

Roll.No.

20UMACT3006

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.

B.Sc Mathematics- END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - III

20UMACT3006 - Three Dimensional Geometry

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. Observe the equation of the plane which passes through the point $(-1, 3, 2)$ and perpendicular to the two planes $x + 2y + 2z = 5$ and $3x + 3y + 2z = 8$.
2. Examine the equation of the plane through the point $(1, -2, 3)$ and intersection of the planes $2x - y + 4z = 7, x + 2y - 3z = 0$.
3. Estimate the perpendicular distance from $P(3, 9, -1)$ to the line $\frac{x+8}{-8} = \frac{y-31}{1} = \frac{z-13}{5}$.
4. Prove that the lines $\frac{x+1}{-3} = \frac{y+10}{8} = \frac{z-1}{2}; \frac{x+3}{-4} = \frac{y+1}{7} = \frac{z-4}{1}$ are coplanar. Find also their point of intersection and the plane through them.
5. Identify the equation of the sphere having the circle $x^2 + y^2 + z^2 - 2x + 4y - 6z + 7 = 0, 2x - y + 2z = 5$ for a great circle.
6. A sphere of constant radius k passes through the origin and meets the axes A, B, C . Categorize that the centroid of the triangle ABC lies on the sphere $9(x^2 + y^2 + z^2) = 4k^2$.
7. Construct the equation of the cone with vertex O and base curve, the conic in which the surface $ax^2 + by^2 + cz^2 = 1$ is cut by the plane $l_1x + m_1y + n_1z = p$.
8. Examine the equation of the cylinder whose generators are parallel to the z axis and the guiding curve is $ax^2 + by^2 = cz, lx + my + nz = p$.

Section C

Answer any **THREE** questions ($3 \times 10 = 30$ Marks)

9. Determine that the origin lies in the acute angle between the planes $x + 2y + 2z = 0, 4x - 3y + 12z + 13 = 0$. Find the planes bisecting the angles between them and point out, which bisects the obtuse angle.

Contd..

10. Analyse the shortest distance between the lines

$$\frac{x-3}{-1} = \frac{y-4}{2} = \frac{z+2}{1}; \frac{x-1}{1} = \frac{y+7}{3} = \frac{z+2}{2}.$$
11. Evaluate the equation of the sphere which passes through the circle
 $x^2 + y^2 + z^2 - 2x - 4y = 0$, $x + 2y + 3z = 8$ and touches the plane $4x + 3y = 25$.
12. Experiment the condition of the equation
 $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2fxy = 0$
 to represent a right circular cone. Obtain the equation of the axis and the vertical angle of the cone.
13. Simulate the equation of the right circular cylinder described on the circle through the points $(a, 0, 0)$, $(0, a, 0)$, $(0, 0, a)$ as a guiding curve.
