I B.SC. – MATHEMATICS / SEMESTER - II (W.E.F. 2017-2018)

Course: SOLID GEOMETRY

Total Hrs. of Teaching: 90 @ 6 h / Week **Total Credits : 05**

Objective:

- To get awareness about the three dimensional geometry along with visualization.
- To be able to apply 3-d geometry for the construction.

Module -1

Unit 1: The Plane **(15 h)**

Equation of plane in terms of its intercepts on the axes, Equation 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 2: The Straight Line **(15 h)**

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 the 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.

Module -2

Unit 3:The Sphere **(15h)**

Equation of the sphere. Plane section of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Tangent lines and tangent planes; plane of contact, Polar plane conjugate points; conjugate planes.

Unit 4: The Sphere and the Cone **(15h)**

Angle of intersection of two spheres; condition for two spheres to be orthogonal; Radical plane, Coaxial system of spheres; simplified form of the equation of two spheres.

Definition of a cone, vertex, guiding curve generators; Equation of the cone with a given vertex and guiding curve; Equation of cone with vertex at origin is homogeneous; Condition that thegeneral equation of the second degree should represent a cone.

Unit 5: The Cone **(15h)**

Enveloping cone of a sphere;Right Circular Cone; Conditions that a cone may have three mutually perpendicular generators; Intersection of a line and 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.

Additional Inputs:

1. Intersection of three planes; Triangular prism.
2. The right circular cylinder.

Prescribed Book:
Scope as in "A text book of Mathematics for B.Sc. volume I" by V.Krishna Murthy & others, S.Chand and Co. .ltd.

ReferenceBooks:
1. Analytical Solid Geometry by Shanti Narayan and P.K.Mittal, published by S.Chand& Company Ltd. Seventh edition.
2. A text book of Analytical Geometry of Three Dimensions byP.K.Jain and Khaleel Ahmed, Wiley Eastern Ltd., 1999.
3. Course on Solid Geometry by N.P.Bali-Golden series publications.

BLUE PRINT FOR QUESTION PAPER PATTERN
SEMESTER-I

Unit	TOPIC	V.S.A.Q	S.A.Q	E.Q	Marks allotted to the Unit
1	The Plane	1	1	2	22
2	The Right Line	1	1	2	22
3	The Sphere	1	1	1	14
4	The Sphere The Cone	1	1	2	22
5	The Cone	1	1	1	14
TOTAL		5	5	8	94

V.S.A.Q = Very short answer questions (1 mark)
S.A.Q = Short answer questions (5 marks)
E.Q = Essay questions (8 marks)
Very short answer questions : 5 X 1 =05
Short answer questions : 3 X 5 =15
Essay questions : 5 X 8 =40

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Total Marks = 60

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P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
IYEAR B.SC., DEGREE EXAMINATIONS II SEMESTER
Mathematics Paper–I B: Solid Geometry
(Model Paper w.e.f. 2017 - 2018)

Time: 2Hrs 30 min Max. Marks:60

PART-I

Answer ALL the questions. **5 X1M= 5 M**

1. Find the equation of the plane through the line of intersection of $x - 3y + 2z + 3 = 0, 3x - y - 2z - 5 = 0$ and the origin.
2. Find the equation of the line passing through $(4,3,-7)$ and equally inclined to the axes.
3. Find the centre of the sphere $x^2 + y^2 + z^2 - 3x + 5y - 4z - 3 = 0$.
4. Find the polar plane of the point (0, -1, 1) with respect to the sphere $x^2 + y^2 + z^2 - 2x + 4y + 6z - 11 = 0$.
5. Write the reciprocal cone of $9x^2 + 4y^2 - 7z^2 = 0$.

PART -II

Answer any THREE questions, each question carries FIVE marks. **3 X 5M= 15 M**

6. Find the equation of the plane through the point (-1,3,2) and perpendicular to the two planes $x + 2y + 2z = 5$ *and* $3x + 3y + 2z = 8$.
7. Find the image of the point $A(1,3,4)$ in the plane $2x - y + z + 3 = 0$.
8. Find the equation of the sphere through the origin and making intercepts a,b,c with the axes.
9. If r_1 and r_2 are the radii of the orthogonal spheres, then find the radius of the circle of their intersection.
10. 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-III

Answer any FIVE questions by choosing at least TWO from each section. **5X8=40M**

SECTION -A

11. Find the planes bisecting the angles between 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.
12. 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.
13. 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.
14. Find the length and equations of shortest distance between the lines $\frac{x-2}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ *and* $\frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$.

SECTION –B

15. Show that the four points (-8,5,2), (-5,2,2),(-7,6,6),(-4,3,6) are concyclic.
16. Find the equation of the sphere which touches the plane $3x + 2y - z + 2 = 0$ at $(1, -2, 1)$ and cuts orthogonally the sphere$x^2 + y^2 + z^2 - 4x + 6y + 4 = 0$.
17. Prove that the plane $ax + by + cz = 0$ cuts the cone $yz + zx + xy = 0$ in a perpendicular lines if $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$.
18. Find the equation of the right circular cylinder of radius 2 and whose axis passes through the point (1,2,3) and has directional cosines proportional to (2,-3,6).

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