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

I. Multiple choice questions

1. Centre of sphere $x^2 + y^2 – z^2 – 4x + 6y – 4z + 8 =0$ will be [a]

(a) (2,-3,2) (b) (2,3,2) (c) (-2,-3,-2) (d) (1,2,2)

2. The radius of the sphere $x^2 + y^2 – z^2-2x+4y-6z-11=0$ is [b]

(a) 49 (b) 5 (c) -7 (d) -5

3. The equations $x^2 + y^2 + z^2+2ux+2vy+2wz+d=0$ and $lx+my+nz=p$ taken together represents a [c]

(a) Circle (b) Plane (c) Pair of planes (d) Sphere

4. The two spheres $x^2 + y^2 + z^2+2ux+2vy+2wz+d=0$ and $x^2 + y^2 + z^2 2u'x+2v'y+2w'z+d'=0$ are orthogonal if [c]

(a) $uu'+vv'+ww'=d+d'$ (b) $uu'+vv'+ww'=2(d+d')$

(c) $2(uu'+vv'+ww')=d+d'$ (d) None of these

5. The equation $ax^2 + ay^2 + az^2+2ux+2vy+2wz+d=0$, $a\neq0$, represents a sphere if [d]

(a) $u^2 + v^2 + w^2+ad \leq 0$ (b) $u^2 + v^2 + w^2+ad \geq 0$

(c) $u^2 + v^2 + w^2-ad \leq 0$ (d) $u^2 + v^2 + w^2-ad \geq 0$

6. The equation of the sphere passing through the origin and making intercepts a,b,c on co-ordinate axes Is [d]

(a) $x^2 + y^2 + z^2+ax+by+cz=0$ (b) $x^2 + y^2 + z^2-2ax-2by-2cz=0$

(c) $x^2 + y^2 + z^2=a+b+c$ (d) $x^2 + y^2 + z^2-ax-by-cz=0$

7. The equation of the tangent plane at a point (x_1, y_1, z_1) of the sphere $x^2 + y^2 + z^2+2ux+2vy+2wz+d=0$ is [c]

(a) $xx_1+yy_1+zz_1+ux+vy+wz+d=0$ (b) $xx_1+yy_1+zz_1+ux_1+vy_1+wz_1+d=0$

(c) $xx_1+yy_1+zz_1+u(x+ x_1)+v(y+y_1)+w(z+z_1)+d=0$ (d) None of these

8. The equation of the sphere passing through (0,0,0), (a,0,0),(0,b,0),(0,0,c) is [c]

(a) $x^2 + y^2 + z^2+2ax+2by+2cz=0$ (b) $x^2 + y^2 + z^2-2ax-2by-2cz=0$

(c) $x^2 + y^2 + z^2-ax-by-cz=0$ (d) $x^2 + y^2 + z^2+ax+by+cz=0$

9. The centre of the sphere which passes through (a,0,0),(0,b,0),(0,0,c) and (0,0,0) is [d]

(a) $\left(\frac{a}{2},0,0\right)$ (b) $\left(0,\frac{b}{2},0\right)$ (c) $\left(0,0,\frac{c}{2}\right)$ (d) $\left(\frac{a}{2},\frac{b}{2},\frac{c}{2}\right)$

10. If two spheres of radii r_1 and r_2 cut orthogonally, then the radius of the common circle is [d]

(a) r_1r_2 (b) $\sqrt{r_1^2 + r_2^2}$ (c) $r_1r_2\sqrt{r_1^2 + r_2^2}$ (d) $\frac{r_1r_2}{\sqrt{r_1^2+r_2^2}}$

11. General equation to the cone which passes through the axes is [d]

(a) $ax^2 +by^2 + cz^2 = 1$ (b) $ax^2 +by^2 + cz^2 = 0$ (c) $fyz + gzx +hxy=1$ (d) $fyz+gzx+hxy=0$

12. A cone of second degree can be found to pass through _____ concurrent lines [a]

(a) 5 (b) 6 (c) 4 (d) 3

13. Equation $ax^2+by^2+cz^2+2ux+2vy+2wz+d=0$ represents a cone if [b]

(a) $au^2+bv^2+cw^2+d=0$ (b) $\frac{u^2}{a}+\frac{v^2}{b}+\frac{w^2}{c}=d$ (c) $\frac{u^2}{a}+\frac{v^2}{b}+\frac{w^2}{c}=0$ (d) None of these

14. The equation yz+zx+xy=0 represent [c]

(a) A pair of planes (b) A sphere (c) A cone (d) A cylinder

15. A surface generated by a variable line passing through a fixed point and intersecting a given curve or touching a given surface. Such type of surface is called [a]

