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(C) Explain Asymptotics for linear terms.

Or

Define Real analytic function.

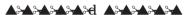
(D) State and prove Cauchy Kovalevskaya theorem.

12

4

Or

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



Roll No. of Sections: 4

Total No. of Printed Pages: 4

Code No.: B03/203

## **III Semester Examination**

# M.Sc.

### 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

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|---|
| 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

|    |     | Or   |            |
|----|-----|--|------------|
|    | (C) | Derive Hamilton ODE.                           | 4          |
|    |     | and Lagrangian function.                       | 2          |
|    | (B) | Explain the relation between Hamilton function | <b>)</b> 1 |
| 2. | (A) | Define complete integrals.                     | 2          |

Derive the solution of Riemann's Problem.

(D) State and prove Asymptotics in  $L^{\infty}$  norm. 12

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Or

State and prove convex duality of Hamilton and Lagrangian.

#### **Unit-III**

3. (A) Define Fourier Transform.
(B) Define travelling wave.
(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.
(B) Define non-characteristic surface.
2
(B) P.T.O.