Reg. No. | | | | | | | | | |

BSCMTC 384

Choice Based Credit System VI Semester B.Sc. Examination, September 2022
(2021 – 2022 Batch Onwards)
MATHEMATICS (Paper – VIII C)
Partial Differential Equations

Time : 3 Hours Max. Marks : 80

Instructions : *1) Answer **any ten** questions from Part – **A**. **Each** question carries **2** marks.*
*2) Answer to Part – **A** should be written in the **first** few pages of the answer book before answer to Part – **B**.*
*3) Answer **twelve** questions from Part – **B**. **Each** question carries **5** marks.*
*4) Scientific calculators are **allowed**.*

PART – A

I. Answer **any 10** questions. **(10×2=20)**

1) Verify the conditions of integrability for the equation $(y^2 + yz)dx + (xz + z^2)dy + (y^2 – xy)\, dz = 0$.
2) Check the integrability of the equation $(y + z)\, dx + dy + dz = 0$.
3) Solve $(yz + xyz)dx + (zx + xyz)dy + (xy + xyz)dz$ by assuming the condition of integrability.
4) Eliminate 'a' and 'b' from $z = (x + a)(y + b)$.
5) Obtain the PDE from $(x – h)^2 + (y – k)^2 + z^2 = r^2$ by eliminating arbitrary constants h and k.
6) Eliminate the arbitrary function 'f' from $z = f(x^2 + y^2)$.
7) Write the Lagrange's method for solving linear equation.
8) Solve $p^2 + q^2 = 4$.
9) Solve $p = y^2q^2$.
10) Solve $pq = x$.
11) Solve $z = px + qy + pq$.

12) Solve the equation $(D^2 + 2DD' - 2D - 2D')\, u = 0$.

13) Find the solution of the equation $(2D - D' + 4)\,(D + 2D' + 1)^2 u = 0$.

14) Solve the PDE $(D^3 - 3D^2D' + 4D'^3)u = 0$.

PART – B

II. Answer **any 12** questions. **(12×5=60)**

15) Assuming the condition for integrability, solve the equation
$(2yz + zx - z^2)dx - zxdy - (x^2 + xy - xz)dz = 0$.

16) Verify the condition of integrability in the equation, solve
$(yz + z^2)dx - xzdy + xydz = 0$.

17) Solve $(x^2y - y^3 - y^2z)dx + (xy^2 - x^2z - x^3)dy + (xy^2 + x^2y)dz = 0$.

18) Solve $(y\cos xy - \sin y)dx + (x\cos xy - x\cos y)dy + 2zdz = 0$.

19) Solve $zydx = zxdy + y^2dz$.

20) Solve $\cos x(\sin y + \sin z)dx + \cos y(\sin z + \sin x)dy + \cos z(\sin x + \sin y)\,dz = 0$.

21) Eliminate the arbitrary function f from $f(x^2 + y^2 + z^2, z^2 - 2xy) = 0$.

22) By using the lagrange's method, solve the equation $(y + z)\,p + (z + x)q = x + y$.

23) Solve $px(y^2 + z) - qy(x^2 + z) = z(x^2 - y^2)$ find the surface that contains the straight line $x + y = 0$ and $z = 1$.

24) Solve $p^2 = z^2(1 - pq)$.

25) Solve $p(1 + q^2) = q(z - 1)$.

26) Solve $p^2 + q^2 = x - y$.

27) Solve $z = px + qy + \frac{p}{q} - p$.

28) Solve $(1 - x)\,p + (2 - y)\,q = 3 - z$.

29) Solve the equation $(D^2 + 3DD' + 2D'^2)u = x + y$.

30) Solve the equation $(D^2 + 2DD' + D'^2 - 2D - 2D')u = \sin(x + 2y)$.

31) Solve the PDE $(D^2 - 4DD' + 4D'^2)u = e^{2x + y}$.

32) Find a real function u(x, y), which reduces to zero when $y = 0$ and satisfy the PDE $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -\pi(x^2 + y^2)$.

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