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## Paper ID [C1425]

(Please fill this Paper ID in OMR Sheet)

B.Sc. BI(504) (S05/Old) (Sem. - 5<sup>th</sup>)

### PARTIAL DIFFERENTIAL EQUATION

Time : 03 Hours

Maximum Marks : 75

#### Instruction to Candidates:

- 1) Section-A is **Compulsory**.
- 2) Attempt any **Nine** questions from Section-B.

#### Section - A

*Q1)*

*(15 × 2 = 30)*

- a) Write the order and degree of the equation  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = \frac{1}{c} \frac{\partial u}{\partial t}$ .
- b) Obtain a partial differential equation from  $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ .
- c) Write Geometrical interpretation of  $Pp + Qq = R$  in 2-3 lines.
- d) State Charpit method.
- e) Give an example of P.D.E. which can be solved using Charpit method.
- f) Write the General form of Linear Non-homogeneous partial differential equation with constant coefficients.
- g) Define particular integral for P.D.E.
- h) Solve  $\frac{\partial^3 z}{\partial x^3} - 7 \frac{\partial^3 z}{\partial x \partial y^2} + 6 \frac{\partial^3 z}{\partial y^3} = 0$
- i) Solve  $DD'(D - 2D' - 3)u = 0$  where  $D = \frac{\partial}{\partial x}$  and  $D' = \frac{\partial}{\partial y}$ .
- j) Find P.I. of  $(D^2 - DD' + D' - 1)z = \cos(x + 2y) + e^y$ .
- k) Solve  $(D^2 - 9D'^2)z = 0$
- l) Solve  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 12(x + y)$ .

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*P.T.O.*

- m) What is P.I. of  $F(D, D')z = f(x, y)$  when  $f(x, y) = \sin(ax+by)$ .
- n) Write General form of P.D.E reducible to linear form with constant coefficients.
- o) Find particular integral of  $x^2 \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} = xy$

**Section - B**

**(9 × 5 = 45)**

**Q2)** Solve  $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$ .

**Q3)** Solve  $2(z + xp + yq) = yp^2$ .

**Q4)** Solve  $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$  using Lagrange's solutions.

**Q5)** Solve  $p - q = z / (x + y)$

**Q6)** Solve by Charpit method  $2(pq + py + qx) + x^2 + y^2 = 0$

**Q7)** Solve  $p \tan x + q \tan y = \tan z$

**Q8)** Solve  $\frac{\partial^3 u}{\partial x^3} - \frac{\partial^3 u}{\partial y^3} = x^3 y^3$

**Q9)** Solve  $(D - D' - 1)(D - D' - 2)z = e^{2x-y} + x$

**Q10)** Solve  $(2D^2 - 5DD' + 2D'^2)z = 24(y - x)$

**Q11)** Solve  $(D^2 - DD' - 2D)z = \sin(3x + 4y) - e^{2x+y}$

**Q12)** Solve  $x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + y^2 \frac{\partial^2 z}{\partial y^2} = 0$

**Q13)** Solve  $x^2 \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} - y \frac{\partial z}{\partial y} + x \frac{\partial z}{\partial x} = 0$ .

