

Syllabus for Entrance Examination for Direct Admission to B.Tech. II Year

(द्वितीय वर्ष में सीधे प्रवेश के लिये प्रवेश परीक्षा का पाठ्यक्रम)

The Entrance examination paper will consist of 100 objective type questions. The paper shall have three sections. Section A is compulsory for all the candidates. Section B is to be attempted by Diploma Holders in Engineering while Section C is to be attempted by Science Graduates (B.Sc.).

SECTION A 30 Marks
Compulsory for all the candidates

General Aptitude

SECTION B 70 Marks
For Diploma Holders in Engineering

Algebra : Arithmetic progression, its n th term, sum of n terms with their applications to engineering problems. Geometrical progression, its n th term and sum of n terms and to infinity with application to engineering problems. Partial fractions (excluding repeated quadratic factors) formally introduction of permutations and combinations, applications of formulae for nP_r , nC_r . Binomial theorem (expansion without proof) for positive integral index (expansion and general term), Binomial theorem for any index (expansion without proof only). First and second binomial approximation with application to engineering problems.

Trigonometry : Concepts of angles, measurement of angles in degrees, grades and radians and their conversions. Trigonometrical ratios and their relations. Review of ratios of some standard angles (0, 30, 45, 60, 90 degrees), T-Ratios of allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-ratios of multiple angles, sub-multiple angles (2A, 3A, A/2), Area of a triangle, Hero's formula, solution of triangles with direct applications of cosine formula, sine formula, Napier's analogy only.

Co-ordinate Geometry: Cartesian coordinates (2D), Distance between two points, Internal and External division formulae, application of area formulae (without proof), Area of triangle when its vertices are given, coordinates of centroid, incentre of a triangle when the vertices are given using the formulae, simple problems on locus, General equation of a circle and its characteristics. To find the equation of a circle given (i) centre and radius (ii) three points on it (iii) Coordinates of end points of a diameter. Definition of conic section, Standard equation of parabola, to find equations of parabola when its focus and directrix are given, Given the equation of a

parabola, determination of its focus, vertex, axis, directrix and latus rectum. Ellipse and hyperbola (standard equations without proof), given the equation in the standard form, determination of focus, directrix, latus rectum, axes, eccentricity, and centre. Concept of polar coordinates and their conversion to Cartesian coordinates and vice versa (in 2D only)

Differential Calculus: Concept of limits. Four standard limits, Differentiation by definition of X^n , $\sin x$, $\cos x$, $\tan x$, e^x , Differentiation of sum, product and quotient of functions, Differentiation of function of a function, Differentiation of trigonometric inverse function. Logarithmic differentiation, Successive differentiation (excluding n^{th} order)

Integral Calculus: Integration as inverse operation of differentiation, Simple integration by substitution, by parts and by partial fractions (for linear factors only), Evaluation of definite integrals (simple problems), Numerical integration : Applications of Simpson's rule and Trapezoidal rule (without proof)

Differential Equation : Concept of formation of Differential Equation and solution of I order differential equation (a) Variable separation (b) Homogeneous differential equation (c) Linear differential equation, Solution of linear differential equations having e^{ax} , $\sin ax$, $\cos ax$ and x^n on the right hand side.

SECTION C 70 Marks For Science Graduates (B.Sc.)

Calculus : Successive differentiation, expansion of functions, Maclaurin's and Taylor's theorems, Maxima and minima up to two independent variables, Indeterminate forms, Jacobian of three functions, Partial differentiation, Asymptotes, curvature, Envelopes, Double point and curve tracing (Polar and Cartesian), Standard reduction formulae, Integration as the limit of a sum, simple definite integrals

Abstract Algebra : Sets and Logic. The well-ordering principle, the division algorithm, The fundamental theorem of arithmetic, congruence modulo, Equivalence relations and Equivalence classes, Groups: Definition, example and properties, permutation and Permutation group, Subgroup and their properties, Cosets and Coset decomposition, Lagrange's theorem and its corollaries

include Fermat's Theorem, Cyclic group, Normal subgroup, centre of a group, Quotient group, Homomorphism and Isomorphism, fundamental theorem of homomorphism, Cayley's theorems

3-D Coordinate Geometry & Trigonometry : System of coordinates, Direction, cosine, angle between two lines, Projections, Distance of a point from a line. The plane: General form, Normal form, intercept form, Reduction of the general form to normal form, Equation of plane through three points, angles between two planes, Parallel planes, perpendicular distance of a point from the planes. Pair of the planes, Area of a triangle and volume of a tetrahedron. The Straight Line; Equation of a line in general form, symmetric form, Two point form, reduction of the general equation to the symmetrical form, Straight line and the plane, Conditions of parallelism and perpendicularity of a line and a plane. Plane through a given line, perpendicular distance formula for the line, projection of a line on a given plane, Coplanar lines, Condition that two given lines may intersect and equation of the plane containing them. Equation of a straight line intersecting two given lines, Perpendicular distance formula for the line and coordinates of the foot of the perpendicular. Shortest distance between two lines. Sphere : General equation of a sphere, Plane section of a sphere, Intersection of two sphere, sphere

through a given circle, Intersection of a straight line and a sphere, Equation of a tangent plane to sphere, condition of tangency, Plane of contact, Polar plane and pole of a given plane, Angle of intersection of two spheres, Length of tangent: Radical planes, axis and centre, Coaxial system of spheres, Cone: Equation of a cone whose vertex and its origin, equation of a cone with a given vertex and a given conic as base, condition that general equation of second degree represent a cone, equation of a tangent plane, condition of tangency of a plane and a cone, Reciprocal cone, Right circular cone.

Elementary Analysis and Differential Equations : Real-Valued functions, Equivalence, Countability, Real numbers, Least upper bound, Sequence of real number series of real numbers. Limits and metric spaces, Functions continuous at a point on the real line: Open sets, Closed sets, Discontinuous functions on \mathbb{R}^1 Derivatives, Rolle's theorem, The law of mean, Ordinary differential equation of the first order and first degree, Claitaut's form of differential equations

Mathematical Statistics: Definition of Probability, addition and multiplication theorems, conditional probability, Independent and dependent events, Mutually exclusive events, Mathematical expectation, Introduction to axiomatic approach.