(APPENDIX-IV)
SYLLABUS FOR B.TECH. (LATERAL ENTRY)

MATHEMATICS

Unit 1: Ordinary Differential Equation

Differential equation of first order. Linear differential equation of second order (homogeneous and nonhomogeneous case). Cauchy, Euler's equation, Application of first order differential equations (mixture problem, Newton's law of cooling, orthogonal trajectory). Application to LCR circuits, Application to free and forced vibration of Mass spring system.

Unit 2: Series Method

Properties of power series, Radius of convergence of power series, Legender's equation and Legender's polynomial, properties of Legender's polynomial, Gamma function, ordinary and singular point Frobenious method, Bessel's equation and properties of Bessel's function.

Unit 3: Laplace Transform

Laplace transforms of standard function, periodic functions, Unit step function, Transforms of derivatives and integrals. Differentiation and integration of transforms, Linearity property, Inverse Laplace transform, Shifting theorems, Convolution. Application to solve differential and integral equations (initial value problem).

Unit 4: Fourier Series

Periodic function, Fourier series, Euler's formula, Even and odd functions, Fourier series expansions of even and odd function, half range expansion of functions, Expansion of functions with finite discontinuities.

Unit 5: Matrix

Types of matrices, algebra of matrices, rank, solution of non-homogenous system of equations, consistency of the system of equations, Linear dependance and independance, solution of homogeneous system of equation. Eigen values and eigen

vectors. Norm and inner product. Orthogonal and projection matrix.

Application of eigen values and vectors to solve the system of homogeneous linear differential equation.

Unit 6 : Vectors:

Vector algebra, product of vectors, vector differentiation, vector differential operator, gradient, directional derivatives, divergence, curl, line integral, double integral, green's theorem.

ENGINEERING MECHANICS

Unit 1:- Statics

Conditions of equilibrium, concept of free body diagram, methods of moments and solution to engineering problems.

Friction : Static friction, ladder friction, problems with friction, Belt friction and screw jack, force analysis of plane trusses (method of joint, method of sections, plane frames, methods of members), Parallel forces in a plane, Centre of parallel forces, Pappus Guldinus theorems, MI of plane figures, parallel axis theorem, perpendicular axis theorem, Polar MI, Principle of virtual work for a single particle, rigid bodies, ideal systems and constrained bodies.

Unit 2: Dynamics

Force proportional to displacement, free vibration, D' Alembert's principle, momentum and impulse. Application to principle of linear momentum to a single particle, rigid bodies and ideal systems. Application to principle of angular momentum to a single particle and rotating rigid bodies. Principle of conservation of momentum.

Unit 3: Work and Energy

Principle of work and energy for ideal system, Conservation of energy.

BASIC ELECTRICAL ENGINEERING

Unit 1: Electrostatics
Coulomb's law, Electric charge, Potential, Field & Capacitance, Potential gradient due to spherical cylindrical and plane charges, Electric force, Flux density and permitivity. Calculation of Capacitance of spherical, coaxial, cylindrical and parallel plate condenser. Energy stored in a electric field.

Unit 2: Electromagnetism

Magnetic field due to current in conductor. Magnetic field intensity and Flux density. Permeability, B-H curves, Magnetisation, Concept in hystersis. Magnetomotive force and Magnetic reluctance.

Electrodynamic force:- Faraday's law of electromagnetic induction, Eddy current, emf induced in a conductor moving in a magnetic field. Energy stored in a magnetic field.

Unit 3: D.C. Circuit

 Current distribution in series and parallel circuit. Power and energy in electric circuit. Star-Delta conversion. Kirchoff;s law & its

application and solve electric circuit by branch & loop current method & nodal method. Superposition theorem.

Unit 4: A.C. Circuit

Production of alternating current – Instantaneous, average & rms value of current and voltage. Peak factor, Form factor, Amplitude, Frequency, Phase difference, Addition and subtraction of alternating quantity. Phasor diagram, Resistance, Inductance, Capacitance, impedance and admittance- power and power factor-series and parallel circuits. Q factor-Three phase circuit. Star-Delta connection-Active and reactive power. Power measurement with one and two wattmeter

methods-Calculation in RLC circuit, in series circuit.

Unit 5: Instrument

Construction and principle of operation-PMMC, MI and dynamometer type ammeter, voltmeter and dynamometer type wattmeter. Power factor meter.

Unit 6: Illumination

Law of illumination- Solid angle, Luminous flux, Luminous intensity, illumination brightness and luminous efficiency.

Unit 7: Production Light

Filament lamp, Arc lamp, Electric discharge lamps, Sodium vapour lamp, Mercury vapour lamp-Theory of electrical energy radiation. Comparison between filament lamp and fluorescent lamp.