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THIRD SEMESTER EXAMINATION -2013

M.Sc.

MATHEMATICS

PAPER-II

PARTIAL DIFFENTIAL EQUITIONS AND MECHANICS-II

TIME: 3 HOURS **M.M. 80**

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

Unit-I

1. (a) Find the fundamental solution of Laplace equation $\Delta u = 0$.

   (b) Define Green's function and Find it's solution.

   (c) Find the solution of Non-homogeneous equation on Transport equation.

Unit-II

2. (a) Derive fundamental solution of Heat equation.

   (b) Show that there exits at most one solution $u \in c_1^2(\bar{u})$ of I.V.P. $\begin{cases} u_t - \Delta u = f \text{ in } U_T \\ u = g \text{ on } \Gamma_T \end{cases}$

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   (c) Find the solution of Non-homogeneous wove equation where $u(x,t) = \int_0^t u(x,t;s)ds \quad (x \in R^n, t \geq 0)$

Unit-III

3. (a) Derive Lagrange's equation from Hamilton's principle.

   (b) Give a short note on Routh's equation.

   (c) Define (i) Scleronomic & Rheonomic system.

   (ii) Holonomic & Non-holonomic System

   (iii) Cycle Co-ordinates

Unit-IV

4. (a) State & prove Jacobi's identity for Poisson's brackets.

   (b) State and prove fundamental Lemma of calculub of variation. http://www.a2zsubjects.com

   (c) Derive Euler's equation for one dependent function & it's generalisation to'n' dependent function.

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Unit-V

5. (a) Find attraction of a spherical shell.

(b) Find the work done by the mutual attraction of the particles of self attracting system.

(c) State & prove Gauss therorem.

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