Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Sc (Non Medical) (2018 & Onwards) (Sem.–1)

SOLID GEOMETRY

Subject Code : BSNM-106-18

M.Code : 75747

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. a) Find the equation of plane passing through the points (2, 3, –4) and (1, –1, 3) and parallel to x-axis.

b) Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6) and perpendicular to the plane $x + 2y + 2z = 5$.

c) Find the equation of the sphere passing through the origin and the points $(\alpha, 0, 0)$, $(0, \beta, 0)$ and $(0, 0, \gamma)$.

d) Prove that the circles $x^2 + y^2 + z^2 - 2x + 3y + 4z - 5 = 0$, $5y + 6z + 1 = 0$ and $x^2 + y^2 + z^2 - 3x - 4y + 5z - 6 = 0$, $x + 2y - 7z = 0$ lie on the same sphere and find its equation.

e) Find the limiting point of the coaxial system of spheres determined by

$x^2 + y^2 + z^2 + 4x - 2y + 2z + 6 = 0$ and $x^2 + y^2 + z^2 + 2x - 4y - 2z + 6 = 0$.

f) Find the equation of the cone whose vertex is the origin and which passes through the curve of intersection of the plane $lx + my + nz = p$ and the surface $ax^2 + by^2 + cz^2 = 1$.

g) Find the equation of the right circular cylinder of radius 2 whose axis is the line

$$\frac{x-1}{2} = \frac{y+2}{1} = \frac{z-3}{2}.$$

h) Prove that the (1, 1, 1) and (–3, 0, 1) lie on the opposite sides of the plane $3x + 4y - 12z + 13 = 0$.

i) Define rectangular cone.

j) 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.

SECTION-B

2. Find the equation the planes which bisect the angles between the two given planes.

3. Find the equation of the right circular cylinder described on the circle through the points (1, 0, 0), (0, 1, 0) and (0, 0, 1) as the guiding curve.

4. Prove that the plane $2x - 2y + z + 12 = 0$ touches the sphere $x^2 + y^2 + z^2 - 2x - 4y + 2z - 3 = 0$.

5. Prove that the polar line $\frac{x+3}{1}=\frac{y+1}{2}=\frac{z-2}{3}$ with respect to the sphere $x^2 + y^2 + z^2 = 1$ is the line $\frac{x}{-1}=\frac{7y+3}{11}=\frac{7z-2}{-5}$.

6. Find the angle between the generating lines in which a plane cuts a cone.

SECTION-C

7. Find the equation of the plane passing through the line of the intersection of the line of intersection of the plane $ax + by + cz + d = 0$and $a'x + b'y + c'z + d' = 0$ and perpendicular to xy – plane.

8. Find the necessary and sufficient condition that the general equation of second degree $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy + 2ux + 2vy + 2wz + d = 0$ represents a cone.

9. a) Find the locus of the tangent lines drawn to the sphere and parallel to a given line.

   b) If $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ represents one of the three mutually perpendicular generator of the cone $5yz - 8zx - 3xy = 0$; find the equation of other two.

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.