**CBCS/ SEMESTER SYSTEM**

**(w.e.f. 2020-21 Admitted Batch)**

**B.A./B.Sc. MATHEMATICS**

**COURSE-II, THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY**

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

**SECTION - A**

**Answer any FIVE questions. Each question carries FIVE marks 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 + − 4 = 0 = 𝑦 + 2𝑧 and 𝑥 + 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 x2+y2+z2-2x-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

8. Find the equation of the enveloping cone of the sphere with its vertex at (1, 1, 1).

**SECTION - B**

**Answer ALL the questions. Each question carries TEN marks. 5 X 10 M = 50 M**

9(a) A plane meets the coordinate axes in A, B, C. If the centroid of ABC is

(a,b,c), show that the equation of the plane is

(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

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(OR)

(b) Prove that the lines **;** are coplanar. Also find their point of intersection and the plane containing the lines.

11 (a) Show that the two circles x2+y2+z2-y+2z=0, x-y+z=2;

x2+y2+z2+x-3y+z-5=0, 2x-y+4z-1=0 lie 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 orthogonally the sphere x2+y2+z2-4x+6y+4=0.

12 (a) Find the limiting points of the coaxial system of spheres x2+y2+z2-8x+2y-2z+32=0, x2+y2+z2-7x+z+23=0.

(OR)

(b) Find the equation to the cone with vertex is the origin and whose base curve is x2+y2+z2+2ux+d=0.

13 (a) Prove that the equation represents a cone that touches the coordinate planes and find its reciprocal cone.

(OR)

(b) Find the equation of the sphere x2+y2+z2-2x+4y-1=0 having its generators parallel to the line x=y=z.