(C) Explain Asymptotics for linear terms. **4**

Or

Define Real analytic function.

(D) State and prove Cauchy Kovalevskaya theorem.

12

Or

Write about stationary phase for wave equation and asymptotics for linear terms.

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Roll No. ..... **Total No. of Sections : 4**

Total No. of Printed Pages : 4

Code No. : B03/203

III Semester Examination

M.Sc.

MATHEMATICS

Paper II

[PDE]

Time : Three Hours] [Maximum Marks : 80

[Min. Passing Marks : 16

Note : *Part A and B of each question in each unit consists of Very Short Answer Type Questions which are to be answered in one or two sentences. Part C (Short Answer Type) of each question will be answered 200-250 words. Part D (Long Answer Type) of each question should be answered within the word limit 400-450.*

Unit–I

1. (A) Write uniqueness for heat equation. **2**

(B) Write Dirichlet's principle for non-homogeneous Laplace equation. **2**

(C) State and prove Harnack's inequality for harmonic function. **4**

Or

State and prove estimates on derivatives for heat equation.

(D) Derive the fundamental solution of Laplace equation. **12**

Or

Derive the solution of non-homogeneous wave equation.

Unit–II

2. (A) Define complete integrals. **2**

(B) Explain the relation between Hamilton function and Lagrangian function. **2**

(C) Derive Hamilton ODE. **4**

Or

Derive the solution of Riemann's Problem.

(D) State and prove Asymptotics in L^{∞} norm. **12**

Or

State and prove convex duality of Hamilton and Lagrangian.

Unit–III

3. (A) Define Fourier Transform. **2**

(B) Define travelling wave. **2**

(C) Explain Resolvents and Laplace Transform. **4**

Or

Find the solution of porous medium equation using separation of variables method.

(D) State and prove Barenblatt's solution for porous medium equation. **12**

Or

State and prove Hopf Cole Transformation.

Unit–IV

4. (A) Define singular perturbations. **2**

(B) Define non-characteristic surface. **2**