

Roll No. ....,.....

Total No. of Questions : 11]

[Total No. of Printed Pages : 6

**02×05=10**

**I. Choose the correct answer :**

(i) If  $\phi$  is harmonic function in R and  $\frac{\partial \phi}{\partial n} = 0$  on  $\partial R$ ,  
then  $\phi$  is constant in .....

(a) -  $\bar{R}$

(b)  $R$

(c)  $\bar{R}'$

(d)  $R'$

(ii) The partial differential equation of the temperature in a  
long thin rod is given by :

(a)  $\frac{\partial T}{\partial t} = \frac{1}{\alpha} \frac{\partial^2 T}{\partial x^2}$

(b)  $\frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2}$

(c)  $\frac{\partial T}{\partial t} = \alpha^2 \frac{\partial^2 T}{\partial x^2}$

(d)  $\frac{\partial T}{\partial t} = -\frac{1}{\alpha} \frac{\partial^2 T}{\partial x^2}$

(iii) The equation  $\frac{\partial^2 u}{\partial t^2} - C^2 \Delta^2 U = F$  is called :

**RA-452** (2)

**RA-452**  
**M.A./M.Sc. III<sup>rd</sup> Semester (Reg./Pvt. ATKT)**

**Examination, 2019**

**Maths**

**Paper - I**

**Partial Differential Equations-I**

**Time : 3 Hours]**

**[Maximum Marks : Reg. 85  
Pvt. 100**

**Note :- Attempt all the questions of Section 'A', Five questions  
from 'B' and any two questions from Section 'C'.**

**SECTION - 'A'**

**Objective Type Questions**

**RA-452**

**(1)**

**P.T.O.**

- (a) Laplace equation  
 (b). Homogeneous wave equation  
 (c) Homogeneous heat equation  
 (d) None of these
- (iv) The value of  $\int_{-\infty}^{\infty} \delta(E) dt$  is  
 (a) - 1  
 (b) -1  
 (c) 0  
 (d) None of these
- (v) One dimension wave equation is :  
 (a)  $\frac{\partial^2 u}{\partial t^2} = C^2 \frac{\partial^2 u}{\partial x^2}$   
 (b)  $\frac{\partial^2 u}{\partial t^2} = -C^2 \frac{\partial^2 u}{\partial x^2}$   
 (c)  $\frac{\partial^2 u}{\partial t^2} = \frac{1}{c^2} \frac{\partial^2 u}{\partial x^2}$   
 (d)  $\frac{\partial^2 u}{\partial t^2} = -\frac{1}{c^2} \frac{\partial^2 u}{\partial x^2}$

**SECTION - 'B'**

**RA-452**

**(3)**

**P.T.O.**

- Short Answer Type Questions**

**5×5=25**

1. Derive Laplace equation.

**OR**

Derive passions equation.

2. Explain parabolic differential equation.

**OR**

Discuss diffusion equation.

3. Discuss Dirac delta function.

**OR**

Find elementary solution of diffusion equation.

4. Explain maximum and minimum principle.

**OR**

Derive one dimensional wave equation.

5. What do you understand by Forced vibrations ?

**OR**

Explain method of Eigen function

**SECTION - 'C'**

- Long Answer Type Questions**

**5×10=50**

1. Explain properties of harmonic function.

**RA-452**

**(4)**

**OR**

State and prove mean value theorem for harmonic function.

2. Derive the solution of Laplace equation in cylindrical coordinates.

**OR**

Derive the solution of Laplace equation in cylindrical coordinates.

3. Derive the solution of diffusion equation in cylindrical coordinates.

**OR**

Derive the solution of diffusion equation in spherical coordinates.

4. Derive the solution of one dimensional wave equation canonical Reduction.

**OR**

Explain D'Alembert's solution.

5. Find the periodic solution of one demensional wave equation in cylindrical coordinates.

**OR**

Find the periodic solution of one dimensional wave equation in spherical polar coordinates.

+++