Reg. No .... Name **17P3604**

MSc DEGREE END SEMESTER EXAMINATION- OCTOBER-NOVEMBER 2017

SEMESTER 3 : MATHEMATICS

COURSE : **16P3MATT11 ; PARTIAL DIFFERENTIAL EQUATIONS**

(For Regular - 2016 admission)

Time : Three Hours Max. Marks: 75

Section A
Answer any 10 (1.5 marks each)

1. Verify that the differential equation $z(x+y)\,dx + z(z+x)\,dy - 2xy\,dz = 0$ is integrable
2. Derive a partial differential equation from $z = f(xy/z)$
3. Verify that the differential equation $(y^2+yz)dx + (xz+z^2)dy + (y^2-xy)dz = 0$ is integrable
4. Define a complete integral of a partial differential equation
5. Find the complete integral of the equation $p + q = pq$
6. Find the particular integral of

$$(2D - D' + 4)(D + 2D' + 1)z = 0$$

7. Find the particular integral of

$$(D^2 - D')z = 2y - x^2$$

8. Find the particular integral of

$$(r + s - 2t) = e^{x+y}$$

9. Write the Laplace's equation
10. State exterior Dirichlet problem

10 x 1.5 (15)

Section B
Answer any 4 (5 marks each)

11. Find the integral curves of $\frac{dx}{xz-y} = \frac{dy}{yz-x} = \frac{dz}{1-z^2}$
12. Verify that the differential equation

$(y^2+yz)dx + (xz+z^2)dy + (y^2-xy)dz = 0$ is integrable and find its primitives

13. Show that the equation $xp = yq$ and $z(xp+yq) = 2xy$ are compatible and solve

14. Let $\alpha_r D + \beta_r D' + \gamma$ is a factor of $F(D, D')$ and $\phi_r(\xi)$ is an arbitrary function of the variable ξ. Prove that if $\alpha_r \neq 0, u_r = \exp(\frac{-\gamma_r x}{\alpha_r})\phi_r(\beta_r x - \alpha_r y)$ is a solution of the equation $F(D, D')z = 0$.

15. Solve

$$(D^3 - 2D^2D' - DD'^2 + 2D'^3)z = e^{x+y}$$

16. Solve $q^2 - 2pqs + p^2t = 0$ using Monge's method

4 x 5 (20)

Section C

Answer any 4 (10 marks each)

17.1. Find the surface which orthogonal to the one parameter system $z = cxy(x^2+y^2)$ and which passes through the hyperbola $x^2 - y^2 = a^2,\ z = 0$

OR

2. Find the surface which intersect the surface of system $z(x+y) = c(3z+1)$ orthogonally and which passes through the surface $x^2+y^2 = 1,\ z = 1$

18.1. Explain Jacobi's method. Hence solve $p^2 + q^2y = z$

OR

2. (i) Derive the condition for compatibility of system of first order partial differential equations

(ii) Show that the equation $xp = yq$ and $z(xp+yq) = 2xy$ are compatible and solve

19.1. (i) Solve $r - t - 3p + 3q = xy + e^{x+2y}$

(ii) Solve $(D^2 - 2DD')z = e^{2x} + x^3y$

OR

2. (i) Solve $(D^2 - 2DD' - 15D'^2)z = 12xy$

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

20.1. Describe Monge's method. Solve $r = a^2t$ using Monge's method

OR

2. Describe Monge's method. Solve $r + 4s + t + rt - s^2$ using Monge's method

4 x 10 (40)