YY-2329

Total No. of Printed Pages: 02

SUBJECT CODE NO: - YY-2329

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. S.Y. SEM IV (CBCGS) (Pattern 2022)

Examination April / May - 2024

Mathematics - X Partial Differential Equations

[Time: 1:30 Hours] **[Max. Marks: 40]**

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 Choose the correct alternative. **10**

1) The auxiliary equation of Lagrange's linear equation $Pp + Qq = R$ are
   a) $dx = dy = dz$
   b) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$
   c) $\frac{dx}{1} = \frac{dy}{-1} = \frac{dz}{R}$
   d) $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$

2) The complete integral of the equation $z = px + qy + pq$ is given by
   a) $z = ax + by + ab$
   b) $z = ax + by$
   c) $z = ax + by - ab$
   d) None of these

3) The general solution of the equation $(a_0 D^n + a_1 D^{n-1} D' + \cdots + a_n D'^n)z = 0$ is
   a) $z = f_1(y + m_1 x) + f_2(y + m_2 x)$
   b) $z = f_1(y + m_1 x)$
   c) $z = f_1(y + m_1 x) + f_2(y + m_2 x) + \cdots + f_n(y + m_n x)$
   d) $z = f_1(y + x) + f_2(y + x) + \cdots + f_n(y + x)$

4) The solution of the equation $(D - mD' - a)z = 0$ is
   a) $e^{ax}\phi(y + mx)$
   b) $e^{-ax}\phi(y - mx)$
   c) $e^{ax}\phi(y - mx)$
   d) $e^{-ax}\phi(y + mx)$

5) The standard form of wave equation is given by
   a) $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$
   b) $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$
   c) $\frac{\partial^2 u}{\partial t^2} = 0$
   d) None of these

Q2 A) Attempt any one. **08**

a) Show that $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ are the auxiliary equations for the partial differential equation $Pp + Qq = R$

b) Explain the Charpit's method to solve the partial differential equation.

B) Attempt any one. **07**

c) Solve $(mz - ny)p + (nx - lz)q = ly - mx$

d) Solve $px + qy = pq$ by using Charpit's method.

Q3 A) Attempt any one **08**

a) Explain the method for solving linear homogeneous partial differential equation with constant coefficient $f(D, D')z = F(x, y)$

b) Explain the solution of wave equation by D'Almbert's method.

B) Attempt any one **07**

c) Solve $r = a^2 t$

d) Solve $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} + \frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2} = 0$ by the method of separation of variables.