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FACULTY OF SCIENCE

Code No. 8188 / E

B.Sc. V-Semester (CBCS) Examination, November / December 2019

Subject : Mathematics (Solid Geometry)
Paper – VI-A (DSE E-1)

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 equation of the sphere which passes through the points
   O(0, 0, 0), A(-1, 2, 3), B(1, -2, 3), C(1, 2, -3).

2 Find the points of intersection of the line $2x - 1 = y + 3 = -z + 4$ with the sphere
   $x^2 + y^2 + z^2 - 6x + 8y - 4z + 4 = 0$.

3 Find the equation of the cone with vertex at O(0, 0, 0) and passing through the circle
   $x^2 + y^2 + z^2 + x - 2y + 3z - 4 = 0$, $x - y + z = 2$.

4 Find the equation of the cylinder with generators parallel to x – axis and passing
   through the curve
   $ax^2 + by^2 = 2cz$, $\ell x + my + nz = p$

5 Find the equation of the tangent plane to the conicoid $3x^2 - 5y^2 + z^2 + 2 = 0$ at point
   P(1, 1, 0).

6 Find the points of intersection of the line $\frac{x+5}{-3} = \frac{y-4}{1} = \frac{z-11}{7}$ with the conicoid
   $12x^2 - 17y^2 + 7z^2 = 7$

7 Find the condition that the spheres
   $a(x^2 + y^2 + z^2) + 2\ell x + 2my + 2nz + p = 0$ and
   $b(x^2 + y^2 + z^2) = k^2$ may cut orthogonally

8 Find the equation of the cone reciprocal to the cone $5x^2 + 9y^2 + 11z^2 = 0$

PART – B (3 x 15 = 45 Marks)
(Essay Answer Type)
Note: Answer ALL questions.

9 (a) If any tangent plane to the sphere $x^2 + y^2 + z^2 = r^2$ makes intercepts a, b, and c
   on the co-ordinate axes, prove that

   $$\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{r^2}$$

   OR

   (b) Find the equation of the sphere having the circle
   $x^2 + y^2 + z^2 + 10y - 4z - 8 = 0$, $x + y + z = 3$ as the great circle.

10 (a) Find the equation of the cone whose vertex is A(1, 2 3) and guiding curve is the
   circle $x^2 + y^2 + z^2 = 4$, $x + y + z = 1$.

   OR

   (b) Find the equation to the cylinder whose generators are parallel to $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and

   guiding curve is $x^2 + y^2 = 16$, $z = 0$

11 (a) Show that the plane $3x + 12y - 6z - 17 = 0$ touches the conicoid
   $3x^2 - 6y^2 + 9z^2 + 17 = 0$, and find the point of contact.

   OR

   (b) A Tangent plane to the conicoid $4x^2 + 6y^2 + 9z^2 = 1$ meets the coordinate axes in
   P, Q and R then find the locus of the centroid of triangle PQR.

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