TELANGANA UNIVERSITY
S.S.R. DEGREE COLLEGE, NIZAMABAD (C.C:5029)
VI SEMESTER INTERNAL ASSESSMENT II EXAMINATIONS
MATHS (ANALYTICAL SOLID GEOMETRY) QUESTION BANK

I. Multiple choice questions.

1. If right circular cone has three mutually perpendicular generators then semi-vertical angle is, [a]
(a) $tan^{-1}\sqrt{2}$ (b) $tan^{-1}2$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{2}$

2. If the vertex is the origin and axis of cone is along z-axis then its direction cosines are [c]
(a) 1,0,0 (b) 0,1,0 (c) 0,0,1 (d) 1,1,0

3. The equations of the circular cones which contain the three co-ordinate axes as generators is [c]
(a) yz+zx+xy = 0 (b) yz-xz-xy = 0 (c) yz$\pm$zx$\pm$xy = 0 (d) None of these

4. The locus of the lines drawn in a given direction or parallel to a given line so as to touch a given surface is called [c]
(a) Cylinder (b) Right circular cylinder (c) Enveloping cylinder (d) None

5. If the generators of the cylinder are parallel to z-axis, then equation of cylinder is [c]
(a) $ax^2+2gzx+cz^2+2gx+2hz+c = 0$ (b) $by^2+2hyz+cz^2+2fy+2gz+c = 0$
(c) $ax^2+2hxy+by^2+2gx+2fy+c = 0$ (d) None

6. The line which generates the surface of the cylinder is called [c]
(a) Axis (b) Guiding line (c) Generator (d) None of these

7. Guiding curve of a right circular cylinder is [b]
(a) Ellipse (b) Circle (c) Pair of straight lines (d) Any closed curve

8. The normal to the plane of the guiding circle through its centre is called _____ of cylinder [a]
(a) Axis (b) Radius (c) Generator (d) None of these

9. Equation of the right circular cylinder whose radius is 4 and axis the line x = 2y = -z is [c]
(a) $5x^2 + 8y^2 – 5z^2 + 8zx – 4xy = 0$ (b) $8x^2 + 5y^2 + 5z^2 + 4zx – 4xy - 144 = 0$
(c) $5x^2 + 8y^2 + 5z^2 + 4yz + 8zx – 4xy -144 = 0$ (d) $5x^2 + 8y^2 - 5z^2 - 4yz - 8zx – 4xy - 144 = 0$

10. If $(\alpha, \beta, \gamma)$is a point on cylinder, then equation of generator is [b]
(a) $\frac{1-\alpha}{x} = \frac{m-\beta}{y} = \frac{n-\gamma}{z}$ (b) $\frac{x-\alpha}{1} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$ (c) $\frac{x+\alpha}{1} = \frac{y+\beta}{m} = \frac{z+\gamma}{n}$ (d) $\frac{1+\alpha}{x} = \frac{m+\beta}{y} = \frac{n+\gamma}{z}$

11. The equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{2z}{c}$ represents [c]
(a) An ellipsoid (b) A hyperboloid (c) An elliptic paraboloid (d) A hyperbolic paraboloid

12. The surface represented by the equation $\frac{x^2}{a^2} - \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$ is [b]
(a) Ellipsoid (b) Hyperboloid of two sheets
(c) Hyperboloid of one sheet (d) Paraboloid

13. The equation of tangent plane at (α, β, γ) to be the conicoid $ax^2+by^2+cz^2=1$ is [a]
(a) $a\alpha x + b\beta y + c\gamma z = 1$ (b) $a\alpha x + b\beta y + c\gamma z$
(c) $ax + by + cz = \sqrt{\alpha^2 + \beta^2 + \gamma^2}$ (d) $ax + \beta y + \gamma z = \sqrt{a^2 + b^2 + c^2}$

14. The condition that the plane lx + my + nz = p may touch the conicoid $ax^2 + by^2 + cz^2 = 1$ is [b]
(a) $\frac{1}{a} + \frac{m}{b} + \frac{n}{c} = p$ (b) $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = p^2$ (c) $\frac{1}{a^2} + \frac{m}{b^2} + \frac{n}{c^2} = p^2$ (d) $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = p$

