BM-231

(Semester-III)

Advanced Calculus

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Continuity, Sequential Continuity, properties of continuous functions, Uniform continuity, chain rule of differentiability. Mean value theorems; Rolle's Theorem and Lagrange's mean value theorem and their geometrical interpretations. Taylor's Theorem with various forms of remainders, Darboux intermediate value theorem for derivatives, Indeterminate forms.

Section-II

Limit and continuity of real valued functions of two variables. Partial differentiation. Total Differentials; Composite functions & implicit functions. Change of variables. Homogenous functions & Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables.

Section-III

Differentiability of real valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem. Maxima, Minima and saddle points of two variables. Lagrange's method of multipliers.

Section-IV

Curves: Tangents, Principal normals, Binormals, Serret-Frenet formulae. Locus of the centre of curvature, Spherical curvature, Locus of centre of Spherical curvature, Involutes, evolutes, Bertrand Curves. Surfaces: Tangent planes, one parameter family of surfaces, Envelopes.

REFERENCES

- C.E. Weatherburn : Differential Geometry of three dimensions, Radhe Publishing House, Calcutta

- Gabriel Klaumber : Mathematical analysis, Mrcel Dekkar, Inc., New York, 1975

- R.R. Goldberg : Real Analysis, Oxford & I.B.H. Publishing Co., New Delhi, 1970

- Gorakh Prasad : Differential

- Calculus, Pothishala Pvt. Ltd., Allahabad

- S.C. Malik : Mathematical Analysis, Wiley Eastern Ltd., Allahabad.

- Shanti Narayan : A Course in Mathemtical Analysis, S.Chand and company, New Delhi

- Murray, R. Spiegel : Theory and Problems of Advanced Calculus, Schaum Publishing co., New York

Partial Differential Equations

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Partial differential equations: Formation, order and degree, Linear and Non-Linear Partial differential equations of the first order: Complete solution, singular solution, General solution, Solution of Lagrange's linear equations, Charpit's general method of solution. Compatible systems of first order equations, Jacobi's method.

Section-II

Linear partial differential equations of second and higher orders, Linear and non-linear homogenious and non-homogenious equations with constant co-efficients, Partial differential eqution with variable co-efficients reducible to equations with constant coefficients, their complimentary functions and particular Integrals, Equations reducible to linear equations with constant co-efficients.

Section-III

Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types, Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions, Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order.

Section-IV

Cauchy' s problem for second order partial differential equations, Characteristic equations and characteristic curves of second order partial differential equation, Method of separation of variables: Solution of Laplace's equation, Wave equation (one and two dimensions), Diffusion (Heat) equation (one and two dimension) in Cartesian Coordinate system.

REFERENCES

- D.A.Murray: Introductory Course on Differential Equations, Orient Longman, (India), 1967

- Erwin Kreyszing : Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999

- A.R. Forsyth : A Treatise on Differential Equations, Macmillan and Co. Ltd. 4. Ian N.Sneddon : Elements of Partial Differential Equations, McGraw Hill Book Company, 1988

- Frank Ayres : Theory and Problems of Differential Equations, McGraw Hill Book Company, 1972

- J.N. Sharma & Kehar Singh : Partial Differential Equations

BM-233

(Semester-III)

Statics

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Composition and resolution of forces. Parallel forces. Moments and Couples.

Section-II

Analytical conditions of equilibrium of coplanar forces. Friction. Centre of Gravity.

Section-III

Virtual work. Forces in three dimensions. Poinsots central axis.

Section-IV

Wrenches. Null lines and planes. Stable and unstable equilibrium.

REFERENCES

- S.L. Loney : Statics, Macmillan Company, London

- R.S. Verma : A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad