

	P.R. Government College (Autonomous) KAKINADA	Program&Semester II Major (II Sem) w.e.f.2023-24 admitted Batch			
CourseCode MAT-202	TITLEOFTHECOURSE Analytical Solid Geometry & Problem Solving Sessions				
Teaching	HoursAllocated:60(Theory)	L	T	P	C
Pre-requisites:	Basic Mathematics Knowledge on number system.	3	-	-	3

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

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

UNIT – II: The Line

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

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

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

UNIT –V: Cones

Definitions of a cone – vertex, guiding curve and 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 - 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; Reciprocal Cone.

Co-Curricular Activities:

Seminar/ Quiz/ Assignments/Threedimensional analytical Solid geometry and its applications/ Problem Solving Sessions.

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 Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, published by Wiley Eastern Ltd., 1999.
2. 2. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by TataMcGraw -Hill Publishers.
3. 3. Solid Geometry by B. Rama Bhupal Reddy, published by Spectrum University Press.

Additional Inputs : Definition of Cylinder and Right Circular Cylinder .

CO-PO Mapping:

(1:Slight[Low];

2:Moderate[Medium];

3:Substantial[High],

'-':NoCorrelation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	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	1	2	25
II	The Line	1	1	15
III	The Sphere	2	1	20
IV	The Sphere	1	1	15
V	Cones	2	1	20
		7	6	95

S.A.Q. = Short answer questions (5 marks)

E.Q = Essay questions (10 marks)

Short answer questions : 4 X 5 = 20 M

Essay questions : 3 X 10 = 30 M

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Total Marks = 50 M

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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. 2023-24 Admitted Batch)
Model Paper (w.e.f. 2023-2024)

Time: 2Hrs

Max. Marks: 50M

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Section -I

Answer any three of the following questions. Must attempt atleast one question from each part. Each question carries 10 Marks.

3 X 10 =

30M

Part – A

1. Find the planes bisecting the angles between the planes $2x - y + 2z + 3 = 0$ and $3x - 2y + 6z + 8 = 0$. Point out which of the planes bisects the acute angle and which bisects the obtuse angle in which the origin lies.
2. Prove that the equation represents a pair of planes, and find the angle between them.
 $6x^2 + 4y^2 - 10z^2 + 3yz + 4zx - 11xy = 0$
3. 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.

Part - B

4. Find the equation of the sphere passing through the circle $x^2 + y^2 = 4$, $z = 0$ and is intersected by the plane $x + 2y + 2z = 0$ in circle of radius 3.
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 $P(2, -3, 5)$ and axis PQ which makes equal angles with the axis and which passes through $A(1, -2, 3)$.

Section II

Answer any four of the following questions. Each question carries 5 marks. 4 X 5 = 20M

7. If a plane meets the coordinate axes in A, B, C such that the centroid of the triangle ABC is the point (p, q, r) then show that the equation of the plane is $\frac{x}{p} + \frac{y}{q} + \frac{z}{r} = 3$.
8. Find the image of the point $(2, -1, 3)$ in the plane $3x - 2y + z = 9$.

9. A plane passes through a fixed point (a, b, c) and intersect the axes in A, B, C . Show that the centre of the sphere $OABC$ lies on $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 2$
10. Find the centre and radius of the circle $x^2 + y^2 + z^2 - 2y - 4z - 11 = 0$, $x + 2y + 2z - 15 = 0$.
11. Find the equation of the sphere which touches the plane $3x + 2y - z + 2 = 0$ at $(1, -2, 1)$ and cuts orthogonally the sphere $x^2 + y^2 + z^2 - 4x + 6y + 4 = 0$.
12. Show that the general equation of the cone of the second degree which pass through Coordinate axes is $fyx + gzx + hxy = 0$.
13. Find the enveloping cone at the $(1, 1, 1)$ and generators touching the sphere $x^2 + y^2 + z^2 - 2x + 4z - 1 = 0$

	P.R.Government College (Autonomous): KAKINADA	Program & Semester II Major (II Sem) w.e.f 2023-24 admitted batch			
CourseCode MAT-202P	TITLE OF THE COURSE Analytical Solid Geometry & Problem Solving Sessions Practical Course				
Teaching	HoursAllocated:30(Practical)	L	T	P	C
Pre-requisites:	Basic Mathematics Knowledge on 2-D Geometry	-	-	2	1

UNIT – I: The Plane

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

UNIT – II: The Line

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 - 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

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

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

UNIT –V: Cones

Definitions of a cone – vertex, guiding curve and 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 - Enveloping cone of a sphere - Right circular cone - Equation of the right circular cone with a given vertex, axis and semi vertical angle.

Semester – II End Practical Examinations

Scheme of Valuation for Practical's

Time : 2 Hours

Max.Marks : 50

- **Record - 10 Marks**
- **Viva voce - 10 Marks**
- **Test - 30 Marks**
- **Answer any 5 questions. At least 2 questions from each section. Each question carries 6 marks.**

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COURSE-II, THREEDIMENSIONAL ANALYTICAL SOLID GEOMETRY

Unit	TOPIC	E.Q	Marks allotted to the Unit
I	The Plane	2	12
II	The Line	2	12
III	The Sphere-I	1	6
IV	The Sphere - II	2	12
V	Cones	1	6
	Total	08	48

P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA
I year B.Sc., Degree Examinations - I Semester
Mathematics Course-I: Differential Equations
(w.e.f. 2023-24 Admitted Batch)
Practical Model Paper (w.e.f. 2023-2024)

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Time: 2Hrs

Max. Marks: 50M

Answer any 5 questions. At least 2 questions from each section.

5 x 6 = 30 Marks

SECTION - A

1. Find the planes bisecting the angles between the planes $2x - y + 2z + 3 = 0$ and $3x - 2y + 6z + 8 = 0$. Point out which of the planes bisects the acute angle and which bisects the obtuse angle in which the origin lies.
2. Show that the equation $x^2 + 4y^2 + 4z^2 + 8yz + 4zx + 4xy - 9x - 18y - 18z + 18 = 0$ represents a pair of parallel planes and find the distance between them.
3. 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.
4. Find the length and equation of the shortest distance between the lines $\frac{x}{1} = \frac{y}{2} = \frac{z}{1}$ and $x + y + 2z - 3 = 0 = 2x + 3y + 3z - 4$.

SECTION -B

5. Find the equation of the sphere passing through the circle $x^2 + y^2 = 4$, $z=0$ and is intersected by the plane $x+2y+2z=0$ in circle of radius 3 .
6. Find the radical centre of the spheres $x^2 + y^2 + z^2 + 4y = 0$, $x^2 + y^2 + z^2 + 2x + 2y + 2z + 2 = 0$, $x^2 + y^2 + z^2 + 3x - 2y + 8z + 6 = 0$, $x^2 + y^2 + z^2 - x + 4y - 6z - 2 = 0$.
7. Prove that if the angle between the lines of intersection of the plane $x + y + z = 0$ and the cone $ayz + bzx + cxy = 0$ is $\pi/2$, then $a + b + c = 0$ and is $\pi/3$, if $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$.
8. Find the vertex of the cone $7x^2 + 2y^2 + 2z^2 + 10zx + 10xy + 26x - 2y + 2z - 17 = 0$.

➤ **Record** - 10 Marks

➤ **Viva voce** - 10 Marks