(a) Cone (b) Cylinder (c) Sphere (d) Plane

16. The condition for the cone $ax^2+by^2+cz^2+2fyz+2gzx+2hxy=0$ having three mutually perpendicular generators is [a]

(a) a+b+c=0 (b) a+b+c=1 (c) ab+bc+ac=0 (d) $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

17. The locus of the lines through the vertex of a cone normal to the tangent planes is called [c]

(a) Right circular cone (b) Enveloping cone (c) Reciprocal cone (c) None of these

18. The equation of enveloping cone is [c]

(a) $S = T_1$ (b) $S_1 = T^2$ (c) $SS_1 = T^2$ (d) $ST = S_1^2$

19. The equation of the cone whose vertex is the origin and base curve z = k, f(x,y) = 0 is [d]

(a) $f\left(\frac{yz}{k},\frac{xz}{k}\right)=0$ (b) $f\left(\frac{xz}{k},\frac{yk}{z}\right)=0$ (c) $f\left(\frac{xk}{z},\frac{yz}{k}\right)=0$ (d) $f\left(\frac{xk}{z},\frac{yk}{k}\right)=0$

20. The general equation of a cone which touches the three co-ordinate planes is [c]

(a) $\sqrt{fx}+\sqrt{gy}+\sqrt{hz}=0$ (b) $\sqrt{fx}-\sqrt{gy}+\sqrt{hz}=0$

(c) $\sqrt{fx}\pm\sqrt{gy}\pm\sqrt{hz}=0$ (d) $\sqrt{fx}-\sqrt{gy}-\sqrt{hz}=0$

II. Fill in the blanks

1. The equation of a sphere whose centre is the point (x_1,y_1,z_1) and radius r is $(x-x_1)^2+(y-y_1)^2+(z-z_1)^2=r^2$
2. The equation of a sphere whose centre is at origin and radius a is $x^2 + y^2 + z^2 = a^2$
3. The equation of a sphere with the end points of its diameter as the points (x_1,y_1,z_1) and (x_2,y_2,z_2) is $(x-x_1)(x-x_2)+(y-y_1)(y-y_2)+(z-z_1)(z-z_2)=0$
4. The coordinates of the centre of the sphere $x^2 + y^2 + z^2+2ux+2vy+2wz+d=0$ are (-u, -v, -w)
5. The section of a sphere cut by a plane is a Circle
6. The radius of the circle $x^2 + y^2 + z^2=25$, 2x+3y-4z=0 is 5
7. The tangent plane at any point of a sphere is perpendicular to the radius through that point.
8. If the distance between the centers of the two spheres is equal to the difference of their radii, then the two spheres touch internally
9. If the distance between the centers of the two spheres is equal to the sum of their radii, then the two spheres touch externally
10. The radical plane of the two spheres is perpendicular to the line joining their centers.
11. The equation of the cone with vertex at the origin is a homogeneous second degree equation in x,y and z.
12. Any straight line lying on the surface of cone is called its generator
13. The equation $ax^2+by^2+cz^2+2ux+2vy+2wz+d=0$ represents a cone if $\frac{u^2}{a}+\frac{v^2}{b}+\frac{w^2}{a}$
14. The tangent plane at any point of a cone passes through its vertex
15. Two cones with a common vertex have, in general, Four generators in common.
16. Two cones which are such that each is the locus of the normals through the origin to the tangent planes to the other are called reciprocal cones
17. A cone may have three mutually perpendicular tangent planes if its reciprocal cone has three mutually perpendicular generators

18. The angle between the lines, x + y + z = 0, ayz + bzx + cxy = 0 is $\frac{\pi}{3}$, if $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

19. The equation F(x,y,z)=0 represents a cone if and only if, four linear equations $F_x = 0$, $F_y = 0$, $F_z = 0$, $F_t = 0$ are consistent

20. The angle between the lines in which the plane x + y + z = 0 cuts the cone ayz + bzx + cxy = 0 is $\frac{\pi}{2}$ if a+b+c=0.

Short Answers.

1. Write the coordinates of the centre of the sphere $x^2 + y^2 + z^2 + ux + vy + wz = 0$?
2. Write the conditions for the system of spheres to be co-axal?
3. Write the equations of the circle circumscribing the triangle formed by the three points (a,0,0),(0,b,0),(0,0,c)?
4. Write the condition for orthogonality of two spheres?
5. Define Radical centre?
6. What is a cone?
7. Define Enveloping Cone?
8. Write the general equation of the cone with vertex at the point (α, β, γ) ?
9. Write the general equation of the cone passing through three axes?
10. Write the condition for the cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$?