

B.A./B.Sc. FIRST YEAR MATHEMATICS SYLLABUS PAPER - II
(SEMESTER – II)
SOLID GEOMETRY

UNIT – I (12 hrs) : 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; Intersection of three planes; Triangular Prism.

UNIT – III (12 hrs) : 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; Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified form of the equation of two spheres.

UNIT – IV (12 hrs) : Cones :

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; Enveloping cone of a sphere; Equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; 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; Right circular cone; Equation of the right circular cone with a given vertex; axis and semi-vertical angle.

UNIT – V (12 hrs) Cylinders :

Definition of a cylinder; Equation to the cylinder whose generators intersect a given conic and are parallel to a given line; Enveloping cylinder of a sphere; The right circular cylinder; Equation of the right circular cylinder with a given axis and radius.


Prescribed Text Book : Scope as in Analytical Solid Geometry by Shanti Narayan and P.K. Mittal Published by S. Chand & Company Ltd. Seventeenth Edition.

Sections :- 2.4, 2.7, 2.9, 3.1 to 3.8, 6.1 to 6.9, 7.1 to 7.8.

Reference Books :

1. V Krishna Murthy & Others "A text book of Mathematics for BA/B.Sc Vol 1, Published by S. Chand & Company, New Delhi.
2. P.K. Jain and Khaleel Ahmed, "A text Book of Analytical Geometry of Three Dimensions", 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.

Note : Concentrate on Problematic parts in all above units.


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S.V.UNIVERSITY, MODEL PAPER.

THREE YEAR B.A/B.Sc DEGREE EXAMINATIONS.

CHOICE BASED CREDIT SYSTEM

II SEMESTER

PART II : MATHEMATICS

Paper II : SOLID GEOMETRY

(New Syllabus w.e.f 2015-16)

Time: 3 hours

Max Marks :75

SECTION - A

Answer any FIVE of the following questions. Each question carries 5 marks(5X5 = 25).

1. Find the distance between the planes $2x-3y+z=5$ and $6x-9y+3z=5$.
2. Find the equation of the plane passing through the line of intersection of the planes $3x-2y+6z+2=0$, $2x-y+2z+2=0$ and the point $(1,-2,1)$.
3. Show that the line $\frac{x+1}{-1} = \frac{y+2}{3} = \frac{z+5}{5}$ lies in the plane $x+2y-z=0$.
4. Show 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.
5. Find the equation of the sphere with $(2,-1,4)$ and $(-2,2,-2)$ as the extremities of the diameter.
6. Find the polar plane of the point $(0,-1,1)$ w.r.t the sphere $x^2+y^2+z^2-2x+4y+6z-11=0$.
7. Show that the reciprocal cone $ax^2+by^2+cz^2=0$ is $\frac{x^2}{a} + \frac{y^2}{b} + \frac{z^2}{c} = 0$.
8. Find the equation of the cylinder whose generators intersect the curve $ax^2+by^2=2z$, $lx+my+nz=p$ and parallel to Z- axis.

(P.T.O)

SECTION - B

Answer ALL of the five questions. Each question carries 10marks (5X10 = 50).

9a. 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 $x^{-2} + y^{-2} + z^{-2} = 16p^{-2}$.

OR

b. Prove that the equation $2x + -6y - 12z + 18yz + 2zx + xy = 0$ represents a pair of planes and hence find the angle between them.

10a. Find the image of the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ in the plane $x+y+z = 1$.

OR

b. Find the shortest distance and equation between the skew lines

$$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4} \text{ and } \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$$

11a. Show that the four points $(-8,5,2), (-5,2,2), (-7,6,6), (-4,3,6)$ are concyclic.

OR

b. Find the limiting points of the coaxial system defined by spheres $x^2 + y^2 + z^2 + 4x - 2y + 2z + 6 = 0$ and $x^2 + y^2 + z^2 + 2x - 4y - 2z + 6 = 0$.

12a. Find the equations of the lines of intersection of the plane $3x + 4y + z = 0$ and the cone $15x^2 - 32y^2 - 7z^2 = 0$

OR

b. Find the equation of the right circular cone with vertex at $(1,0,1)$ and passing through $(1,1,1)$. Also the axis of the cone makes equal angles with coordinate axes.

13a. Find the equation of the right circular cylinder whose guiding curve is $x^2 + y^2 + z^2 = 0$, $x - y + z = 3$

OR

b. Find the enveloping cylinder of the sphere $x^2 + y^2 + z^2 + 2x - 4y - 1 = 0$ having its generators parallel to $x = y = z$.



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