Multiple choice questions. Unit III .

1. The equation of the sphere whose centre $(1, 2, 1)$ and radius $\sqrt{6}$ is
   - A. $x^2 + y^2 + z^2 + 2x + 2y + z = 6$
   - B. $x^2 + y^2 + z^2 = 6$
   - C. $x^2 + y^2 + z^2 - 2x - 4y + 2z = 6$
   - D. $x^2 + y^2 + z^2 - 2x - 4y - 2z = 0$

2. The radius of the sphere $2x^2 + 2y^2 + 2z^2 - 6x + 8y - 6z = 1$ is
   - A. 6
   - B. 3
   - C. 1
   - D. 2

3. The equation of sphere with diameter joining the end points $(1, -2, 3)$ and $(3, -4, -5)$, is
   - A. $x^2 + y^2 + z^2 - x + y + z = 0$
   - B. $x^2 + y^2 + z^2 - 4x + 6y + 2z = 4$
   - C. $x^2 + y^2 + z^2 - 2x + y = 6$
   - D. $x^2 + y^2 + z^2 + 2x - z = 2$

4. The equation of sphere passing through the points $(0, 0, 0)$ $(1, 0, 0)$, $(0, 2, 0)$ and $(0, 0, 3)$ is
   - A. $x^2 + y^2 + z^2 - x - 2y - 3z = 0$
   - B. $x^2 + y^2 + z^2 - x + 2y = 2$
   - C. $x^2 + y^2 + z^2 - x + 3z = 1$
   - D. $x^2 + y^2 + z^2 = 9$

5. The radius of the circle $x^2 + y^2 + z^2 - 8x + 42y + 8z - 45 = 0$, $x - 2y + 2z = 3$ is

   A. 2

   B. $4\sqrt{5}$

   C. 5

   D. $3\sqrt{2}$

6. The equation of tangent plane to the sphere $x^2 + y^2 + z^2 - 2x - 2y - 2z = 6$ at the point $(-1, 0, -1)$ is

   A. $3x - 2y + z = 14$

   B. $2x - 3y + z = 11$

   C. $2x + y + 2z = 0$

   D. $2x + y + 2z + 4 = 0$

7. The condition for orthogonal intersection of two spheres $x^2 + y^2 + z^2 + 2u_1x + 2v_1y + 2w_1z + d_1 = 0$ and $x^2 + y^2 + z^2 + 2u_2x + 2v_2y + 2w_2z + d_2 = 0$ is

   A. $(u_1u_2 + v_1v_2 + w_1w_2) = d_1 + d_2$

   B. $2(u_1v_2 + v_1w_2 + w_1u_2) = d_1 + d_2$

   C. $2(u_1u_2 + v_1v_2 + w_1w_2) = d_1 + d_2$

   D. $(u_1u_2 + v_1v_2 + w_1w_2) = 2(d_1 + d_2)$

8. Condition for the plane $lx + my + nz = p$ to be a tangent plane to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ is

