B.A/ B.Sc	Semester-II	Credits:4
Course:2	**THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY**	**Hrs/Weak:5**

Course Outcomes:

After successful completion of this course, the student will be able to;

1. get the knowledge of planes.
2. basic idea of lines, sphere and cones.
3. understand the properties of planes, lines, spheres and cones.
4. express the problems geometrically and then to get the solution.

UNIT I: (12hrrs)

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, Orthogonal projection on a plane.

UNIT II: (12 hrs)

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: (12 hrs)

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: (12 hrs)

The Sphere and Cones : Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres. Limiting Points.

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: (12 hrs)

Cones :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/Three dimensional analytical Solid geometry and its applications/ Problem Solving.

TEXT BOOK :

1. 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, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.
4. Solid Geometry by B.Rama Bhupal Reddy, published by Spectrum University Press.

BLUE PRINT FOR QUESTION PAPER PATTERN

COURSE-II, THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Unit	TOPIC	S.A.Q (including choice)	E.Q (including choice)	Total Marks
I	The Plane	2	2	30
II	The Right Line	2	2	30
III	The Sphere	2	2	30
IV	The Sphere & The Cone	1	2	25
V	The Cone	1	2	25
Total		8	10	140

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

E.Q. = Essay questions   (10 marks)

Short answer questions : 5 X 5 M = 25 M

Essay questions : 5 X 10 M = 50 M

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Total Marks   = 75 M

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MODEL QUESTION PAPER (Sem-End)
B.A./B.Sc. DEGREE EXAMINATIONS
Semester - II
Course-2: THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Time: 3Hrs   **Max.Marks:75M**

SECTION - A

Answer any FIVE questions.   **5 X 5 M=25 M**

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 bisecting plane of the acute angle between the planes 3x-2y-6z+2=0,-2x+y-2z-2=0.

3. Find the image of the point (2,-1,3) in the plane 3x-2y+z =9.

   4. Show that the lines $2x + y - 4 = 0 = y + 2z$ and $+ 3z - 4 = 0$, $2x + 5z - 8 = 0$ are coplanar.

5. A variable plane passes through a fixed point (a, b, c). It meets the axes in A, B, C.

   Show that the centre of the sphere OABC lies on $ax^{-1}+by^{-1}+cz^{-1}=2$.

6. 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.

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).

SECTION - B

Answer ALL the questions.   **5 X 10 M = 50 M**

9. (a) A plane meets the coordinate axes in A, B, C. If the centroid of $\triangle$ABc (a,b,c),

   show that the Equation of the plane is $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 3.$

   (OR)

   (b) A variable plane is at a constant distance p from the origin and meets the axes in A,B,C.

   Show that The locus of the centroid of the tetrahedron OABC is $x^{-2}+y^{-2}+z^{-2}=16p^{-2}$.

10. (a) Find the shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$; $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$.

(OR)

(b) 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 ofintersection and the plane containing the lines.

11. (a) 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=0lie on the same sphere and find its equation.

(OR)

(b) Find the equation of the sphere which touches the plane 3x+2y-z+2=0 at (1,-2,1) and cuts

orthogonallyThe sphere $x^2+y^2+z^2-4x+6y+4=0$.

12. (a) Find the limiting points of the coaxial system of spheres $x^2+y^2+z^2-8x+2y-$

$2z+32=0,x^2+y^2+z^2-7x+z+23=0$.

(OR)

(b) Find the equation to the cone with vertex is the origin and whose base curve is $x^2+y^2+z^2+2ux+d=0$.

13 (a) Prove that the equation $\sqrt{fx} \pm \sqrt{gy} \pm \sqrt{hz} = 0$ represents a cone that touches the coordinatePlanes and find its reciprocal cone.

(OR)

(b) Find the equation of the sphere $x^2+y^2+z^2-2x+4y-1=0$ having its generators parallel to the line x=y=z.