B.Sc. B.Ed SEM-II Examination: 2020
Course-GE 2.1
Subject: Mathematics (2D and 3D Geometry and Differential Equations-I)

Time: 2 Hours

F.M. 50

Answer any *ten* questions

$(5 \times 10 = 50)$

1. For the hyperbola $16x^2 - 9y^2 = 144$, find the foci, the vertices, the eccentricity, the latus rectum and the directrices.

2. Find the equation of the plane passing through the points $(1, 1, 2)$ and $(2, 4, 3)$ and perpendicular to the plane $x - 3y + 7z + 5 = 0$.

3. Find the equation of the sphere for which the circle $x^2 + y^2 + z^2 + 7y - 2z + 2 = 0$, $2x + 3y + 4z = 8$ is a great circle.

4. Find the equations of the straight lines in which the plane $2x + y - z = 0$ cuts the cone $4x^2 - y^2 + 3z^2 = 0$. Find also the angle between them.

5. Find the equation of the cylinder whose generators are parallel to the straight line $2x = y = 3z$ and which passes through the circle $y = 0$, $x^2 + z^2 = 6$.

6. Show that, the plane $y + 6 = 0$ intersects the hyperbolic paraboid $\frac{x^2}{5} - \frac{y^2}{4} = 6z$ in a parabola.

7. Solve the following differential equation: $xdx + ydy + \frac{xdy - ydx}{x^2 + y^2} = 0$.

8. Solve the following differential equation: $(x^2 y^3 + 2xy)dy = dx$.

9. Solve the following differential equation: $y\{x(2x + 1)\frac{dy}{dx} - y\left(\frac{dy}{dx}\right)^2\} = 2x^3$.

10. Solve the following differential equation:

$\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = x^2 e^x$.

11. Solve: $x^2 \frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x^2$.

12. Solve the following differential equation: $\frac{1}{D^2 - 5D + 6} e^{4x}$ .Evaluate omitting the arbitrary constants.