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M.A./M.Sc. (Final) Examination, 2022

MATHEMATICS

(Compulsory)

Paper Second

(Partial Differential Equations and Mechanics)

Time : Three Hours] *[Maximum Marks:100*

Note: All questions are compulsory. Attempt any two parts from each question. All questions carry equal marks.

Unit - I

1. (a) State and prove symmetry of Greed's function.

   (b) Define transport equation with inital-value problem. Derive non-homogeneous problem for transport equation.

   (c) Derive fundamental solution of heat equation.

Unit - II

2. (a) State and prove Hamiltons ODE.

   (b) Derive HopF - Lax formula.

   (c) State and prove Lax-Oleinik's Formula.

Unit - III

3. (a) Derive Lagrange's Equation of first kind.

   (b) Derive Routh's equation of motion.

   (c) Determine equation of the shortest curve between two points on a plane.

Unit - IV

4. (a) Derive Lee-Hwa-Chung theorem.

   (b) Derive Hamilton's canonical equations using Hamilton's principle.

   (c) Derive Poincare cartan integral invariant.

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Unit - 5

5. (a) Find potential of a uniform thin circular plate at a point on its axis.

   (b) State and Prove Gauss's theorem and its application.

   (c) Find the attraction of a uniform circular disc of radius **a,** small thickness **K** at a point on the axis of a disc at a distance **p** from its centre.