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SUBJECT CODE NO: - CB-2339
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y. (Sem-I)
Examination December/January-2022-23
Mathematics - I MAT-011
Geometry

[Time: 1:30 Hours]

[Max. Marks: 40]

Please check whether you have got the right question paper.

N. B

- 1) Attempt all questions.
- 2) Figures to the sight indicate full marks.

Q1 A) Attempt any one:

05

- a) Prove that every equation of the first degree in x, y, z represents a plane.
- b) Find the perpendicular distance of the point $p(x_1, y_1, z_1)$ from the plane
 $lx + my + nz = p$

B) Attempt any one:

05

- c) Find the equation of the plane passing through the intersection of the planes
 $x + y + z = 6$ and $2x + 3y + 4z + 5 = 0$ and the point $(1, 1, 1)$.
- d) Show that the distance between the Parallel planes
 $2x - 2y + x + 3 = 0$ and $4x - 4y + 2x + 5 = 0$ is $\frac{1}{6}$

Q2 A) Attempt any one:

05

- a) Find the angle between the line

$$\frac{x - x_1}{l} = \frac{y - y_1}{m} = \frac{z - z_1}{n}$$

and the plane

$$ax + by + cz + d = 0.$$

- b) Find the magnitude and the equations of the line of shortest distance between the straight lines?

$$\frac{x - x_1}{l_1} = \frac{y - y_1}{m_1} = \frac{z - z_1}{n_1}$$

$$\frac{x - x_2}{l_2} = \frac{y - y_2}{m_2} = \frac{z - z_2}{n_2}$$

B) Attempt any one:

05

c) Find the co-ordinates of the point of intersection of the line with the plane

$$\frac{x + 1}{1} = \frac{y + 3}{3} = \frac{z - 2}{-2}$$

With the plane

$$3x + 4y + 5z = 5.$$

d) Find the equation of the plane containing the line

$$\frac{x + 2}{2} = \frac{y + 3}{3} = \frac{z - 4}{-2}$$

and the point (0, 6, 0).

Q3 A) Attempt any one:

05

a) Prove that a plane section of a sphere is a circle.

b) Find the equation of the right circular cone whose vertex is the point (α, β, γ) and whose axis is the line

$$\frac{x - \alpha}{l} = \frac{y - \beta}{m} = \frac{z - \gamma}{n}$$

and semi-vertical angle θ .

B) Attempt any one:

05

c) Find the radius and centre of the sphere

$$x^2 + y^2 + z^2 - 2x = 4y - 6z = 2$$

d) Find the equation of the radius 2 whose axis passes through the point (1, 2, 3) and has direction cosines proportional to (2, -3, 6).

Q4 Choose the correct alternatives:

10

1) The intercepts of the plane $2x - 3y + 4z = 12$ on the co-ordinates axes are -----

- a) 2, -3, 4 b) 6, -4, -3 c) 3, -2, 1 d) 6, -4, 3

2) If the line $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$ is parallel to the plane $ax + by + cz + d = 0$, then -----

- a) $al + bm + cn = 0$ b) $am + bn + cl = 0$
 c) $an = bl + cm = 0$ d) $l^2 + m^2 + n^2 = 0$

- 3) The direction cosines of the straight line $\frac{x+1}{2} = \frac{y-3}{1} = \frac{z-5}{-2}$ are -----
a) 2, 1, -2 b) $\frac{2}{3}, \frac{1}{3}, \frac{-2}{3}$ c) $\frac{2}{6}, \frac{1}{6}, \frac{-2}{6}$ d) 2, 2, -1
- 4) The two equations $x^2 + y^2 + z^2 + 24x + 2vy + 2wz + d = 0$ and $lx + my + nz = p$ taken together represents a -----
a) Sphere b) Plane c) Pair of lines d) Circle
- 5) If the vertex of the cone is at origin and the axis is z-axis then equation of cone with semi-vertical angle θ is -----
a) $x^2 + y^2 = z^2 \tan^2 \theta$ b) $y^2 + z^2 = x^2 \tan^2 \theta$
b) $(y^2 + z^2) \tan^2 \theta = x^2$ c) $(x^2 + y^2) \tan^2 \theta = z^2$