



# RAN-7027

## B.Sc. (Sem. IV) Examination

### March / April - 2019

### Mathematics : MTH - 402 (Partial Differential Equations)

Time: 2 Hours ]

[ Total Marks: 50

સૂચના : / Instructions

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.  
Fill up strictly the details of signs on your answer book

Name of the Examination:

B.Sc. (Sem. IV)

Name of the Subject :

Mathematics : MTH - 402 (Partial Differential Equations)

Subject Code No.:

7 0 2 7

Seat No.:

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Student's Signature

- (1) Digits to the right indicates marks of the question.
- (2) Follow the usual notations.

**Q-1. Answer the following : (any FIVE)**

**10**

- (1) Form a partial differential equation by eliminating arbitrary constants a and b from  $z = axe^y + \frac{1}{2} a^2 e^{2y} + b$ .
- (2) Solve :  $x(y - z) p + y(z - x) q = z(x - y)$ .
- (3) Find the complete integral of  $p^3 + q^3 = 27$ .
- (4) Eliminate arbitrary function  $f$  from  $z = f\left(\frac{x}{y}\right)$ .
- (5) Find C.F. of  $2r + 5s + 2t = xy$ .
- (6) Find P.I. of  $(D^2 - 2DD' + D'^2) z = e^{x-2y}$ .
- (7) Solve :  $\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial^2 z}{\partial x \partial y} - 15\frac{\partial^2 z}{\partial y^2} = 0$
- (8) Solve :  $(D^2 + DD' + D' - 1) z = 0$

**Q-2. Answer the following : (any TWO) 10**

- (1) Obtain the partial differential equation by eliminating arbitrary

Function  $\varphi$  from  $\varphi(x + y + z, x^2 + y^2 + z^2) = 0$ .

- (2) Solve :  $(y^2 + z^2)p - xyq + zx = 0$ .  
(3) Solve :  $x^2(y - z)p + y^2(z - x)q = x^2(x - y)$ .

**Q-3. Answer the following : (any TWO) 10**

- (1) Explain the method to solve the partial differential equation

$F(z, p, q) = 0$

- (2) Solve :  $q = px + p^2$   
(3) Solve :  $(p^2 + q^2)x = pz$ . (by Char pit's Method)

**Q-4. Answer the following : (any TWO) 10**

- (1) Find the C.F. of  $(D^2 + k_1 DD' + k_2 D'^2)z = f(x, y)$ ;  $D \equiv \frac{\partial}{\partial x}$ ,  $D' \equiv \frac{\partial}{\partial y}$ ,  
and  $k_1, k_2$  are constant and roots of an auxiliary equation are real  
and equal.

- (2) Solve :  $\frac{\partial^2 z}{\partial x^2} + (a + b) \frac{\partial^2 z}{\partial x \partial y} + ab \frac{\partial^2 z}{\partial y^2} = xy$ .

- (3) Solve :  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6 \frac{\partial^2 z}{\partial y^2} = y \cos x$ .

**Q-5. Answer the following : (any TWO) (10)**

- (1) Show that the C.F. of  $f(D, D')z = F(x, y)$  is given by

$\phi_1(y + mx) + e^{cx} \phi_2(y + mx)$ ,  $f(D, D') = (D - mD')(D - mD' - c)$

- (2) Solve :  $[D^2 - DD' - 2D'^2 + 2D + 2D']z = e^{2x + 3y}$

- (3) Solve :  $(2DD' + D'^2 - 3D')z = 5 \cos(3x - 2y)$

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