   A. $(u^2 + v^2 + w^2 - d)^2 = (l^2 + m^2 + n^2)(ul + vm + wn + p)^2$

   B. $\frac{(u^2+v^2+w^2-d)}{(l^2+m^2+n^2)} = (ul + vm + wn + p)$

   C. $(u^2 + v^2 + w^2)(l^2 + m^2 + n^2) = (ul + vm + wn + p)$

D. $(u^2+v^2+w^2-d)(l^2+m^2+n^2)=(ul+vm+wn+p)^2$

9. The pole of the plane $lx+my+nz=p$ with respect to the sphere $x^2+y^2+z^2=r^2$ is

   A. $(\frac{lr}{p^2},\frac{mr}{p^2},\frac{nr}{p^2})$

   B. $(\frac{lr^2}{p^2},\frac{mr^2}{p^2},\frac{nr^2}{p^2})$

   C. $(\frac{lr^2}{p},\frac{mr^2}{p},\frac{nr^2}{p})$

   D. $(\frac{lr}{p},\frac{mr}{p},\frac{nr}{p})$

10. If the two spheres $x^2+y^2+z^2=64$ and $x^2+y^2+z^2+12x+4y-6z+48=6$ touch internally, then the point of contact is

    A. $(-\frac{48}{7},-\frac{16}{7},\frac{24}{7})$

    B. $(\frac{8}{7},\frac{18}{7},\frac{4}{7})$

    C. $(\frac{48}{7},\frac{36}{7},\frac{24}{7})$

    D. $(\frac{3}{7},\frac{5}{7},\frac{4}{7})$

11. The equation of sphere which extremities of diameter (x_1,y_1,z_1) and (x_2,y_2,z_2) is

    A. $(x-x_1)(y-y_2)+(y-y_1)(z-z_2)+(z-z_1)(x-x_2)=0$

    B. $(x-x_1)(x-x_2)+(y-y_1)(y-y_2)+(z-z_1)(z-z_2)=0$

    C. $(x-x_1)(y-y_1)(z-z_1)+(x-x_2)(y-y_2)(z-z_2)=0$

    D. $(y-x_1)(z-x_2)+(z-y_1)(x-y_2)+(x-z_1)(y-z_2)=0$

12. The equation of sphere passing through the origin and circle $x^2+y^2+z^2=9$, $2x+3y+4z=3$ is

    A. $x^2+y^2+z^2-2x-3y-z=0$

    B. $x^2+y^2+z^2-6x-9y-12z=144$

C. $x^2 + y^2 + z^2 - 6x - 9y - 12z = 0$

D. None of these

13. The equation of tangent plane to the sphere $x^2 + y^2 + z^2 - 2x - 4y + 2z = 3$ at point $(-1, 4, -2)$ is

A. $x - 2y + 2z = -12$

B. $x - y + 2z = 9$

C. $2x - y + 5z = 2$

D. $2x - 2y + z = -12$

14. The radical plane of two spheres $S_1 \equiv x^2 + y^2 + z^2 + 2u_1x + 2v_1y + 2w_1z + d_1 = 0$, $S_2 \equiv x^2 + y^2 + z^2 + 2u_2x + 2v_2y + 2w_2z + d_2 = 0$ is

A. $S_1 + S_2 = 0$

B. $S_1 - S_2 = 0$

C. $S_1.S_2 = 0$

D. None of these

15. The vertex of cone $2x^2+2y^2+7z^2-10yz-10zx+2x+2y+26z-17 = 0$ is

A. $(1, 1, 2)$

B. $(2, 2, 1)$

C. $(1, 1, 1)$

D. None of these

16. The equation of cone whose vertex $(0, 0, 5)$ and guiding curve $x^2 + y^2 = 16$, $z = 0$, is

A. $25x^2 + 25y^2 - 16z^2 + 10z = 400$

B. $5x^2 + 5y^2 + 6z^2 + z = 40$

C. $5x^2 + 2y^2 + 6z^2 + 10z = 4$

D. None of these

17. The enveloping cone of the sphere $x^2 + y^2 + z^2 - 2x + 4y = 1$ with vertex $(1, 1, 1)$ is

A. $2x^2 + 5y^2 + z^2 + yz + 2x = 4$

B. $x^2 + 5y^2 - 4z^2 + 10yz = 40$

C. $4x^2 - 5y^2 + 3z^2 - 6yz - 8x + 16y = 4$

D. None of these

18. The equation of right circular cone with vertex at the origin and axis as the z-axis is

A. $2x^2 + 5y^2 + z^2 tan^2\theta = 0$

B. $3x^2 + y^2 + z^2 tan^2\theta = 0$

C. $x^2 + y^2 - z^2 tan^2\theta = 0$

D. $x^2 + y^2 + z^2 = 0$

where θ is semi-vertical angle of the right circular cone.

