

G.H.RAISONI COLLEGE OF ENGINEERING
BACHELOR OF ENGINEERING
BOARD OF STUDIES IN ELECTRICAL ENGINEERING
III rd Semester
BRANCH - ELECTRICAL (ELECTRONICS AND POWER)

SEMESTER III (ELECTRICAL ENGINEERING)

APPLIED MATHEMATICS III

Unit-1 : Laplace Transforms.(8)

Laplace transform, and their simple properties, simple applications for Laplace transforms to solve ordinary differential equations including simultaneous equations, solution of one-dimensional partial differential equations by transform method.

Unit-2 : Complex Variables (8)

Analytic function, Cauchy- Riemann conditions, conjugate functions, singularities, Cauchy's integral theorem and integral formula (statement only), Taylor's and Laurent's theorem (Statement only), Residue theorem, contour integration.

Unit-3 : Calculus of Variations (8)

Maxima and minima of functionals, variation and its properties, Euler's equation, functionals dependent on first and second order derivatives, simple applications

Unit-4 : Fourier series and signal spectra. (10)

Introduction, the Fourier theorem, Evaluation of Fourier coefficients, considerations of symmetry, (odd, even, rotational), exponential form, Fourier series, Fourier integral theorem, Fourier transform and continuous spectra.

Unit-5 : Partial Differential Equation (8)

Partial differential equation of first order first degree i.e. Lagrange's form, Linear, homogeneous partial differential equation of nth order with constant coefficient method of separation of variables, Application to transmission lines.

Unit-6 : Matrices (8)

Inverse of matrix by adjoint method and its use in solving simultaneous equations, rank of a matrix, consistency of system of equation, inverse of matrix by partitioning method, Linear dependence, Linear and orthogonal transformations, Characteristics equations, eigen values and eigen vectors, Reduction to diagonal form, Cayley-Hamilton theorem (without proof) statement and verification, Sylvester's theorem, Association of matrices with linear differential equation of second order with constant coefficient, Determination of largest eigen value and eigen vector by iteration method.

TEXT BOOKS:

Advanced Engineering Mathematics, Kreyszing.
Higher Engineering mathematics, B.S.Grewal.
Linear Network Theory by Kelkar, Pandit (for unit no. 4)

REFERENCE BOOK :

Mathematics for engineers, Chandrika Prasad.
Advanced Mathematics for Engineers, Chandrika Prasad.
Applied Mathematics for engineer, L.A. Pipes and Harville.
A test book of applied Mathematics, P.N. and J.N. Wartikar.

STEAM AND HYDROTURBINES:

Unit – 1 :

A) Properties and System (8)

Introduction, Properties of thermodynamic system such as specific volume, density, temperature, pressure etc, Their units and measurements, Laws of thermodynamics, Flow process and Non-Flow process.

B) Analysis of System:

Conservation of energy and mass and their application to various thermodynamics systems such as steam plant, I.C. Plant, Refrigeration and all Air- conditioning plant.

Unit-2 : Ideal Gases and Vapours :- (8)

Difference between gases and vapours, Law of perfect gases, Heating and expansion of gases, Internal energy and specific heats of gases, Universal gas constant work done, changes in Internal energy, heat absorbed and rejected during various thermodynamic processes P. V. diagrams.

Unit – 3: Properties of Steam :- (8)

Critical state sensible heat, Latent heat and total heat of steam, internal energy of steam, dryness fraction, steam tables and their use. Entropy

concept, entropy change for an ideal gas and steam. T & H charts, Carnot Rankine and modified Rankine cycle, regenerative cycle.

Unit – 4: (10)

Steam Nozzles and turbines, flow of steam through convergent, divergent nozzles.

Unit – 5:(8)

General study of steam and hydro Turbines Classification, Method of reducing rotor speed, Governing of turbines (No rigorous mathematical treatment is contemplated).

Unit – 6 : Condensers :- (8)

Different types of condensers, Their construction and principles of working.

TEXT BOOKS:

Engg. Thermodynamics : P.K.Nag

Thermal Engg. : R.S.Khurmi

Elements of Heat Engines: Patel Karamchandani (Vol. I, II, III)

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT.

Unit- 1 : Measuring Instruments :- (10)

Classification, Analog & Digital instruments, comparison of Analog & Digital instruments, advantages of digital instruments, classification of analog instruments, Absolute & secondary instruments, indicating type instruments, Recording type instruments, Loading effect of instruments, Measurement of Resistance: classification, measurements by voltage drop method, Measurement of medium resistance :- Wheatstone Bridge. Low resistance :- Kelvin's Double Bridge. High resistance :- Ohmmeter, Megger & loss of charge method.

Earth resistance :- Earth tester

Unit-2 : Measurement of inductance and capacitance :- (8)

General theory of AC bridges, study of Maxwell, Hay's, Owen's de-sauty, Wein, balancing bridges, detectors for AC bridges.

Unit-3 : D.C. and A.C. Potentiometers :- (6)

Principles and use of D.C. potentiometer for calibration purposes, principle and application of A.C., potentiometer.

