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Code No. 3186/E

FACULTY OF SCIENCE

B.Sc. V-Semester (CBCS) Examination, November / December 2018

Subject : Mathematics

Paper – VI-A : Solid Geometry (DSE E– I)

Time : 3 Hours Max. Marks: 60

PART – A (5 x 3 = 15 Marks)
(Short Answer Type)

Note : Answer any FIVE of the following questions.

1 Find the centre and radius of the sphere

$$2x^2 + 2y^2 + 2z^2 - 2x + 4y + 2z + 3 = 0$$

2 Find the limiting points of the co-axial system define by the sphere

$x^2 + y^2 + z^2 + 3x - 3y + 6 = 0$ and $x^2 + y^2 + z^2 - 6y - 6z + 6 = 0$

3 Find the equation of the cone whose vertex is the point (1, 1, 0) and whose guiding curve is

$y = 0, x^2 + z^2 = 4$

4 Show that the general equation to a cone which passes through the three coordinate axes is

$fyz + gzx + hxy = 0$ where f, g, h are parameters

5 Find the points of intersection of the line $\frac{x+5}{-3} = \frac{y-4}{1} = \frac{z-11}{7}$ with the conicoid

$12x^2 - 17y^2 + 7z^2 = 7$

6 Find the enveloping cylinder of the conicoid $ax^2 + by^2 + cz^2 = 1$ with its generations parallel to the line $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$

7 Find the equation of the sphere through the circle
$x^2 + y^2 + z^2 = 9, 2x + 3y + 4z = 5$ then point (1, 2, 3)

8 Find the enveloping cone of the sphere $x^2 + y^2 + z^2 - 2x + 4z - 1 = 0$ with its vertex at (1, 1, 1)

PART – B (3 x 15 = 45 Marks)
(Essay Answer Type)

Note: Answer ALL the questions.

9 (a) Show that the two circles

$2(x^2 + y^2 + z^2) + 8x - 13y + 17z - 17 = 0 = 2x + y - 3z + 1$

and $x^2 + y^2 + z^2 + 3x - 4y + 3z = 0 = x - y + 2z - 4$

lie on some sphere and find its equation.

OR

(b) Two spheres of radii r_1 and r_2 cut orthogonally. Prove that the radius of the common circle is

$$\frac{r_1 r_2}{\sqrt{r_1^2 + r_2^2}}$$

10 (a) Find the equations to the lines in which the plane $2x + y - z = 0$ cuts the cone $4x^2 - y^2 + 3z^2 = 0$

OR

(b) Find the equation of the right circular cone with its vertex at the origin, axis along z-axis and semi vertical angle α.

11 (a) Find the equations to the two planes which contain the line given by $7x + 10y - 30 = 0$, $5y - 3z = 0$ and touch the ellipsoid $7x^2 + 5y^2 + 3z^2 = 60$.

OR

(b) Find the locus of points from which three mutually perpendicular tangent lines can be drawn to the conicoid $ax^2 + by^2 + cz^2 = 1$.

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