SUBJECT CODE NO:- 2066
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. S.Y (Sem-IV)
Examination March/April-2022 (To Be Held In June/July-2022)
Mathematics MAT - 402
Partial Differential Equation

[Time: 1:53 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.

Q.1   A) Attempt any one: 08
               a) Define Lagrange's linear partial differential equation and explain the method of
                    solving it.
               b) Explain the method of solving a non- linear partial differential equation of the from
                    $f(p,q) = 0$

           B) Attempt any one   07
               c) Find the complete integral of $p^3 + q^3 = 3pqz$
               d) Solve:
                    $x(y-z)p + y(z-x)q = z(x-y)$

Q.2   A) Attempt any one   08
               a) Explain the general method to solve a partial differential equation of the form
                    $f(x,y,z,p,q) = 0$
               b) Solve the equation
                    $R_r + S_s + T_t = V$,
                    Where r, s, t have their usual Meanings and R, S, T, and V are functions of x, y, z, p
                    and q.

           B) Attempt any one   07
               c) Find the complete integral of $2P_1 X_1 X_3 + 3P_2 X_3^2 + P_2^2 P_3 = 0$
               d) solve :
                    $(D^2 - D D' - 2D)Z = Sin(3x + 4y)$

Q.3   A) Attempt any one: 05
               a) With usual notations, Prove that $\frac{1}{F(D,D')} e^{ax+by} = \frac{1}{F(a,b)} e^{ax+by}, if\ f(a,b) \neq 0$
               b) Obtain the general solution of the equation
                    $(A_o D^n + A_1 D^{n-1} D' + \cdots + A_n D' D'^n)z = 0$

B) Attempt any one: 05
    c) Solve :
$$Ys + p = \cos(x + y) - y\sin(x + y)$$
    d) Solve
$$(D^2 - 2DD' + D'^2)Z = 12xy$$

Q.4   Choose the correct alternative 10
  1) The complete integral of pq=k is ------.
    a) $z = ax + \frac{1}{a}y + c$ b) $z = ax + \frac{k}{a}y + c$
    c) $z = ax + y + c$ d) $z = x + ky + c$

  2) Lagrange's subsidiary equations of $P + 3q = 5Z + \tan(y - 3x) are ------$.
    a) $\frac{dx}{1} = \frac{dy}{3} = \frac{dz}{5z+\tan(y-3x)}$

    b) $dx = \frac{dy}{3} = \frac{dz}{5z}$

    c) $\frac{dx}{p} = \frac{dy}{q} = \frac{dz}{5z}$

    d) None of these

  3) The Solution of the equation $(D - MD' - K)Z = 0 \ is$ ------------.
    a) $Z = e^{-kx}\phi(y + mx)$ b) $z = e^x\phi(y + mx)$
    c) $z = e^{kx}\phi(y)$ d) $z = e^{kx}\phi(y + mx)$

  4) The complementary function of $(D^2 - 6DD' + 9\ D'^2)z = 12\ x^2 is$ -------.
    a) $z = \phi_1(y + 3x) + \phi_2(y - 3x)$
    b) $z = \phi_1(y + 3x) + x^2\phi_2(y - 3x)$
    c) $z = \phi_1(y + 3x) + x\phi_2(y + 3x)$
    d) $z = \phi_1(y + 3x) + \phi_2(y + 4x)$

  5) The particular integral of $(2D - D')^2 Z = 16\log(x + 2y) \ is$ -----.
    a) $2x^2\log(x + 2y)$
    b) $x\log(x + 2y)$
    c) $x\log(x + 4y)$
    d) $\frac{x^2}{2}\log(x + 2y)$