

	P.R.Government College (Autonomous): KAKINADA	Program&Semester IB.Sc. (IISem)			
CourseCode MAT-201/2201	TITLE OF THE COURSE Solid Geometry				
Teaching	HoursAllocated:60(Theory)	L	T	P	C
Pre-requisites:	BasicMathematicsKnowledge on 2-D Geometry	4	-	-	4

Course Objectives:

The student will demonstrate knowledge of geometry and its applications in the real world.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Get the knowledge of planes.
CO2	Basic idea of lines, sphere and cones.
CO3	Understand the properties of planes, lines, spheres and cones.
CO4	Express the problems geometrically and then to get the solution.

Course with focus on employability/entrepreneurship /Skill Development modules

Skill Development		Employability		Entrepreneurship	
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COURSE SYLLABUS:

UNIT – I: The Plane

(12 Hours)

Equation of plane in terms of its intercepts on the axis, Equations of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane. The plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors

UNIT – II: The Line

(12 Hours)

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line.

UNIT – III: The Sphere

(12 Hours)

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes.

UNIT – IV: The Sphere and Cones

(12 Hours)

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres.

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone.

UNIT –V: Cones

(12 Hours)

Enveloping cone of a sphere; right circular cone: equation of the right circular cone with a given vertex, axis and semi vertical angle: Condition that a cone may have three mutually perpendicular generators; intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex.

Co-Curricular Activities:

(15 Hours)

Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.

Prescribed Text Book:

Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, published by S. Chand &Company Ltd. 7th Edition.

Reference Books :

1. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, published by S. Chand & Company, New Delhi.

2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, published by Wiley Eastern Ltd., 1999.
3. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam,
4. G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.

Additional Inputs :

Definition of Cylinder and Right Circular Cylinder .

CO-POMapping:

(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High], '-':NoCorrelation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS01	PS02	PS03
C01	3	3	2	3	2	3	1	2	2	3	2	3	2
C02	3	2	3	3	2	3	3	1	3	3	3	2	1
C03	2	3	2	3	2	3	2	1	2	3	2	2	3
C04	3	2	3	2	1	2	3	3	1	2	3	1	2

BLUE PRINT FOR QUESTION PAPER PATTERN
COURSE-II, THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Unit	TOPIC	S.A.Q	E.Q	Marks allotted to the Unit
I	The Plane	2	2	20
II	The Line	2	2	20
III	The Sphere	1	2	16
IV	The Sphere and Cones	2	2	20
V	Cones	1	2	16
	Total	8	10	92

S.A.Q. = Short answer questions (4 marks)

E.Q = Essay questions (6 marks)

Short answer questions : 5X4 = 20M

Essay questions : 5X6 =30M

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Total Marks = 50M

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P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA
I year B.Sc., Degree Examinations - II Semester
Mathematics Course-II: Three Dimensional Analytical Solid Geometry
(w.e.f. 2022-23 Admitted Batch)
Model Paper (w.e.f. 2022-2023)

Time: 2Hrs

Max. Marks:

50M

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PART - I

Answer any FIVE questions. Each question carries FOUR marks. 5 X 4=20M

1. Find the equation of the plane through the point $(-1, 3, 2)$ and perpendicular to the planes $x+2y+2z=5$ and $3x+3y+2z=8$.
2. Find the equation to the plane through the points $(1, 1, 1)$, $(1, -1, 1)$ and $(-7, -3, -5)$. Show that it is parallel to y - axis.
3. Find the image of the point $(2, -1, 3)$ in the plane $3x-2y+z=9$.
4. Find the equations of the line through the point $(1, 1, 1)$ and intersecting the lines $2x - y - z - 2 = 0 = x + y + z - 1$; $x - y - z - 3 = 0 = 2x + 4y - z - 4$.
5. 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.
6. Find the limiting points of the coaxial system of spheres determined by $x^2 + y^2 + z^2 + 4x - 2y + 2z + 6 = 0$, $x^2 + y^2 + z^2 + 2x - 4y + 2z + 6 = 0$.
7. Find the equation to the cone which passes through the three coordinate axes and the lines $\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ and $\frac{x}{2} = \frac{y}{1} = \frac{z}{1}$.
8. Find the equation of the enveloping cone of the sphere $x^2 + y^2 + z^2 + 2x - 2y = 2$ with its vertex at $(1, 1, 1)$.

PART - II

Answer the following questions. Each question carries SIX marks. 5 X 6 = 30M

9. A plane meets the coordinate axes in A, B, C. If the centroid of $\triangle ABC$ is (a, b, c) . Show that the equation of the plane is $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 3$.

(OR)

10. 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.

11. Find the shortest distance between the lines $\frac{x-2}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$.

(OR)

12. Prove that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$; $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar . Also find their point of intersection and the plane containing the lines.

13. Show that the two circles $x^2 + y^2 + z^2 - y + 2z = 0$, $x - y + z = 2$; $x^2 + y^2 + z^2 + x - 3y + z - 5 = 0$, $2x - y + 4z - 1 = 0$ lie on the same sphere.

(OR)

14. Find the equation of the sphere through the circle $x^2 + y^2 + z^2 = 9$, $2x + 3y + 4z - 5 = 0$ and the point $(-1, -2, 3)$.

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

(OR)

16. Prove that if the angle between the lines of intersection of the plane $x + y + z = 0$ and the cone

$$ayz + bzx + cxy = 0 \text{ is } \pi/2, \text{ then } a + b + c = 0 \text{ and is } \pi/3, \text{ if } \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$$

17. Prove that the equation $\sqrt{fx} \mp \sqrt{gy} \mp \sqrt{hz} = 0$ represents a cone that touches the coordinate planes and find its reciprocal cone.

(OR)

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