

Mathematics

B.A./B.Sc. II year

Paper-I

Higher and Abstract Algebra M.M:50

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B shall be short answer type of 20 marks. Candidates will have to attempt four out of eight questions selecting at least one question from all the three parts (viz. Higher Algebra, Group Theory and Ring Theory). Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four questions. The number of questions for framing of question paper shall be 30% from Higher Algebra, 60% from Group Theory and 10% from Ring Theory. The question paper be framed proportionately from the whole syllabus.

Higher Algebra

Transformation of equations, Descartes's rule of signs, Solution of cubic equations (Cardan's method), Biquadratic equations, Convergence and Divergence of sequence and series.

Group Theory

Relations and binary operations on a set, Definition, Examples and simple properties of groups, Order of a group and order of an element of a group, Abelian and cyclic groups, Groups of permutations, Even and odd permutations, Symmetric group, Alternating groups.

Subgroup: Definition and simple properties (Necessary and sufficient conditions on non-empty set for being subgroups) of subgroups, Cosets of a subgroup and its properties, Quotient group of a group, Lagrange's theorem, Corollaries of Lagrange's theorem.

Homomorphism, Fundamental theorem of homomorphism, Kernel of homomorphism, Cayley's theorem, Normal subgroups, Isomorphism theorems.

Ring Theory

Definition, Examples and simple results related to rings, Special rings, Integral domain, skew field and fields.

Paper-II

Differential Equations M.M.:50

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B will be short answer type of 20 marks. Candidates will have to attempt four out of eight questions. Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four questions. The question paper be framed proportionately from the whole syllabus.

Differential equations of first order and first degree, Clairaut's form, Singular solutions, Trajectories, Existence and uniqueness of the solution $dy/dx = f(x,y)$, Initial and boundary value properties, simple applications of differential equations of first order to the problems of general interest, Linear equations with constant coefficients Simultaneous equation with constant coefficient and of the form $dx/P = dy/Q = dz/R$ where P, Q, R are functions of x, y, z, Homogeneous linear equations, Exact differential equations, Linear differential equations of second order with variable coefficients, Total differential equations, Solutions in series, Partial differential equations of first order, Charpit's method, Linear partial differential equations with constant coefficients.

Paper-III

Statics and Dynamics

M.M.:50

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B shall be short answer type of 20 marks. Candidates will have to attempt four out of eight questions selecting at least two question from both parts (viz. Statics and Dynamics). Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four questions. The number of questions for framing of question paper shall be 40% from Statics and, 60% from Dynamics. The question paper be framed proportionately from the whole syllabus.

Statics

Centre of gravity in two and three dimensions, Strings in two dimensions (Common catenary of uniform strengths only), Virtual works, Forces in three dimensions, Central axis.

Dynamics

Kinematics, Rectilinear motions, Motion in resisting medium, Central orbits (Excluding Kepler's Laws), Constrained motion (Circular and cycloidal motions only), Moments and products of inertia (Simple case, Theorem of parallel axis, Momental ellipsoid, Principal axes).