19. If a right circular cone has three mutually perpendicular generators, then the semi-vertical angle is

A. $\theta = tan^{-1}(\sqrt{5})$

B. $\theta = tan^{-1}(\sqrt{3})$

C. $\theta = tan^{-1}(2)$

D. $\theta = tan^{-1}(\sqrt{2})$

20. The equation of the cylinder whose generators are parallel to the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and passes through the curve $x^2 + y^2 = 16$, $z = 0$, is

A. $x^2 + y^2 + z^2 - 6xz - 2yz = 14$

B. $9x^2 + 9y^2 + 9z^2 - 6xz - 12yz = 144$

C. $x^2 + y^2 + z^2 - xz - 2yz = 144$

D. $x^2 + y^2 + z^2 = 12$

21. The enveloping cylinder of the sphere $x^2 + y^2 + z^2 = a^2$ whose generators are parallel to the line $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ is

A. $(lx + my + nz)^2 = (l^2 + m^2 + n^2)(x^2 + y^2 + z^2 - a^2)$

B. $(x + y + z)^2 = (l^2 + m^2 + n^2)(x^2 + y^2 + z^2 - a^2)$

C. $(lx + my + nz)^2 = (x^2 + y^2 + z^2 - a^2)$

D. $(lx + my + nz)^2 = (l^2 + m^2 + n^2)$

22. The equation of the right circular cylinder whose axis is the z-axis and the radius r is

A. $x^2 + z^2 = r^2$

B. $y^2 + z^2 = r^2$

C. $x^2 + y^2 + z^2 = 0$

D. $x^2 + y^2 = r^2$

23. The equation of reciprocal cone to the cone $\frac{x^2}{a} + \frac{y^2}{b} + \frac{z^2}{c} = 0$ is

A. $bx^2 + cy^2 + az^2 = 0$

B. $ax^2 + by^2 + cz^2 = 0$

C. $x^2 + y^2 + z^2 = a + b + c$

D. None of these

24. The perpendiculars drawn from the origin to the tangent planes of the cone $ax^2 + by^2 + cz^2 = 0$, lie on the cone

A. $\frac{x^2}{a} + \frac{y^2}{b} + \frac{z^2}{c} = 0$

B. $x^2 + y^2 + z^2 = 0$

C. $\frac{x^2}{b} + \frac{y^2}{c} + \frac{z^2}{a} = 0$

D. None of these

25. The equation of the cone with vertex origin and passes through the curve $ax^2 + by^2 + cz^2 = 1$, $\alpha x^2 + \beta y^2 = 2z$ is

A. $4z^2(ax^2 + by^2 + cz^2) = (\alpha x^2 + \beta y^2)$

B. $z(ax^2 + by^2 + cz^2) = 4(\alpha x^2 + \beta y^2)$

C. $(ax^2 + by^2 + cz^2) = 4z(\alpha x^2 + \beta y^2)$

D. $(ax^2 + by^2 + cz^2) = (\alpha x^2 + \beta y^2)$

26. The second degree general equation of the cone passing through the co-ordinate axes is

A. $x^2 + y^2 + z^2 + fyz + gzx + hxy = 0$

B. $fyz + gzx + hxy = 0$

C. $x^2 + y^2 + z^2 + 2fyz + 2gzx + 2hxy + d = 0$

D. $x^2 + y^2 + z^2 = 0$

27. If $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ is a generator of the cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$, then

A. $x^2 + y^2 + z^2 + 2yz + 2zx + 2xy = 0$

B. $flm + gmn + hnl = 0$

C. $al^2 + bm^2 + cn^2 + 2fmn + 2gnl + 2hlm = 0$

D. $am^2 + bn^2 + cl^2 + 2flm + 2gmn + 2hnl = 0$

28. The equation of cone with vertex at the origin is

A. $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$,

B. $x^2 + y^2 + z^2 + 2yz + 2zx + 2xy = a^2$

C. $x^2 + y^2 + z^2 = a + b + c$,

D. $None of these$

29. The equation of right circular cone with vertex at the origin is

A. $(l^2 + m^2 + n^2)(x^2 + y^2 + z^2) = sin^2\theta(lx + my + nz)^2$

B. $(l^2 + m^2 + n^2)(x^2 + y^2 + z^2)cos^2\theta = (lx + my + nz)^2$

C. $(l^2 + m^2 + n^2)(x^2 + y^2 + z^2)cos\theta = (lx + my + nz)^2$

D. $(l^2 + m^2 + n^2)(lx^2 + my^2 + nz^2) = (lx + my + nz)^2$

30. Condition for three mutually perpendicular generators of the cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$ is

