

National Institute of Technology, RAIPUR

B.Tech. III Semester

Branch: Electrical Engg.

Code: EL20311

Subject: Solid state Devices

Minimum number of Class tests to be conducted: 2

UNIT I

Diodes characteristics ,equivalent circuit, Junction capacitance of diode and applications as Clipping, Clamping circuits, Voltage doublers, special purpose diodes- photodiode, LED, tunnel diode, Varactor diode, pin diode.

UNIT II

Diode Applications Rectifiers: half wave and full wave bridge rectifier circuit ,Design filters for rectifiers. Various parameters of power supply, Shunt, Series & Zener voltage regulators.

UNIT III

Input and output characteristics of transistor circuits, various Biasing - Purpose of biasing, dc operating point, dc load line, different biasing techniques – Base bias, Emitter bias, Voltage divider bias, Collector feedback bias, Thermal Runaway, Thermal stability. ac load line, graphical analysis, current, voltage & power gain, input and output impedance, analysis using r- parameters and h-parameters, frequency response, cascading.

UNIT IV

FET & MOSFET- The JFET, pinch off voltage, JFET V-I characteristics, FET small signal model, depletion mode MOSFET, enhancement mode MOSFET, low frequency common source and common drain amplifiers, FET biasing, FET as a voltage variable resistor. The common source and common drain amplifier at high frequencies, MOSFET as a switch, MOSFET driver circuits.

UNIT V

Feedback amplifier and oscillators: General Feedback Theory, current and voltage feedback, Effect of negative feedback, condition for oscillation, Wein bridge` and RC phase shift oscillator, Hartley and Colpitts oscillator, crystal oscillator, Tuned diode oscillator.

Text Books:

1. Electronic Devices – Millman & Halkias
2. Electronics Principles – A.P.Malvino

Reference Books:

1. Electronic Circuit Discrete and Integrated – Donald I. Schilling
2. Electronic Devices – David Bell

National Institute of Technology, RAIPUR

B.Tech. III Semester

Branch: Electrical Engg.

Code: MA20312

SUBJECT: Numerical method and Computer Programming

Minimum number of Class tests to be conducted: 2

Numerical Methods

Unit1: Numerical solution of algebraic & Transcendental Equations. Approximation errors in computation, round of errors, truncation errors; solution of algebraic & transcendental equations using by section method, Regula falsi method, Newton's raphsons method, Secant method, Birge-vieta method.

Unit2: Numerical solution of simultaneous Linear equations and interpolation-Gauss Elimination method, Gauss Jordan's method, Crout triangularisation method, Gauss seidal method, Gauss Jacobi's method, Relaxation method, Newton forward & Backward Interpolation, Newton divided Interpolation Lagrange interpolation, Striling's and Bessel's formula.

Unit 3: Numerical Solution of Ordinary Differential equations and curve fitting –Picard method, Taylor's series method Euler's method, Euler's modified method, Runge-Kutta method of fourth order. Curve fitting method of least square- straight line, second degree parabolic curve and exponential curve.

Computer Programming

Unit4: Introduction of computer programming in C & C++ Language, Arithmetic expression, Example of some simple C programme., Concept of variable, program statement and function calls from the library (print for example) (Data type, print char, float etc), C expressions, arithmetic operation relation and logic operation assignment statement, C statement, Conditional statements, concept of loop & loop statements. Using these articles (of this unit) programming in C language of different Numerical methods from the above units.

Unit5: Arrays, String, Structure, Unions and File I/O, one dimensional array and example of iterative programs using arrays, 2-d arrays Use in matrix computations, Concept of subprogramming, fuction example of functions argument passing mainly for the simple variable, array of pointers, passing arrays are argument, String, C string library, Structure and unions, Defining C structure, passing structure as arguments, Program examples, File I/O, use of open, scan & print routines, Using this articles (of this unit) programming in C language of different Numerical methods from the above units.

