R-19

Code:6308/E3

Faculty of Science
B.Sc (Mathematics) III-Year, CBCS –VI Semester
Regular Examinations -June/July, 2022
PAPER: Analytical Solid Geometry

Time: 3 Hours Max Marks: 80

Section-A

I. Answer any eight of the following questions (8x4=32 Marks)

1. Find the value of *K* for which the plane $x+y+z=K\sqrt{3}$ touches the sphere $x^2+y^2+z^2-2x-2y-2z-6=0$.
2. Find the Centre and radius of the circle $x^2+y^2+z^2=25,\ 2x+y+2z=9$
3. If the radius of the sphere $x^2+y^2+z^2+6x-8y-t=0$ is 6 then find t.
4. Find the enveloping cone of the sphere $x^2+y^2+z^2+2x-4y=0$ with vertex at (1,1,1).
5. Find the equation of the cone with vertex (1,1,0) and guiding curve $x^2+y^2=4,\ z=0$.
6. Find the equation to the cone which passes through the three coordinate axes and the lines $\frac{x}{1}=\frac{y}{-2}=\frac{z}{3}$ and $\frac{x}{3}=\frac{y}{-1}=\frac{z}{1}$.
7. Find the equation to the right circular cylinder whose guiding circle is $x^2+y^2+z^2=25,\ x-y+z=3$.
8. Find the equation of the cylinder whose generators are parallel to $\frac{x}{1}=\frac{y}{2}=\frac{z}{-1}$ and passing through the curve $3x^2+2y^2=1, z=0$.
9. Define right circular cone and cylinder.
10. Find the equations of tangent planes to $7x^2-3y^2-z^2+21=0$ which passes through the line $7x-6y+9=0,\ z=3$.
11. The plane $lx+my+nz=p$ touch the conicoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1$ then show that $a^2l^2+b^2m^2-c^2n^2=p^2$
12. Show that $3x^2+4y^2+z^2-x+12y-4z+13=0$ is an ellipse and find its Centre.

Section-B

II. Answer the following (4x12=48 Marks)

13. (a) Find the equation of the sphere through the points (0,-2,-4),(2,-1,-1) and whose Centre lies on the line $2x-3y=0=5y+2z$.

(OR)

(b) Show that the spheres
$x^2+y^2+z^2=25, x^2+y^2+z^2-24x-40y-18z=-225$
touch externally. Find the point of contact.

14. (a) Show that the equation $2y^2-8yz-4zx-8xy+6x-4y-2z+5=0$ represents a cone with vertex (-7/6,1/3,5/6).

(OR)

(b) Show that the plane $ax+by+cz=0$ cuts the cone $yz+zx+xy=0$ in

Perpendicular lines if $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

15. (a) Find the equation of the enveloping cylinder of the sphere $x^2+y^2+z^2-2x+4y-1=0$ having its generators parallel to the line $x=y=z$.

(OR)

(b) Find the equation to the right circular cylinder whose axis is $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z-3}{2}$ and radius 2.

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

(OR)

(b) A point P moves so that the section of enveloping cone of the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ with P as vertex by XY plane is a circle. Show that P lies on One of the conics $\frac{y^2}{b^2-a^2}+\frac{z^2}{c^2}=1,\ x=0$ (or) $\frac{x^2}{a^2-b^2}+\frac{z^2}{c^2}=1, y=0$

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Code:6308E3/BL/19

Faculty of Science

B.Sc(Mathematics) III-Year, CBCS –VI Semester Backlog Examinations –Jan, 2023

PAPER: Analytical Solid Geometry

Time: 3 Hours Max Marks: 80

Section-A

I. Answer any *eight* of the following questions (8x4=32 Marks)

1. Find the centre and radius of the sphere $x^2+y^2+z^2+2x-4y-6z+5=0$.
2. Find the pole of the plane $x-y+5z-3=0$ with respect to the sphere $x^2+y^2+z^2=9$.
3. Find the equation of the sphere through the circle $x^2+y^2+z^2=0,\ 2x+3y+4z=5$ and the point $(1,2,3)$.
4. Find the equation of the cone whose vertex is $(1,1,0)$ and guiding curve is $x^2+z^2=4,\ y=0$.
5. Find the equation of the cone which passes through the three coordinate axis and the lines $\frac{x}{1}=\frac{y}{-2}=\frac{z}{3},\ \frac{x}{3}=\frac{y}{-1}=\frac{z}{1}$.
6. Find the intersecting points of the cone $4x^2-y^2+z^2=0$ and the line $\frac{x-1}{1}=\frac{y-2}{3}=\frac{z-1}{2}$.
7. Find the equation to the cylinder whose generators are parallel to $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and guiding curve is $x^2+y^2=1,\ z=1$.
8. Find the right circular cylinder of radius 1 and axis is the line $\frac{x-1}{2}=\frac{y}{3}=\frac{z-3}{1}$
9. Find the equation of the cylinder with generators parallel to Z-axis and passing through the curve $ax^2+by^2=2z,\ lx+my+nz=p$.
10. Find the intersecting points of the line $\frac{x+5}{-3}=\frac{y-4}{1}=\frac{z-11}{7}$ with the conicoid $12x^2-17y^2+7z^2=7$.
11. Find the equations to the tangent planes to $7x^2-3y^2-z^2+21=0$ which passes through the line $7x-6y+9=0,\ z=3$.
12. Show that the plane $3x+12y-6z-17=0$ touches the conicoid $3x^2-6y^2+9z^2+17=0$ and find their point of contact.

