B.Sc.DEGREE EXAMINATION,APRIL 2020
II Year III Semester
Three Dimensional Geometry

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Find the angle between the planes $2x - y + z = 6$, $x + y + 2z = 3$.
2. Find the length of perpendicular distance from the point $(1,\ 1, -1)$ to the plane $4x - 4y + 2z + 5 = 0$.
3. Find the equation of the straight line joining the points $(2,\ 5,\ 8)$ and $(-1,\ 6, 3)$.
4. Write the condition for the lines $ax + by + cz + d = 0 = a_1x + b_1y + c_1z + d_1$, $a_2x + b_2y + c_2z + d_2 = 0 = a_3x + b_3y + c_3z + d_3$ to be coplanar.
5. Find the equation of the sphere with centre (-1, 2, -3) and radius 3.
6. Write the equation of tangent plane to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ at the point (x_1, y_1, z_1).
7. Define right circular cone.
8. Find the equation of the cone whose vertex is at the origin , axis along the z-axis and semi-vertical angle α.
9. Define Right Circular Cylinder.
10. Define axis of the cylinder.
11. Prove that the plane $x + 2y + 2z = 0$, $2x + y - 2z = 0$ are at right angles.
12. Find the equation of the sphere which has its centre at the point $(6, -1,\ 2)$ and touches the plane $2x - y + 2z - 2 = 0$.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Find the equation of the plane passing through the points *(2,5, - 3)*, *(-2, -3, 5)* and *(5, 3, -3)*
14. Prove that the lines $\frac{x+1}{-3} = \frac{y+10}{8} = \frac{z-1}{2}$ and $\frac{x+3}{-4} = \frac{y+1}{7} = \frac{z-4}{1}$ are coplanar.
15. Find the centre and radius of the circle $x^2 + y^2 + z^2 - 8x + 4y + 8z - 45 = 0,\ \ x - 2y + 2z = 3.$

16. Show that the equation of the right circular cone whose vertex is O,axis OZ and semi-vertical angle α is $x^2 + y^2 = z^2 \tan \alpha$

17. Find the equation of the cylinder whose generators are parallel to the $z-$axis and the guiding curve is $ax^2 + by^2 = cz, lx + my + nz = p$

18. Find the equation of the sphere having the circle

    $x^2 + y^2 + z^2 - 2x + 4y - 6z + 7 = 0,\ 2x - y + 2z = 5$ for a great circle.

19. Find the symmetrical form of the equations of the line of intersection of the planes $x+5y-z-7 = 0,\ \ 2x-5y+3z+1 = 0.$

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. (i) Find the equation of the plane through the line of intersection of the planes $x + y + z - 1 = 0$,$2x + 3y + 4z - 7 = 0$ and perpendicular to the plane $x - 5y + 3z - 5 = 0.$ (5marks)

    (ii) Find the equation of the plane which passes through the point *(-1,3,2)* and perpendicular to the two planes $x+2y+2z = 5,\ 3x+3y+2z = 8.$ (5marks)

21. Find the shortest distance and the equation to the line of shortest distance between these two lines $\frac{x+7}{3} = \frac{y+4}{4} = \frac{z+3}{-2}$ and $\frac{x-21}{6} = \frac{y+5}{-4} = \frac{z-2}{-1}.$

22. Find the equation of the sphere passing through the points $(2, 3, 1)$, $(5, -1,\ 2)$, $(4,\ 3, -1)$ and $(2,\ 5,\ 3)$.

23. Find the condition for the equation

    $F(x, y, z) = ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy + 2ux + 2vy + 2wz + d = 0$ to represent a cone.

24. Find the equation of the right circular cylinder of radius 3 with axis $\frac{x+2}{3} = \frac{y-4}{6} = \frac{z-1}{2}$