Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐ **Total No. of Pages : 02**

Total No. of Questions : 07

B.Sc. (Computer Science) (2013 & Onwards) (Sem.–3)

SOLID GEOMETRY

Subject Code : BCS-301

M.Code : 71773

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students has to attempt any FOUR questions.**

SECTION-A

1. **Write briefly :**

(a) Find the condition that three planes may form a triangular prism.

(b) Find the equation of a sphere with given centre and radius.

(c) Define Radical Plane of Two sphere.

(d) Define change of axis for plane.

(e) Find the equation of the sphere passing through the points (1, –1, –1), (3, 3, 1), (–2, 0, 5), (–1, 4, 4).

(f) If a right circular cone has three mutually perpendicular generators, prove that the semi vertical angle is $\tan^{-1}\sqrt{2}$.

(g) Find the equation of a cone whose vertex is at the origin.

(h) Find the equations of the lines in which the plane $3x + 4y + z = 0$ cuts the cone $15x^2 - 32y^2 - 7z^2 = 0$

(i) Explain guiding curve of the cylinder.

(j) Prove that the equation of a right circular cylinder whose axis, z on $x^2 + y^2 = r^2$.

SECTION-B

2. (a) Prove that the planes $3x + 3y - z = 2$, $3x + 3y + z = 4$, $x - y + 2z = 5$ intersect in a point. Find the point of intersection.

   (b) Explain rotation of axis for plane.

3. (a) Find the centre and radius of the circle

   $x^2 + y^2 + z^2 - 8x + 4y + 8z - 45 = 0$, $x - 2y + 2z = 3$.

   (b) Two spheres of radius r_1 and r_2 intersect orthogonally. Prove that the radius of the common circle is $\frac{r_1 r_2}{\sqrt{r_1^2 + r_2^2}}$.

4. (a) Find the condition when the plane $lx + my + nz = p$ becomes a tangent to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$.

   (b) Prove that the polar plane is perpendicular to the line joining the centre of the sphere to the pole.

5. (a) Find the equation of the right circular cylinder of radius 2 whose axis is the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{2}$.

   (b) Explain the parabolic form of cylinder in standard form.

6. (a) Prove that Enveloping cylinder is a limiting case of enveloping cone.

   (b) Find the equation of the right circular cylinder whose guiding curve is

   $x^2 + y^2 + z^2 = 9$, $x - y + z = 3$.

7. (a) Prove that the cones $ax^2 + by^2 + cz^2 = 0$ and $\frac{x^2}{a} + \frac{y^2}{b} + \frac{z^2}{c} = 0$ are reciprocal.

   (b) Prove that the general equation to a cone which touches the three coordinate planes is $\sqrt{fx} \pm \sqrt{gy} \pm \sqrt{hz} = 0$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.