B.Sc. DEGREE EXAMINATION,NOVEMBER 2018
II Year III Semester
Core Major - Paper VI
THREE DIMENSIONAL GEOMETRY

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

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

Answer any **TEN** questions

1. Write the normal form of an equation of a plane.
2. Find the angle between the planes $\mathbf{x+2y+2z=0}$ and $\mathbf{2x+y-2z=0}$.
3. Write down the equation of a straight line passing through the points $(\mathbf{2,-3,8})$ and $(\mathbf{1,4,-6})$.
4. Find the angle between the lines $\frac{\mathbf{x-6}}{\mathbf{2}}=\frac{\mathbf{y-2}}{\mathbf{1}}=\frac{\mathbf{z+4}}{\mathbf{-1}}$ and $\frac{\mathbf{x-1}}{\mathbf{1}}=\frac{\mathbf{y-1}}{\mathbf{-1}}=\frac{\mathbf{z}}{\mathbf{-2}}$.
5. Write the equation of the sphere with centre $(\mathbf{9,-3,4})$ and radius 6 units.
6. Write down the equation of a sphere passing through a circle $\mathbf{x^2+y^2+z^2+2ux+2vy+2wz+d=0}$, $\mathbf{lx+my+nz=p}$.
7. Define a cone.
8. Write down the condition for $\mathbf{ax^2+by^2+cz^2+2fyz+2gzx+2hxy}$ split into two linear factors.
9. Define a cylinder.
10. Define a right circular cylinder.
11. Write down an equation of a plane which is parallel to $\mathbf{3x-y+7z=0}$.
12. Find the coordinates of the centre and radius of the sphere $\mathbf{2x^2+2y^2+2z^2-2x+4y+2z-15=0}$.

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

Answer any **FIVE** questions

13. Find the equation of the plane passing through three points $(\mathbf{2,5,-3})$, $(\mathbf{-2,-3,5})$ and $(\mathbf{5,3,-3})$.
14. Transform the equation of a line $\mathbf{3x-2y+z-1=0=5x+4y-6z-2}$ into the symmetrical form.
15. Show that the spheres $\mathbf{x^2+y^2+z^2+6x+10y+22z=245}$ and $\mathbf{x^2+y^2+z^2-12x-14y-18z+141=0}$ touch each other.

16. Show that the equation of a right circular cone whose vertex is O, axis OZ and semi vertical angle α is $\mathbf{x^2+y^2=z^2\ tan^2}\alpha$.
17. Find the equation of the cylinder whose generators are parallel to the z-axis and the guiding curve is $\mathbf{ax^2+by^2=c}z$, $\mathbf{l}x+\mathbf{m}y+\mathbf{n}z=\mathbf{p}$.
18. Find the equation the plane that bisects the line joining the points $(-\mathbf{1},\mathbf{2},\mathbf{3})$ and $(\mathbf{3},-\mathbf{5},\mathbf{6})$ at right angles.
19. Find the perpendicular distance from the point $(-\mathbf{1},\mathbf{3},\mathbf{9})$ to the line $\frac{\mathbf{x-1}3}{\mathbf{5}}=\frac{\mathbf{y+8}}{\mathbf{-8}}=\frac{\mathbf{z-3}1}{\mathbf{1}}$.

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

Answer any **THREE** questions

20. Find the planes bisecting the angles between the planes $\mathbf{x+2y+2z-9=0}$, $\mathbf{4x-3y+}12\mathbf{z+}13\mathbf{=0}$.
21. Find the shortest distance between the lines $\frac{\mathbf{x-3}}{\mathbf{-1}}=\frac{\mathbf{y-4}}{\mathbf{2}}=\frac{\mathbf{z+2}}{\mathbf{1}}$, $\frac{\mathbf{x-1}}{\mathbf{1}}=\frac{\mathbf{y+7}}{\mathbf{3}}=\frac{\mathbf{z+2}}{\mathbf{2}}$ and find the equation of the shortest distance between them.
22. Find the equation of the sphere passing through the points $(\mathbf{0},\mathbf{0},\mathbf{0})$, $(\mathbf{a},\mathbf{0},\mathbf{0})$, $(\mathbf{0},\mathbf{b},\mathbf{0})$, and $(\mathbf{0},\mathbf{0},\mathbf{c})$.
23. Obtain the equation of a right circular cone
24. Find the equation of a right circular cylinder of radius 3 units with axis as $\frac{\mathbf{x-1}}{\mathbf{2}}=\frac{\mathbf{y-3}}{\mathbf{2}}=\frac{\mathbf{z-5}}{\mathbf{-1}}$.

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