Total No. of Printed Pages:2

SUBJECT CODE NO:- B-2066
FACULTY OF SCIENCE & TECHNOLOGY
B.Sc. S.Y (Sem-IV)
Examination November/December- 2022
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

Q.1 A) Attempt any one 08

i) Explain the method of obtaining complementary function of $(A_o D^n + A_1 D^{n-1}D' + -- + A_n D'^n)z = f(x,y)$

ii) Explain the method of obtaining complete general integral of $f_1(x,p) = f_2(y,q)$

B) Attempt any one: 07

iii) Solve: $x^2p + y^2q = z^2$

iv) Solve :$pz = 1 + q^2$

Q.2 A) Attempt any one: 08

a) Explain Jacobi's method to solve $f(x_1, x_2, x_3, p_1, p_2, p_3) = 0$

b) Discuss Monge's method to solve $Rr + Ss + Tt = V$ where R,S,T and V are functions of x,y,z,p and q

B) Attempt any one 07

c) Solve $(p^2 + q^2)y = qz\ by$ using charpit's method

d) Solve: r+5s +6t=0

Q.3 A) Attempt any one 05

a) With usual notations prove that
$\frac{1}{F(D^2,DD',D'^2)}\cos(ax+by) = \frac{\cos(ax+by)}{F(-a^2,-ab,-b^2)}$; if $F(-a^2,-ab,-b^2) \pm 0$

b) Find the general solution of $(D - mD' - k)z = 0$

B) Attempt any one 05

c) Solve : $\frac{\partial^2 Z}{\partial x \partial y} = \frac{1}{xy}$

d) Solve : $(D^2 - 2DD' + D'^2)Z = e^{x+2y}$

Q.4 Choose the correct alternatives 10

1) The Lagrange's auxiliary equation of $P_1 \frac{\partial z}{\partial x_1} + P_2 \frac{\partial z}{\partial x_2} + - - - + P_n \frac{\partial z}{\partial x_n} = R$ are ------
   a) $\frac{dx_1}{1} = \frac{dx_2}{1} = - - - -- = \frac{dx_n}{1}$
   b) $\frac{dx_1}{P_1} = \frac{dx_2}{P_2} = - - - - - = \frac{dx_n}{P_n}$
   c) $P_1\, dx_1 = P_2 dx_2 = - - - - -= P_n dx_n$
   d) None of these

2) The complete integral of $z = px + qy + pq$ is ------
   a) $z = ax + by$ b) $z = ax + ab$ c) $z = ax + by + ab$ d) $z = a + b$

3) The complementary function of $\left(D^2 - 2DD' + D'^2\right)$ z=sin (2x+3y) is ---------
   a) $z = \phi_1$ (y + x) + $x\phi_2(y + x)$
   b) $z = \phi_1$(y+x) +$\phi_2(y + x)$
   c) $z = \phi_1(y - x) + \phi_2(y - x)$
   d) $z = \phi_1(y - x) + x^2\phi_2(y - x)$

4) The value of $\frac{1}{F(D,D')}\, e^{ax+by}$ = -----
   a) $\frac{1}{F(a,b)}\, e^{ax}, if\ F(a,b) \neq 0$
   b) $\frac{1}{F(a,b)}\, e^{by}, if\ F(a,b) = 0$
   c) $\frac{1}{F(a,b)}\, e^{ax+by}, if\ F(a,b) = 0$
   d) $\frac{1}{F(a,b)}\, e^{ax+by}, if\ F(a,b) \neq 0$

5) The direction ratios of the normal at a point (x, y, z) to the surface given by $Pp + Qq = R$ are ---
   a) p,q,1 b) p,q,-1 c) 1,1,1 d) P,Q,R