

**B.A./B.Sc. FIRST YEAR MATHEMATICS**

**SEMESTER-II,PAPER-II**

**MODEL QUESTION PAPER**

**SOLID GEOMETRY**

*Time: 3 Hours*

*Max. Marks : 75*

**PART-A**

**I. Answer any FIVE of the following Questions :**

**5 X 5= 25 Marks**

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 angles between the planes  $x+2y+3z=5$ ,  $3x+3y+z=9$ .
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. Find the point of intersection with the plane  $3x+4y+5z=5$  and the line  $\frac{x+1}{1} = \frac{y+3}{3} = \frac{z-2}{2}$ .
5. Find the centre and radius of the sphere  $2x^2+2y^2+2z^2-2x+4y+2z+1=0$ .
6. Find the equation of the sphere through the circle  $x^2+y^2+z^2=9$ ,  $2x+3y+4z=5$  and the point  $(1,2,3)$
7. Find the equation of the tangent plane to the sphere  $3x^2+3y^2+3z^2-2x-3y-4z=22=0$  at the point  $(1,2,3)$
8. Show that the spheres are orthogonal  $x^2+y^2+z^2+6y+2z+8=0$ ;  
 $x^2+y^2+z^2+6x+8y+4z+20=0$ .
9. Find the enveloping cone of the sphere  $x^2+y^2+z^2+2x-2y-2=0$  with its vertex at  $(1,1,1)$
10. Find the equation of the cone with vertex  $(1,1,0)$  and guiding curve  $y=0, x^2+z^2=4$ .

## PART - B

Answer any FIVE of the following Questions.

5 × 10 = 50 Marks

### SECTION - A

11. Find the equation of the plane passing through the intersection of the planes  $x + 2y + 3z = 4$ ,  $2x + y - z + 5 = 0$  and perpendicular to the plane  $6z + 5x + 3y + 8 = 0$ .
12. Prove that Equation  $2x^2 - 6y^2 - 12z^2 + 18yz + 2zx + xy = 0$  represents a pair of planes and find the angle between them.
13. Find the image of the point  $(2, -1, 3)$  in the plane  $3x - 2y + z = 9$ .
14. Find the length and equation to the line of shortest distance between the lines  $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-1}{2}$ ,  $\frac{x-4}{4} = \frac{y-5}{5} = \frac{z-2}{3}$ .
15. Find the equation of the sphere through the circle  $x^2 + y^2 + z^2 + 2x + 3y + 6 = 0$ ,  $x - 2y + 4z - 9 = 0$  and the centre of the sphere  $x^2 + y^2 + z^2 - 2x + 4y - 6z + 5 = 0$ .
16. Find whether the following circle is a great circle or small circle  $x^2 + y^2 + z^2 = 4x + 6y - 8z + 4 = 0$ ,  $x + y + z = 3$ .
17. Find the equation of the sphere which touches the plane  $3x + 2y - z + 2 = 0$  at  $(1, -2, 1)$  and cuts orthogonally the sphere  $x^2 + y^2 + z^2 - 4x + 6y + 4 = 0$ .
18. Find limiting points of the co axial system of spheres  $(x^2 + y^2 + z^2 - 20x + 30y + 40z + 29) + \lambda(2x - 3y + 4z) = 0$ .
19. Find the equation of right circular cone whose vertex is  $P(2, -3, 5)$  axis PQ which makes equal angles with the axis and which passes through  $A(1, -2, 3)$ .
20. Find the vertex of the cone  $7x^2 + 2y^2 + 2z^2 - 10zx + 10xy + 26x - 2y + 2z - 17 = 0$ .