

SEMESTER	II	QP CODE	23MAT22
 P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA SEM END EXAMINATIONS MAY -2024 I B.SC. MATHS HONS SUBJECT: ANALYTICAL SOLID GEOMETRY & PROBLEM-SOLVING SESSION			
DATE & SESSION	07.06.2024 FN	REG NO	MAX MARKS 50

SECTION-A

Answer any three questions selecting atleast one question from each part

Part - A

3 X 10 = 30M

1. A variable plane is at a constant distance $3p$ from the origin and meets the axes in A, B, C. Show that the locus of the centroid of ΔABC is $x^{-2} + y^{-2} + z^{-2} = p^{-2}$.
2. Show that the equation $x^2 + 4y^2 + 9z^2 - 12yz - 6zx + 4xy + 5x + 10y - 15z + 6 = 0$ represents a pair of parallel planes and find the distance between them.
3. Find the length and equation of the shortest distance between the line $\frac{x-2}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$

Part - B

4. Show that the plane $2x - 2y + z + 12 = 0$ touches the sphere $x^2 + y^2 + z^2 - 2x - 4y + 2z - 3 = 0$ and find the point of contact.
5. Find the limiting points of the coaxial system of spheres determined by $x^2 + y^2 + z^2 + 4x - 2y + 2z + 6 = 0$, $x^2 + y^2 + z^2 + 2x - 4y + 2z + 6 = 0$
6. Find the equation to the right circular cone whose vertex is $(1, -2, -1)$, axis the line $\frac{x-1}{3} = \frac{y+2}{4} = \frac{z+1}{5}$ and semi vertical angle 60° .

SECTION-B

Answer any four questions.

4 X 5 = 20M

1. Find the equation of the plane through the points $(2, 2, 1)$, $(9, 3, 6)$ and perpendicular to the plane $2x + 6y + 6z = 9$.
2. Find the image of the point $(1, 6, 3)$ in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$
3. Find the pole of the plane $x - y + 5z - 3 = 0$ with respect to the sphere $x^2 + y^2 + z^2 = 9$.

4. Show that the plane $2x - 2y + z + 12 = 0$ touches the sphere $x^2 + y^2 + z^2 - 2x - 4y + 2z - 3 = 0$.
5. Show that the spheres $x^2 + y^2 + z^2 + 6y + 2z + 8 = 0$, $x^2 + y^2 + z^2 + 6x + 8y + 4z + 20 = 0$ are orthogonal.
6. Show that the general equation of the cone of the second degree which pass through coordinate axes is $fyz + gzx + hxy = 0$.
7. Find the enveloping cone at the $(1, 1, 1)$ and generators touching the sphere $x^2 + y^2 + z^2 - 2x + 4z - 1 = 0$