Text Books:

1. Numerical method by B.S.Grewal, Khanna publication..
2. Let us C by Yashwant Kanetkar.
3. programming in Ansi C by Balaguruswami TMH.

Reference Books :

1. Numerical method for scientific & engineering computation by M.K. Jain, SRK Iyenger and R.K Jain, Wiely Eastern.
2. .programming in C++ by Balaguruswami, TMH.

National Institute of Technology, RAIPUR

B.Tech. III Semester

Branch: Electrical Engg.

Code: EL20313

Subject: Electric Circuits

Minimum number of Class tests to be conducted: 2

UNIT – I

Development Of Circuit Concepts:

The relationship of field and circuit concept for parameters, lumped, linear and bilateral elements, voltage and current sources, duality of simple circuit, network topology: graph-tree, branch link, tie set, cutset, loop and nodal analysis, equilibrium equations.

UNIT – II

Network Solution And Reduction:

Solution of network equation of determination method of network reductions, nodal analysis, mesh analysis, super node, super mesh network theorems, superposition theorem, reciprocity theorem, Thevenin's theorem, Norton's theorem, star delta transformation theorem, Tellegen's theorem.

UNIT – III

Network Solution And Reduction:

Electrostatic and electromagnetic coupling, self-inductance, mutual inductance, coupling coefficient, complete network with conductive and inductive coupling, Series and parallel resonance, quality factor, band width, selectivity, half power frequencies, circle diagram of simple series and parallel circuits, inversion of circle and straight line impedance and Admittance loci.

UNIT – IV

Poly Phase Circuits:

Examples of two, three, four-loop circuits and their solutions, unbalanced poly phase circuits, determination of phase sequence, star/delta connections, and power measurement in poly phase circuits.

UNIT – V

Non – sinusoidal Ideal Wave Forms:

Common non-sinusoidal waveforms, Fourier series, analytical evaluation of Fourier coefficients, exponential form of Fourier series, frequency spectra of periodic waveforms, semi graphical method of analysis, effective value and equivalent power factor solution of circuits with non sinusoidal currents and voltages, harmonic resonance and harmonics in poly phase circuits.

Text Books: 1. “*Electric Circuit Analysis*”, Hayt, Kemmerly, Durbin, TMH Pbs.

2. “*AC Circuits*”, Kerchner and Cocoran

3. Network Analysis by M.E. Van Valkenberg

Reference Books: 1. “*Fundamentals of Electric Circuits*” Alexander & Sadiku, TMH Pbs.

2. “*Basic Circuit Theory*”, Desoer and Kuh, Mc Graw Hill Pbs.

3. Network Analysis & Synthesis, D. Roy Choudhary

National Institute of Technology, RAIPUR

B.Tech. III Semester

Branch: Electrical Engg.

Code: MA20314

Subject: Mathematics-III

Minimum number of Class tests to be conducted: 2

UNIT I

FOURIER SERIES

Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half range series, Harmonic analysis.

UNIT II

LAPLACE TRANSFORM

Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by tn , Division by t , Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT III

PARTIAL DIFFERENTIAL EQUATION

Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

UNIT IV

COMPLEX VARIABLES

Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue, Evaluation of real definite integrals.

UNIT V

Z-TRANSFORM

Definition, Properties, Initial value & final value theorems, Inverse Z-transform, Convolution theorem, Partial fraction, Residue method & Applications to solution of difference equations.

TEXT BOOKS: -

1. Higher Engg. Mathematics by Dr. B.S. Grewal– Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

REFERENCE BOOKS: -

1. Advanced Engg. Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P.N. Wartikar & J.N. Wartikar. Vol- II– Pune Vidyarthi Griha Prakashan, Pune.
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes-

National Institute of Technology, RAIPUR

B.Tech. III Semester

Branch: Electrical Engg.