15. How many normals can be drawn from any point to a conicoid? [b]
(a) 8 (b) 6 (c) 4 (d) 2

16. The equation of the director sphere of the conicoid $ax^2 + by^2 + cz^2 = 1$ [c]
(a) $x^2 + y^2 + z^2 = a + b + c$ (b) $x^2 + y^2 + z^2 = abc$
(c) $x^2 + y^2 + z^2 = a^{-1} + b^{-1} + c^{-1}$ (d) $x^2 + y^2 + z^2 = a^2 + b^2 + c^2$

17. The central conicoid $ax^2 + by^2 + cz^2 = 1$ will represent an ellipsoid if [d]
(a) a, b, c are all negative (b) a, b are positive and c is negative
(c) a, b are negative and c is positive (d) a, b, c are all positive

18. A straight line which intersects a central conicoid in two coincident points is called a [b]
(a) Polar line (b) Tangent line (c) Chord of contact (d) Diameter

19. Condition that the plane lx+my+nz = p should touch the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ [c]
(a) $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = p^2$ (b) $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = 0$
(c) $a^2 l^2 + b^2 m^2 - c^2 n^2$ (d) None

20. The locus of the centres of sections of a central conicoid which pass through a given line is a [a]
(a) Conic (b) Circle (c) Pair of straight lines (d) Paraboloid

II. Fill in the blanks
1. The section of a right circular cone by a plane perpendicular to its axis is a circle
2. The equation of the right circular cone with vertex at (0, 0, 0) and z-axis as its axis is $x^2 + y^2 = z^2 \tan^2\theta$ where θ is the semi-vertical angle of the cone.
3. The equation of cone when the vertex is origin is, $(lx+my+nz)^2 = (l^2+m^2+n^2)(x^2+y^2+z^2)\cos^2\theta$
4. The semi-vertical angle of a right circular cone having sets of three mutually perpendicular tangent planes is $\tan^{-1}\sqrt{\frac{1}{2}}$
5. Any line on the surface of a cylinder is called its Generator
6. The length of the perpendicular from any point on a right circular cylinder to its axis is equal to its radius
7. The equation of the right circular cylinder of radius 4 whose axis is the y-axis is $x^2 + z^2 = 16$
8. The equation f(x,y)=0 represents a cylinder, whose generators are parallel to the z-axis
9. The equation of enveloping cylinder of the sphere $x^2+y^2+z^2 = a^2$ and whose generators are parallel to the line $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ is $(lx+my+nz)^2 = (l^2+m^2+n^2)(x^2+y^2+z^2-a^2)$
10. The equation of a right circular cone with vertex at the origin, axis along the x-axis and semi-vertical angle θ is $y^2+z^2 = x^2\tan^2\theta$
11. The equation $\frac{x^2}{a^2} - \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$ represents a hyperboloid of two sheets
12. $ax^2 + by^2 + cz^2 = 1$ is the standard equation of the conicoid.
13. The central conicoid $ax^2 + by^2 + cz^2 = 1$ is an ellipsoid if the constant a, b, c are all positive.
14. The centre of the central conicoid $ax^2 + by^2 + cz^2 = 1$ is at the origin
15. The equation of the tangent plane to the central conicoid $ax^2 + by^2 + cz^2 = 1$ at the point (x_1,y_1,z_1) on it is $axx_1 + byy_1 + czz_1 = 1$
16. The equation of the tangent plane at (1, 1, -1) to the conicoid $2x^2 + 3y^2 - z^2 = 4$ is $2x + 3y + z = 4$
17. The plane lx+my+nz=p will touch the conicoid $ax^2 + by^2 + cz^2 = 1$, provided $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = p^2$
18. The plane lx+my+nz=p touches the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ if $a^2 l^2 + b^2 m^2 + c^2 n^2 = p^2$

19. The director sphere of a central conicoid is the locus of the point of intersection of three mutually Perpendicular tangent planes to that conicoid.
20. The equation of the director sphere of the central conicoid $ax^2 + by^2 + cz^2 = 1$ is $x^2 + y^2 + z^2 = \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$

Short Answers.

1. Define right circular cone?
2. What is the semivertical angle of a right circular cone admitting sets of three mutually perpendicular generators?
3. Write the equation of enveloping cylinder?
4. Define right circular cylinder?
5. What is the equation of right circular cylinder?
6. Write the equation of the Ellipsoid?
7. What is the point of intersection of the line $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$ and the central conicoid $ax^2 + by^2 + cz^2 = 1$?
8. What is a tangent plane?
9. What is the condition for the plane $lx + my + nz = p$ to touch the central conicoid $ax^2 + by^2 + cz^2 = 1$?
10. Define Enveloping cylinder?