Section-B

II. Answer the following questions (4x12=48 Marks)

13. (a) Find the equation of the sphere through the four points $(4,-1,2),(0,-2,3),(1,-5,-1)\ and\ (2,0,1)$.

(OR)

(b) Find the limiting points of the co-axal system defined by the spheres $x^2+y^2+z^2+3x-3y+6=0,\ x^2+y^2+z^2-6y-6z+6=0$.

14. (a) Show that the general equation of the cone which touches the three co-ordinate planes is $\sqrt{fx}+\sqrt{gy}+\sqrt{hz}=0$.

(OR)

(b) Prove that the equation $x^2-2y^2+3z^2-4xy+5yz-6zx+8x-19y-2z-20=0$ represents a cone and find its vertex.

15. (a) Find the equation of a right circular cone whose vertex is $(1,1,1)$, axis is $\frac{x-1}{-1}=\frac{y-1}{2}=\frac{z-1}{3}$ and semi vertical angle is 30^0.

(OR)

(b) Find the equation to the right circular cylinder of radius 2, whose axis is the line $\frac{x-1}{2}=\frac{y-2}{-3}=\frac{z-3}{6}$.

16. (a) Find the equations to the tangent planes to the surface $4x^2-5y^2+7z^2+13=0$ parallel to the plane $4x+20y-21z=0$ find their point of contact also.

(OR)

(b) Find the locus of the perpendiculars from the origin to the tangent planes to the surface $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ which cut off from its axes intercepts. The sum of whose reciprocals is equal to the constant 1/k.

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Code:6308E3/19/REG

Faculty of Science

B.Sc(Mathematics)III-Year, CBCS–VI Semester Regular Examinations –June, 2023

PAPER: Analytical Solid Geometry

Time: 3 Hours Max Marks: 80

Section-A

I. Answer any *eight* of the following questions (8x4=32 Marks)

1. Find the centre and radius of the sphere $2x^2+2y^2+2z^2-2x+4y+2z+3=0$.
2. Find the tangent plane to the sphere $x^2+y^2+z^2-6x+2z+1=0$ at the point $(2,-2,1)$.
3. Find the equation of the sphere whose end points of the diameter are $(2,3,-1)\ and\ (1,-2,-1)$.
4. Find the equation of the cone whose vertex is the origin and guiding curve is $x^2+y^2=4,\ z=2$.
5. Find the intersecting points of the cone $11x^2-5y^2+z^2=0$ and the line $\frac{x+1}{-1}=\frac{y-12}{5}=\frac{z-7}{2}$.
6. Find the equation of the cone which passes through the three coordinate axes and the lines $\frac{x}{1}=\frac{y}{-3}=\frac{z}{3},\ \frac{x}{1}=\frac{y}{-1}=\frac{z}{-1}$
7. Find the equation of the cylinder whose generators are parallel to $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and the guiding curve is $x^2+y^2=16,\ z=0$.
8. Find the right circular cylinder of radius 2 and axis is the line $\frac{x-1}{2}=\frac{y}{3}=\frac{z-3}{1}$
9. Find the equation of the cylinder with generators parallel to Z-axis and passing through the curve $ax^2+by^2=2z,\ lx+my+nz=p$.
10. Find the points of intersection of the line $\frac{x+5}{-3}=\frac{y-4}{1}=\frac{z-11}{7}$ with the conicoid $12x^2-17y^2+7z^2=7$.
11. Find the equations to the tangent planes to $7x^2-3y^2-z^2+21=0$ which passes through the line $7x-6y+9=0,\ z=3$.
12. Find the tangent planes to the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ which are parallel to the plane $lx+my+nz=0$.

Section-B

II. Answer the following questions (4x12=48 Marks)

13.(a) Show that the points $(5,0,2),(2,-6,0),(7,-3,8),(4,-8,6)$ are concytlic.

(OR)

(b)Show that the spheres $x^2+y^2+z^2=25,\ x^2+y^2+z^2-24x-40y-18z+225=0$ touch externally and find the point of contact.

14.(a) Prove that the equation $4x^2-y^2+2z^2+2xy-3yz+12x-11y+6z+4=0$ represents a cone whose vertex is $(-1,-2,-3)$.

(OR)

(b) Prove that the cones $x^2-y^2+2z^2-3yz+4zx-5xy=0$ and $17x^2+8y^2+29z^2+28yz-46zx-16xy=0$ are reciprocal.

15.(a) Find the equation of the right circular cone which passes through the point $(1,1,2)$ and has vertex at the origin and axis is the line $\frac{x}{2}=\frac{-y}{4}=\frac{z}{3}$.

(OR)

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

16.(a) Find the equations to the tangent planes to the surface $4x^2-5y^2+7z^2+13=0$ parallel to the plane $4x+20y-21z=0$ find their point of contact also.

(OR)

(b) If the section of the enveloping cone of the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ whose vertex is P by the plane $z=0$ is a rectangular hyperbola. Show that the locus of P is $\frac{x^2+y^2}{a^2+b^2}+\frac{z^2}{c^2}=1.$

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