Questions Bank

Paper Name: Analytical Geometry and Applied Algebra

Course Name: B.A(Prog) 3rd Semester

1.Describe the graph of the equation $x^2 - y^2 - 4x + 8y - 21 = 0$.

2. Sketch the ellipse, and label the foci, vertices, and ends of the minor axis:

i) $(x+3)^2 + 4(y-5)^2 = 16$

ii) $9x^2 + 4y^2 - 18x + 24y + 9 = 0$.

3. Find an equation for a hyperbola that satisfies the given conditions:

Vertices (0,6) and (6,6); foci 10 units apart.

4. Identify and sketch the curve $xy = 1$.

5. Rotate the coordinate axes to remove the xy-term. Then identify the type of conic and sketch its graph

i)$x^2 + 4xy - 2y^2 - 6 = 0$

ii) $x^2 - 10\sqrt{3}xy + 11y^2 + 64 = 0$

6. Find the center and radius of the sphere $x^2 + y^2 + z^2 - 2x - 4y + 8z + 17 = 0$.

7. Sketch the graph of $x^2 + z^2 = 1$ in 3-space.

8. Describe the surface whose equation is given:

i) $x^2 + y^2 + z^2 + 10x + 4y + 2z - 19 = 0$

ii) $x^2 + y^2 + z^2 - y = 0$

9. Sketch the surface in 3-space:

i) $y = \sin x$

ii) $y = e^x$

iii) $z = 1 - y^2$

d) $2x + z = 3$

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10. Find parametric equations for the line through $P_1$and P_2 and also for the line segment joining those points:

a) $P_1(3,-2), P_2(5,1)$

b) $P_1(5,-2,1), P_2(2,4,2)$

11. The line that is tangent to the parabola $y = x^2$ at the point $(-2,4)$.

12. Find an equation of the plane through the points $P_1(1,2,-1), P_2(2,3,1)$, and $P_3(3,-1,2)$.

13. Determine whether the line $x = 3 + 8t,\ y = 4 + 5t,\ z = -3 - t$ is parallel to the plane $x - 3y + 5z = 12$.

14. Determine whether the line and plane are parallel, per- pendicular, or neither

i) $x = 4 + 2t, y = -t, z = -1 - 4t;\ 3x + 2y + z - 7 = 0$

ii) $x = t, y = 2t, z = 3t;\ x - y + 2z = 5$

iii) $x = -1 + 2t, y = 4 + t, z = 1 - t;\ 4x + 2y - 2z = 7$

15. Find the distance between the given parallel planes :

$$-2x + y + z = 0$$

$$6x - 3y - 3z - 5 = 0\,.$$

16.Find a vector v having opposite direction as the vector from the point $P(1,0,-6)$ to $Q\ (-3,1,1)$ with $\|v\| = 5$.

17.Using vector ,find the area of triangle with vertices $A(2,2,0), B(-1,0,2)$ and $C(0,4,3)$.

18.Let u= $i - 3j + 2k$,v= $i + j$ and w= $2i + 2j - 4k$.Find the volume of the parallelepiped with adjacent edges u, v and w.

19.Prove that u.v $= \frac{1}{4}\left(\|u + v\|^2 - \|u - v\|^2\right)$.

20.Given three pitchers: $8, 5$ and 3 liters capacity . Only 8 liter pitcher is full. Make at least one of them contain exactly 4 liter of water with the minimum number of water transfers.

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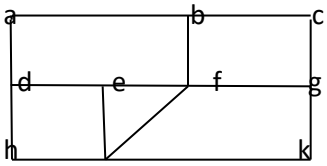
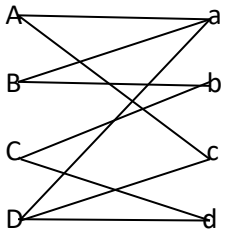
21.Define Latin square . Construct a Latin square of order 5 on $\{e, e^2, e^3, e^4, e^5\}$.

22.Find a maximum independent set of vertices for the following graph . What is the minimum number of independent set needed to cover all the vertices ?



23.Find a matching or explain why none exists for the following graph:



24. Find the direction cosines of v . Then use the direction cosines to approximate the direction angles to the nearest degree

i) v = $i + j - k$

ii) v = $2i - 2j + k$

25.Find the distance between the skew lines:

$L_1 : x = 1 + 7t \quad y = 3 + t \quad z = 5 - 3t, \ -\infty < t < \infty$

$L_2 : x = 4 - t \quad y = 6 \quad z = 7 + 2t, \ -\infty < t < \infty$