[103] No. of printed pages: 3

SARDAR PATEL UNIVERSITY
F.Y.B.Sc. (II SEM.) (CBCS) EXAMINATION
2011
Monday, 25th April
3.00 p.m. to 5.00 p.m.
MATHEMATICS
US02CMTH01: ANALYTICAL SOLID GEOMETRY
Total Marks: 70

Q:1 Indicate your choice of correct answer for each sub-questions in your answer-book by writing sub-question number and answer with lattera.b.c.d whichever is appropriate. (10)

(1)The centre of the sphere $x^2+y^2+z^2+2x+2y-2z-6=0$ is a

(a) (-1,1,1) (b) (-1,-1,1) (c) (-1,-1,-1) (d) (1,1,-1)

(2) The plane section of any sphere is

(a) points (b) line (c) circle (d) sphere

(3) The radius of a sphere $x^2+y^2+z^2-2x-4y-4z=7$. is

(a) $\sqrt{2}$ (b) 2 (c) 3 (d) 4

(4) The equation $\frac{x^2}{9}-\frac{y^2}{4}-\frac{z^2}{25}=1$ represents an

(a) Elliptic hyperboloid of two sheets (b) Elliptic hyperboloid of one sheet (c) Elliptic cone (d) Elliptic paraboloid

(5)The xz-trace of the surface $\frac{x^2}{9}+\frac{y^2}{4}-\frac{z^2}{25}=1$ is

(a) Parabola (b)Hyperbola (c) Ellipse (d)Pair of lines

(6) In a cylindrical polar co-ordinate system the equation z=2 represents a plane

(a) parallel to xy- plane (b)parallel to yz-plane

(c)parallel to zx-plane (d)none of these

(7)The vertex of a cone $ax^2+by^2+cz^2+2fyz+2gzx+2hxy=0$ is

(a) (f,0,0) (b) (0,g,0) (c) (0,0,h) (d) none of these

(8) The condition that a cone $ax^2+by^2+cz^2+2fyz+2gzx+2hxy=0$ admits a set of three mutually perpendicular generators is

(a) ab+bc+ca=0 (b) ab+bc+ca=1 (c) a+b+c=0 (d) a+b+c=1

(9)The vertex of reciprocal cone of a cone $ax^2+by^2+cz^2+2fyz+2gzx+2hxy=0$ is

(a) (0,0,0) (b) (f,g,h) (c) (-f,-g,-h) (d) (-F,-G,-H)

(10) Every plane sections of a right circular cone by a plane perpendicular to its axis is

(a) Hyperbola (b) Rectangle (c) Circle (d) Ellipse

Q:2 Do as directed (20)

(1) Find the equation of a sphere with centre (2,-1,0) and passing through the point (1,-1,2).

(2) By using definition of a sphere derive the equation of a sphere with centre (α,β,γ) and radius 'a'.

*(9) Find the condition that the cone $ax^2+by^2+cz^2+2fyz+2gzx+2hxy=0$ admits three mutually Tangent planes. 2Mr

(3) Find the equation of a tangent plane to a sphere $x^2+y^2+z^2+2x+4y-6z-24=0$ at a point (1,1,-2)

(4) By using standard form of quadric surface identify the surface given by $9x^2-4y^2+9z^2=0$.

(5) Find Jaccobian for u=x+2y, v=3x+y.

(6) Plot the points (2,7π/6,π/6), and (3,40°,60°) in R^3

(7) Find the equation of the cone with vertex at origin and direction cosine of whose generators satisfy the condition $l^2+m^2-n^2=0$.

(8) Find the equation of the cone with vertex at origin and which passes through the three co-ordinate axes.

* (10) Find the equation of right circular cone with vertex at origin and axis of cone be z-axis.

Q:3 (a) Two spheres given by $S_1 \equiv x^2+y^2+z^2+2u_1x+2v_1y+2w_1z+d_1=0$ and $S_2=x^2+y^2+z^2+2u_2x+2v_2y+2w_2z+d_2=0$. Prove that $S_1+\lambda S_2=0$, where $\lambda \in$ R-{-1}, represents a family of spheres passing through the intersection of $S_1 \equiv 0$ & $S_2 \equiv 0$. (6)

(b) Show that the spheres $x^2+y^2+z^2=64$ and $x^2+y^2+z^2-12x+4y-6z+48=0$ touches each othere. (4)

OR

Q:3 (c) Find the equation of the sphere which passing through the circle $x^2+y^2+z^2+2x+6y-4z-11=0$; $x^2+y^2+z^2+4x-8y+2z+17=0$ and through the centre of one of the spheres. (5)

(d) Find the equation of a tangent planes to the sphere $x^2+y^2+z^2+2x-2y-2z-1=0$ which are parallel to the plane 2x-y+2z=0 (5)

Q:4 (a) Identify and describe the surface given by $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1, c>a, c>b.$ (5)

(b) Show that $Ax^2+By^2+Cz^2=D$ represents an elliptic hyperboloid of one sheet if one of the coefficient is negative and D>0 (5)

OR

Q:4 (c) Describe the surface given by (1) ρ =a, a is positive constant (2) θ =0, in spherical polar co-ordinate system. (5)

(d) By using standard form of quadratic surface identify the surface $9x^2+4y^2-9z^2-18x-8y-18z=32$ (5)

Q:5 (a) Find the equation of a cone with vertex at (α, β, γ) and whose generators touches the sphere $x^2+y^2+z^2=a^2, (a \neq 0)$ (6)

(b) Show that the cone whose vertex is at the origin and which (4)

passes through the curve of intersection of the sphere $x^2+y^2+z^2=3a^2$,and any plane at a distance "a"form the origin Has mutually perpendicular generators.

OR

Q:5 (c)The plane through OX and OY Included an angle θ . Show that their line of intersection lies on the cone $z^2(x^2+y^2)=x^2y^2\tan^2\theta$ (5)

(d)Find the equation of the cone with vertex at Origin and which Passes through the curve $x^2+y^2=4, z=2$. (5)

Q:6 (a) Find the equation of the reciprocal cone of the cone $2yz+3zx+4xy=0$ (5)

(b) Find the equation of the cylinder whose generator intersect the conic $ax^2+2hxy+by^2+2gx+2fy+c=0, z=0$. and are parallel to $\frac{x}{l}=\frac{y}{m}=\frac{z}{n}$. (5)

OR

Q:6 (c) Find the condition that the line of intersection of the Plane $lx+my+nz=0$ and a cones $ax^2+by^2+cz^2=0$, $fyz+gzx+hxy=0$ shoud be coincident. (5)

(d) Find the equation of the right circular cylinder whose ,axis is $\frac{x-\alpha}{l}=\frac{y-\beta}{m}=\frac{z-\gamma}{n}$ and radius is r. (5)

X=X=X