(For Reappear Candidates Only (2022-23)) (9243)

Exam Code: 112412 **Paper Code: 9243**

Programme: Bachelor of Science (Honours) Mathematics
Semester–II
Course Title: Solid Geometry
Course Code: BOML-2335

Examination Time: 3 Hours **Max. Marks: 80**

Note: Attempt five questions in all selecting at least one question from each section. The fifth question may be attempted from any section. All questions carry equal marks (16 marks each).

Section-A

Q1. (a) Find the equation of the plane $4x - 2y + 3z - 1 = 0$ referred to the parallel axes through the point (2, -2, 2).

(b) For what values of k the planes $x - y - z = -1$; $kx + 3y - 2z = 3$; $3x + ky + z = 2$ intersects at a point. [8 X 2=16]

Q2. (a) Find the centre and radius of the circle $x^2 + y^2 + z^2 - x + z - 2 = 0$, $x + 2y - z = 4$.

(b) Does the plane $x + 5y - 2z = 8$ touch the sphere $2x^2 + 2y^2 + 2z^2 - 4x - 8y + 4z + 3 = 0$. [8 X 2=16]

Section-B

Q3. (a) Define tangent plane to a sphere. Find the equation of the tangent plane at (1,1,1) to the sphere

$$x^2 + y^2 + z^2 - 2x - 4y + 2z - 3 = 0.$$

(b) Does the sphere $x^2 + y^2 + z^2 - 2x + 6z - 6 = 0$ and $x^2 + y^2 + z^2 + 2x + 2y + 2z + 2 = 0$ intersect? Justify your answer. [8 X 2=16]

Q4. (a) Find the equation of the sphere which touches the plane $3x + 2y - z + 2 = 0$ at point $P(1, -2, 1)$ and also cuts orthogonally the sphere $x^2 + y^2 + z^2 - 4x + 6y + 4 = 0$.

(b) Define Radical plane. Find the equation of the radical plane of the spheres

$$x^2 + y^2 + z^2 + 3x - 3y + 6 = 0, \quad x^2 + y^2 + z^2 - 6y - 6z + 6 = 0.$$ [8 X 2=16]

Section-C

Q5. (a) Find the equation of right circular cylinder whose axis is $\frac{x-1}{2} = \frac{y-3}{2} = \frac{5-z}{7}$ and radius is 3 units.

(b) Derive the equation of the tangent plane to the cylinder. [8 X 2=16]

Q6. (a) Find the equation to the right circular cone whose vertex is P (2,-3, 5), axis PQ which makes equal angles with the axes and semi vertical angle is 30°.

(b) Define Right Circular cone. Justify whether the equation $2x^2 + 7y^2 + 2z^2 - 10yz - 10xy + 2x + 26y + 2z - 17 = 0$ represents a cone? [8 X 2=16]

Section-D

Q7. (a) Trace the locus of the equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ where a, b, c are positive constants.

(b) Write down the equation of surface of revolution obtained by rotating the surface $y^2 + z^2 = 9$, $x = 0$, about the y - axis. [8 X 2=16]

Q8. Reduce the equation $8x^2 + 5y^2 + z^2 - 4xy - 36 = 0$ to the standard form and give the nature of the surface and trace it roughly. [16]