RA18110020 30008

Time: 1 Hrs   Max. Marks: 30
B.Tech.   Sem.: III (II year)

Part 1

Note: Answer ALL Questions. Each question carries one mark.

Q1. A differential is called partial differential equation, if it contains the partial derivatives of unknown function with respect to

(A) one or more independent variables
(B) two or more independent variables
(C) only two independent variables
(D) only one independent variable.

Q2. In the formation of P.D.E., the elimination of one arbitrary functions gives a

(A) First order P.D.E.
(B) First order or higher order P.D.E.
(C) Second order P.D.E.
(D) Second or higher order P.D.Es.

Q3. The complete integral of $p^2 - q^2 = 1$ is

(A) $z = a(x - y) + c$
(B) $z = ax + by + c$
(C) $z = ax + (a^2 - 1)^{1/2} y + c$
(D) $z = ax + (1 - a^2)^{1/2} y + c$

Q4 The PDE obtained by eliminating arbitrary constants from $z = (x^2 + a)(y^2 + b)$

(A) $pq = 4xyz$ (B) $pq = yz$
(G) $pq = 2xy$ (D) $pq = 2xyz$

Q5 The solution of the PDE $px + qy = z$ is

(A) $z = ax + by$ (B) $z = xf\left(\dfrac{x}{y}\right)$
(C) both A and B   (D) none.

Q6. The complete integral of $z = px + qy + p^2 q^2$ is

(A) $z = ax + y + ab$ (B) $z = x + ay + b$
(G) $z = ax + by + a^2 b^2$ (D) $z = ax + by$

Q7. The complementary function of $(D-3)^2 z = 0$ is

(A) $z = \phi_1(y + 3x) + x\phi_2(y + 3x)$
(B) $z = \phi_1(y + 3x) + \phi_2(y - 3x)$
(C) $z = \phi_1(y - 3x) + \phi_2(y - 3x)$
(D) $z = \phi_1(y - 3x) + x\phi_2(y - 3x)$

Q8. The complete integral of $p = 2qx$

(A) $z = a(x^2 + y^2) + b$ (B) $z = ax^2 + y + b$
(C) $z = x^2 + ay + b$ (D) $z = ax^2 + ay + b$

Q9. The C.F. of $(D^2 + D'^2)z = 0$ is

(A) $z = \phi_1(y - x) + \phi_2(y + ix)$
(B) $z = \phi_3(y + ix) + \phi_4(y - ix)$
(C) $z = \phi_1(y + x) + \phi_2(y - x)$
(D) $z = \phi_1(y + x) + x\phi_2(y - x)$

Q10. The C.F of $(D^3 + DD'^2 - D^2 D' - D'^3)z = 0$ is

(A) $z = \phi_1(y + x) + \phi_2(y + ix) + \phi_3(y - ix)$
(B) $z = \phi_1(y - x) + \phi_2(y + ix) + \phi_2(y - ix)$
(G) $z = \phi_1(y - x) + \phi_2(y + ix) + \phi_3(y - ix)$
(D) $z = \phi_1(y + x) + \phi_2(y + ix) + \phi_2(y - ix)$

Part 2

Note: Attempt any three questions. Each question carries 4 marks.

Q11. Form the PDE by eliminating the arbitrary constants 'a' and 'b' from
$(x - a)^2 + (y - b)^2 + z^2 = r^2$.

Q12. Form the partial differential equation by eliminating an arbitrary function 'f' from
$z = f(x^2 + y^2 + z^2, x + y + z)$

Q13 Solve $9(p^2 z + q^2) = 4$

Q14. Solve $p^2 + q^2 = x^2 + y^2$

Part 3

Note: Attempt any one question. Each question carries 8 marks.

Q15. Find the complete integral of
$$\left(\frac{xp}{z}\right)^2 + \left(\frac{yq}{z}\right)^2 - 1 = 0$$

Q16. Find the general integral of
$x(z^2 - y^2)p + y(x^2 - z^2)q = z(y^2 - x^2)$ by Lagrange's method.