Code: EL20315

Subject: Generation of Electrical Energy (Conventional & Non-conventional)

Minimum number of Class tests to be conducted: 2

UNIT -I

Introduction to Generating station & Loads: Choice of Power station and units: Types of power station, choice of type of generation, choice of size of generator units and number of units. Definition of connected load, maximum load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor, plant utilization factor, load duration curve, mass curve

UNIT -II

Steam Power station: Main parts and working of a steam station, characteristics off steam turbines, characteristics of turbo alternators, steam station auxiliaries, steam station layout, super pressure steam stations.

UNIT- III

Hydro power stations: Hydrology, hydrographs, flow duration curve, mass curve, types of dam, principle of working of a hydro electric plant, tidal power plant, power to be developed, types of turbine and their characteristics, characteristics of generators, power station structure and layout.

UNIT- IV

(A) Nuclear power stations: main parts of nuclear power station principle of nuclear energy, main parts of reactor, types of power reactor, location of nuclear power plant, layout of power station, reactor control, nuclear waste disposal.

(B) MHD generation: history of MHD generation, principle of MHD generation, MHD cycles and working fluids, open cycle MHD system, closed cycle MHD system, advantage of MHD generation.

UNIT -V

(A) New Energy Sources: Solar radiation, Solar energy collectors, Conversion of solar energy into electric energy, Solar hydrogen energy cycle, Wind mills, Tidal power generation schemes, Tidal barrage, Environmental aspects of new and old electric energy generation.

(B) Economic operation of power systems: Criteria for distribution of load between units of a plant and between plants, transmission loss as a function of plant generation, loss formula coefficients, brief aspects of load dispatching.

Text Books:

- 1.Generation of Electrical Energy by B.R. Gupta, S.Chand Pbs.
2. Electric Power Station, Car, T.H.,Chappman & Hall

Reference Books:

1. Elements of Electric Power Station Design by M.V. Deshpande
2. A Course in Electrical Power by Soni Gupta Bhatnagar, Dhanpat Rai
3. A Course in Electrical Power by J.B.Gupta, Kataria Pbs.

National Institute of Technology, RAIPUR

B.Tech. III Semester

Branch: Electrical Engg.

Code: EL20316

Subject: Electrical Machines-I

Minimum number of Class tests to be conducted: 2

UNIT – I

Single Phase Transformer

Review of transformer theory: Construction and Principle of operation of single phase transformer, equivalent circuit representation of a practical transformer, Phasor diagrams under no load and load condition, Auto-transformer equivalent circuit and phasor diagram.

UNIT – II

Three Phase Transformer

Three-phase transformers, core and shell type transformer, three-phase tank, three-phase unit, Different connections and vector groups, three winding transformer connections, parameters of three winding transformer, coupled circuit view point.

UNIT – III

Parallel Operation And Testing Of Single Phase and Three Phase Transformers

Parallel operation of single-phase and three-phase transformer, open delta, Scott connection, back-to-back test, separation of losses, excitation phenomenon in transformers. transformer cooling, pulse transformer, wide band transformer.

UNIT – IV

DC Generators

Electromagnetic principle of DC machine, constructional details, production of voltage and torque, BLV and BLI concepts, classification of DC machine, conditions of self excitation, Cross-field machines, armature winding, armature reaction and its effect, flux and mmf waves, effect of brush shift, commutation, methods of improving commutation, Operating characteristics of DC generator, parallel operation.

UNIT – V

DC Motors

DC machine as motor, electrical and mechanical characteristics of DC motor, starting and speed control of DC motors, losses in DC machines, Testing of DC machines, Swinburne's test, regenerative and retardation test.

Text Books:

1. Electrical Machines by Smarajit Ghosh, Pearson Education
2. Performance & Design of A.C. Machines by M.G. Say, C.B.S. Publishers

Reference Books:

1. Performance & Design of D.C. Machines by A.E. Clayton & Hancock, C.B.S. Pbs.
2. Electric Machines by Nagrath & Kothari, TMH Pbs.
3. Electric Machines by P.K. Mukherjee & S.Chakravarti, Dhanpat Rai
4. Electrical machines by B. R, Gupta, New age international.