

Total No. of Printed Pages: 3

SUBJECT CODE NO: - Y-2066
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. S.Y (Sem-IV)
Examination March / April - 2023
Mathematics MAT - 402 Partial Differential Equation

[Time: 1.30 Hours]

[Max. Marks: 50]

Please check whether you have got the right question paper.

N. B

- 1) All questions are compulsory
- 2) Figures to the right indicate full marks

Q1

A) Attempt any one

- a) Explain the method of solution of the partial differential equation 08

$$f(z, p, q) = 0 \text{ and solve } p^3 + q^3 = 27z$$

- b) Define Lagrange's Linear partial differential equation. Obtain subsidiary equation of Lagrange's partial differential equation 08

B) Attempt any one

- c) Solve : 07

$$(y^2 + z^2 - x^2)p - 2xyq + 2zx = 0$$

- d) Find the complete integral of 07

$$(x + y)(p + q)^2 + (x - y)(p - q)^2 = 1$$

Q2

A) Attempt any one

- a) Explain the charpit's method for solution of partial differential equation 08

$$f(x, y, z, p, q) = 0$$

- b) Explain the method of solution of $Rr + Ss + Tt + f(x, y, z, p, q) = 0$ when $S^2 - 4RT > 0$ where R,S,T are the continuous functions of x,y and possesses continuous partial derivatives of any order 08

B) Attempt any one

- c) Find the complete integral of $x_3^2 p_1^2 p_2^2 p_3^2 + p_1^2 p_2^2 - p_3^2 = 0$ by Jacobi's method 07

- d) Solve $(D^2 - DD' + D' - 1)z = \cos(x + 2y) + e^y$ 07

Q3 A) Attempt any one 05

a) With usual notations prove that $\frac{1}{F(D,D')} (e^{ax+by} V) = e^{ax+by} \frac{1}{F(D+a,D'+b)} (v)$

b) Find the general solution of $(D - m_o D')^2 z = 0$

B) Attempt any one 05

c) Solve $\frac{\partial q}{\partial y} - \frac{1}{y} z = x$

d) Find the general solution of the equation $(D + D')z = \sin x$

Q4 Choose the correct alternative 10

1) Auxiliary equation of

$$(y^2 + z^2 - x^2)p - 2xyq + 2xz = 0 \text{ are } \dots\dots\dots$$

a) $\frac{dx}{p} = \frac{dy}{q} = \frac{dz}{R}$

b) $\frac{dx}{y^2+z^2-x^2} = \frac{dy}{-2xy} = \frac{dz}{-2xz}$

c) $\frac{dx}{y^2+z^2+x^2} = \frac{dy}{-2xy} = \frac{dz}{2xz}$

d) $\frac{dx}{y^2+z^2-x^2} = \frac{dy}{2xy} = \frac{dz}{2xz}$

2) The symbols r,s and t are denoted respectively by -----

a) $\frac{\partial z}{\partial x}, \frac{\partial^2 z}{\partial x^2}, \frac{\partial^2 z}{\partial y^2}$

b) $\frac{\partial^2 z}{\partial y^2}, \frac{\partial^2 z}{\partial x \partial y}, \frac{\partial^2 z}{\partial x^2}$

c) $\frac{\partial^2 z}{\partial x^2}, \frac{\partial^2 z}{\partial x \partial y}, \frac{\partial^2 z}{\partial y^2}$

d) None of these

3) The complete integral of $p^2 + q^2 = n^2$ is -----

a) $z = ax + \sqrt{(n^2 - a^2)} \cdot y + c$

b) $z = ax + \sqrt{(n^2 - a^2)y} + c$

c) $z = ax + \sqrt{n^2 - a^2} + c$

d) $z = \sqrt{(n^2 - a^2)} y + c$

4) Complementary function of

$$(D^2 - 2aDD' + a^2 D'^2)z = f(y + ax) \text{ is -----}$$

a) $z = \phi_1(y + ax) + \phi_2(y + ax)$

b) $z = \phi_1(y + ax) + x\phi_2(y + ax)$

c) $z = \phi_1(y + ax) - x\phi_2(y + ax)$

d) $z = \phi_1(y - ax) + x\phi_2(y - ax)$

5) Solution of $S = 2x + 2y$ is -----

a) $z = x^2y + xy^2 + F(y) + f(x)$

b) $z = xy + xy^2 + F(y) + f(x)$

c) $z = x^2y - xy^2 + F(y) + f(x)$

d) $z = x^2y + xy^2 - F(y) - f(x)$