANALYSIS:** Numerical differentiation, numerical integration trapezoidal rule, Simpson's one-third and one eighth rule. Numerical Integration of ordinary differential equations of first order, Picard's method, Euler's & modified Euler's methods. Miline's method and Runga Kutta fourth order method. Simple linear difference equations with constant coefficients.
- Unit3. **SPECIAL FUNCTIONS:** Bessel's function of first and second kind, simple recurrence relations, orthogonal property of Bessel functions, Transformation, Generating functions, Legendre's function of first kind, simple recurrence relations, orthogonal property, Generating functions.
- Unit4. **STATISTICS & PROBABILITY:** Elementary theory of probability, Baye's theorem with simple applications, Expected value. Theoretical probability distributions – Binomial, Poisson and Normal distributions
- Unit5. **STATISTICS & PROBABILITY:** Lines of regression, co-relation and rank correlation.  
**TRANSFORMS:** Z-transforms, its inverse, simple properties and application to difference equations.

#### **4EE7 POWER ELECTRONICS LAB-II**

1. Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1KHz with and without negative feedback.
2. Study of series and shunt voltage regulators and measure line and load regulation and ripple factor.
3. Plot and study the characteristics of small signal amplifier using FET.
4. Push Pull amplifier: To study variation of output power & distortion with load.
5. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
6. Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
7. Study the following oscillators and observe the effect of variation of C on oscillator frequency: (i) Hartley (ii) Colpitts
8. (i) Study op-amp in inverting and non-inverting modes. (ii) Use op-amp as scalar, summer and voltage follower.
9. Use of op-amp as differentiator and integrator.
10. Study Op-amp characteristics and get data for input bias current, measure the output-offset voltage and reduce it to zero and calculate slow rate.
11. Obtain a frequency response of filters.
12. Analyze filter circuits to produce voltage frequency & phase-frequency response graphs using PSPICE.

#### **4EE8 DIGITAL ELECTORNICS LAB**

1. Study of following combinational circuits: Multiplexer, Demultiplexer and Encoder. Verify truth tables of various logic functions.
2. Study of various combinational circuits based on: AND/NAND Logic blocks and OR/NOR Logic blocks.
3. To study various waveforms at different points of a transistor bistable multivibrator and its frequency variation with different parameters.
4. To design a frequency divider using IC-555 timer.
5. To study various types of registers and counters.

6. To study Schmitt trigger circuit.
7. To study transistor astable multivibrator.
8. Experimental study of characteristics of CMOS integrated circuits.
9. Interfacing of CMOS to TTL and TTL to CMOS.
10. BCD to binary conversion on digital IC trainer.
11. Testing of digital IC by automatic digital IC trainer.
12. To study OP-AMP as Current to Voltage & Voltage to Current converters & comparator.

### **4EE09 ELECTRICAL MACHINES LAB-II**

1. Separation of transformer core losses and to determine the hysteresis and eddy current losses at rated voltage and frequency.
2. To plot the O.C.C. & S.C.C. of an alternator and to determine its regulation by synchronous impedance method.
3. To synchronize an alternator across the infinite bus (RSEB) & summarize the effects of variation of excitation on load sharing.
4. To plot the V-curve for a synchronous motor for different values of loads.
5. To perform sumpner's back-to-back test on 3 phase transformers, find its efficiency & parameters for its equivalent circuits.
6. To perform the heat run test on a delta/delta connected 3-phase transformer and determine the parameters for its equivalent circuit.
7. To perform no load and blocked rotor test on a 3 phase induction motor and to determine the parameters of its equivalent circuits. Draw the circle diagram and compute the following (i) Max. Torque (ii) Current (iii) slip (iv) p.f. (v) Efficiency.
8. To perform the load test on a 3-phase induction motor and determine its performance characteristics (a) Speed vs load curve (b) p.f. vs load curve (c) Efficiency vs load curve (d) Speed vs torque curve
9. Determination of losses and efficiency of an alternator.
10. To find  $X_d$  and  $X_q$  of a salient pole synchronous machine by slip test.

### **4EE10 COMPUTER PROGRAMMING LAB - II**

#### **UNIX**

1. Use of advanced vi commands.
2. Sorting of files containing records using sort command.
3. Searching patterns in files.
4. Use of bc, expr, factor commands.
5. Use of head, tail, compress commands.
6. Memory management commands, df, space, du, ulimit etc.

#### **JAVA**

7. Programs based on matrix: addition, multiplication, transpose, check if matrix is symmetric / upper triangular / lower triangular / unit matrix.
8. Representation of complex numbers and their operation: add, multiply; divide, subtraction, magnitude (mod) etc.
9. Complex matrix representation and operation: add, subtract, multiply.
10. Defining packages for sorting algorithms.
11. File handling operations: input from file, output to file, file copy, file concatenation.

12. Mouse and keyboard event handling programs.
13. Programs based on string operations.
14. Drawing in applet and use of buttons check boxes, text fields and labels in applets.

#### **4EE11 HUMANITIES & SOCIAL SCIENCE**

**INDIA:** Brief history of Indian Constitution, farming features, fundamental rights, duties, directive principles of state. History of Indian National Movement, socio economic growth after independence.

**SOCIETY:** Social groups- concept and types, socialization- concept and theory, social control: concept, social problem in contemporary India, status and role.

**THE FUNDAMENTALS OF ECONOMICS:** meaning, definition and importance of economics, Logic of choice, central economic problems, positive and normative approaches, economic systems- socialism and capitalism.

**MICROECONOMICS:** Law of demand supply, utility approach, indifference curves, elasticity of demand and supply and applications, consumer surplus, Law of returns to factors and returns to scale.

**MACROECONOMICS:** concepts relating to National product – National income and its measurement, Simple Keynesian theory, simple multiplier, money and banking. Meaning, concept of international trade, determination of exchange rate, Balance of payments.