A. $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$

B. $ab + bc + ca = 0$

C. $a + b + c = 0$

D. $a^2 + b^2 + c^2$

31. The semi-vertical angle of a right circular cone which has three mutually perpendicular tangent planes is

A. $cot^{-1}(\frac{1}{\sqrt{2}})$

B. $cos^{-1}(\sqrt{2})$

C. $cot^{-1}(\sqrt{2})$

D. $tan^{-1}(\sqrt{2})$

32. The equation of a cylinder with generator parallel to z-axis is

A. $x^2 + y^2 + z^2 + 2xy + 2yz + 2zx = 0$

B. $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

C. $ax^2 + by^2 + cz^2 + 2fy + 2hz = 0$

D. $by^2 + cz^2 + 2gz + 2fy = 0$

33. The equation of cone with vertex origin and having relation $2l^2 + 3m^2 - 5n^2 = 0$ among direction cosines of its generator, is

A. $x^2 + 2y^2 - 3z^2 = 0$

B. $2x^2 + 3y^2 + 5z^2 = 0$

C. $x^2 + 3y^2 + z^2 = 0$

D. $2x^2 + 3y^2 - 5z^2 = 0$

34. The equation $\sqrt{fx} \pm \sqrt{gy} \pm \sqrt{hz} = 0$ represents

A. Cone

B. Cylinder

C. Right circular cylinder

D. Sphere

35. The co-ordinates of the points in which the line $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-2}{1}$ cuts the cone $81x^2 - 17y^2 - 19z^2 = 0$, are

A. $(2, 0, 3), (3, 1, 4)$

B. $(2, 5, 3), (3, 2, 4)$

C. $(2, 3, 3), (3, 5, 4)$

D. $(2, 1, 0), (3, 1, 2)$

36. The condition for three mutually perpendicular tangent planes to the cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$ is

A. $a + b + c = 0$

B. $ab + bc + ac = 0$

C. $a^2 + b^2 + c^2 = 0$

D. $ab + bc + ac = f^2 + g^2 + h^2$

37. Condition for the plane $lx + my + nz = 0$ to be tangent plane of the cone $ax^2 + by^2 + cz^2 = 0$ is

A. $ab + bc + ca = l + m + n$

B. $bc + ca + ab = l^2 + m^2 + n^2$

C. $bcl^2 + cam^2 + abn^2 = 0$

D. $bcl + cam + abn = 0$

38. The equation of pair of tangent plane to the cone $ax^2+by^2+cz^2 = 0$, and passing through the line $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ is

A. $(ax^2 + by^2 + cz^2) = (alx + bmy + cnz)^2$

B. $(ax^2 + by^2 + cz^2)(al^2 + bm^2 + cn^2) = (alx + bmy + cnz)^2$

C. $(x^2 + y^2 + z^2)(al^2 + bm^2 + cn^2) = (ax + by + cz)^2$

D. $(al^2 + bm^2 + cn^2) = (alx + bmy + cnz)^2$

39. The equation of the lines in which the plane $x + 3y - 2z = 0$ cuts the cone $x^2 + 9y^2 - 4z^2 = 0$ are

A. $\frac{x}{-2} = \frac{y}{2} = \frac{z}{5}$ and $\frac{x}{2} = \frac{y}{7} = \frac{z}{1}$

B. $\frac{x}{3} = \frac{y}{2} = \frac{z}{0}$ and $\frac{x}{2} = \frac{y}{3} = \frac{z}{1}$

C. $\frac{x}{0} = \frac{y}{2} = \frac{z}{3}$ and $\frac{x}{2} = \frac{y}{0} = \frac{z}{1}$

D. None of these

40. If the y-axis is a generators of the cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$, then the value of b is

A. -1

B. 1

C. 0

D. None of these

41. Condition for the cone $ax^2 + 4y^2 + 5z^2 + 2yz + 4zx + 6xy = 0$ to have three mutually perpendicular generators is

    A. $a = -9$

    B. $a = 9$

    C. $a = 5$

    D. $a = 4$

42. The plane $ax + by + cz = 0$ cuts the cone $yz + zx + xy = 0$ in perpendicular lines if

    A. $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$

    B. $a + b + c = 0$

    C. $ab + bc + ca = 0$

    D. None of these