Unit- 4 : 8)

Ammeter, Voltmeter, principle of moving coil, moving iron & Dynamometer type instruments, extension of range using series and shunts, errors due to extension of range, Digital Voltmeter:- Types of DVM, Ramp type DVM, integrating type DVM.

Unit-5 : Measurement of Power energy :- (10)

Measurement of active and reactive power in polyphase circuits, using dynamometer type instruments., Measurement of Energy in single and polyphase circuits using indication type instruments, Errors in power and energy measurements maximum demand indicator, Trivector Meter.

Unit-6 : Instrument Transformers :- (8)

General theory extension of range using S.T. & P.T., errors in instrument transformers, applications of instrument transformers for metering & protection.

Special Instruments :- Power factor meter, frequency meter, synchroscope, Rectifier type instrument, Digital frequency meter Basic circuit (Block Diagram), time base start & stop gate & complete simple circuit.

Practicals based on Above syllabus .

TEXT BOOKS:

A course in Electrical & Electronics measurement and instrumentation by A.K. Sawhney.

Electrical Measurements by Rajendra Prasad.

NETWORK ANALYSIS.

Unit-1 : (10)

Nodal and mesh basis equilibrium equations, matrix approach for complicated network, containing voltage, current sources and reactances, source transformations quality.

Unit-2 : (12)

Network Theorems, Superposition, Reciprocity, Thevenin's Norton's maximum power transfer, compensation, Tellegen's theorem as applied to A. C. circuits.

Unit -3 : (10)

Trigonometric and exponential fourier series, Discrete spectra and Symmetry of waveforms, steady state response of a Network to non sinusoidal periodic inputs, Fourier transforms and continuous spectra.

Unit- 4: (12)

Laplace transform and properties, partial fractions, singularity functions, waveforms, synthesis, Analysis of RCRI and RIC network with and without initial conditions with Laplace transforms, evaluation of initial condition.

Unit – 5 : (10)

Transuebt behaviour, concept of complex frequency, Driving points and transfer functions, poles, zeros of immittance function, their properties, sinusoidal response from Pole- Zero locations, convolution theorem and integral solution.

Unit- 6 :(10)

Two part Network parameters and inter-connections study of series and parallel resonance in A. C., three phase unbalanced circuit and power calculations.

TEXT BOOKS:

Network Analysis by Van Valkendurg.

Linear Network Theory by Kelkar and Pandit.

Circuits and Networks by A. Sudhakar and S.P.Shyam Mohan

REFERENCE BOOKS:

Network and System D.P.Royohoudhary

Network Analysis G.K.Mittal.

Electrical circuits Dal Toro Prontice Hall.

Network systems/ Analysis B.P. Gupta (S.Chand)

ELECTRONIC DEVICES AND CIRCUITS.

Unit 1 : Semiconductor Diodes and Power Supplied :-(10)

Intrinsic and extrinsic semiconductors theory of PN junction, diode junction, capacitance, zener diodes, varactor diodes, Tunnel diodes, Power supplies, Half wave and full wave Rectifiers, Voltage doublers, filters, ripple factor, Zener and Emitter follower type series regulators.

Unit 2 : Functions Transistors :-(8)

Theory of operation, static characteristics, break down voltage, current voltage, power Limitations, Biasing of BJT different biasing arrangement, stability factor, Thermal runaway, power transistors.

Unit 3 : BJT Analysis :-(8)

Small signal analysis of CE, CB, CC amplifiers and comparison, High frequency analysis, calculation of frequency response, gain bandwidth product.

Unit 4 : Power Amplifiers :-(8)

Classification A, B, AB, C classes efficiency, Pushpull configuration (A, B, AB) complementary symmetry, Distortions and cross over distortion.

Unit 5 : Positive and Negative Feedback Amplifiers :-(8)

Feed back amplifiers, classification, Practical circuits applications, advantages, Stability, Oscillators, Barkhausen Criterion RC, LC and Crystal Oscillators.

Unit 6 : Fet and it's Analysis :-(8)

Field effect transistor and 'MOSFET', Principle of operation and characteristic, biasing arrangement, small signal analysis of CG, CS, High frequency, Analysis.

Practicals based on above syllabus :-

1. Diode Characteristics.
2. CE amplifier characteristics.
3. FET and MOSFET characteristics.
4. Half wave, Full wave rectifier with and without filters.
5. EF type regulator.
6. RC phase shift oscillator.
7. Push pull amplifier.
8. Voltage series feedback amplifier frequency response.
9. Voltage regulator.
10. Zener Regulator.

TEXT BOOKS:

Millman and Halkias : Integrated Electronics, McGraw Hill.

Millman and Halkias : Electronic Devices and Circuits, McGraw Hill.

REFERENCE BOOKS:

Schilling and Below : Electronics circuits – Discrete and Integrated, McGraw Hill.

Bapat : Theory and problems in ckt. Analysis (McGraw Hill).

Car : Electronics Devices (Tata McGraw Hill).