S.NO. 447 BATCH: 87 - 2017 Reg. No.



**END OF SEMESTER EXAMINATIONS, APRIL / MAY-2018**

**MATHEMATICS PAPER-IV**

**SUBJECT CODE: 14UBMA08** 4

**MAJOR: B.Sc (Chemistry)** **SEMESTER : II**

**TIME : 3 HOURS** **MAX. MARKS: 75**

## SECTION – A (5 X2 = 10)

**Answer All the Questions:**

1. Define coaxial system.

**(OR)**

2. Write the condition for two circles to cut one another orthogonally.
3. Define Conjugate diameter of the ellipse.

**(OR)**

4. Write any two properties of conjugate diameter of an Hyperbola.
5. What is the polar equation of a conic?

**(OR)**

6. Write the co-ordinates of the point on the line joining the points $(x_1, y_1, z_1)$ and $(x_2, y_2, z_2)$.
7. Write the equation of the line passing through the points $(x_1, y_1, z_1)$ and $(x_2, y_2, z_2)$

**(OR)**

8. What are the conditions required for the lines to be coplanar?
9. What is the equation of a sphere with the extremities of a diameter at the points $(x_1, y_1, z_1)$ and $(x_2, y_2, z_2)$?

**(OR)**

10. Define Centre of sphere.

## SECTION – B (5 X 4 = 20)

**Answer All the Questions:**

11. Find the limiting points of the system of circles coaxial with $x^2 + y^2 - 6x - 6y + 4 = 0; x^2 + y^2 - 2x - 4y + 3 = 0$

**(OR)**

12. Show that the two circles $x^2 + y^2 - 6x - 9y + 13 = 0$ and $x^2 + y^2 - 2x - 16y = 0$ touch each other.
13. If $\alpha, \beta, \gamma, \delta$ be the eccentric angles of four points on the ellipse such that the normal at them are concurrent, then show that $\alpha + \beta + \gamma + \delta$ is an odd multiple of $\pi$.

**(OR)**

14. Show that the common chords of an ellipse and a circle taken in pairs are equally inclined to the axes of the ellipse.
15. Show that in a conic the semi-latus rectum is the harmonic mean between the segments of a focal chord.

**(OR)**

16. Find the co-ordinates of the point A in which the line joining the points P(6,-2,1) and Q(3,-4,2) meet the XOY plane. In which ratio does A divide PQ?
17. Find the equation of the plane passing through the point (-2,3,1) and intersecting line of the planes $x + 4y - 2x + 9 = 0$ and $2x - 3y + z = 5$.

**(OR)**

18. Find the distance between the two parallel planes $4x + 3y - 12z + 6 = 0$ and $4x + 3y - 12z - 9 = 0$.

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19. Find the equation of the sphere with centre (-1,2,3) and radius 3.

**(OR)**

20. Find the equation of the sphere which touches the sphere $x^2+y^2+z^2-x+3y+2z-3=0$ at (1,1,-1) and passing through (2,0,1).

## SECTION – C (5 X 9 = 45)

**Answer All the Questions:**

21. Find the equation to the circle whose diameter is the common chord of the two circles $(x-a)^2+y^2=a^2$ and $x^2+(y-b)^2=b^2$. Find also the length of the common chord.

**(OR)**

22. Find the equation to the circle which cuts orthogonally the three circles $x^2+y^2+2x+4y+1=0$; $x^2+y^2-4x+3=0$; $x^2+y^2+6y+5=0$.

23. If the normals at the points whose eccentric angles are $\alpha,\beta,\gamma$ are concurrent then show that $\sin(\beta+\gamma)+\sin(\gamma+\alpha)+\sin(\alpha+\beta)=0$.

**(OR)**

24. Show that a circle will cut an ellipse in four points, Real or imaginary, and that the sum of eccentric angles of the four points is an even multiple of $\pi$.

25. If the normal at L, one of the extremities of the latus rectum of the conic $\frac{l}{r}=1+e.\cos\theta$ meets the curve again in Q, show that $SQ=l.\frac{1+3e^2+e^4}{1+e^2-e^4}$.

**(OR)**

26. If $(l_1,m_1,n_1),(l_2,m_2,n_2),(l_3,m_3,n_3)$ are the direction cosines of three mutually perpendicular lines, show that the line whose direction cosines are proportional to $l_1+l_2+l_3, m_1+m_2+m_3, n_1+n_2+n_3$ makes equal angles with them.

27. Find the equation to the line passing through (1,1,1) which cuts each of the two lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-2}{4}$; $\frac{x}{6}=\frac{y}{3}=\frac{z}{2}$.

**(OR)**

28. Find the shortest distance between the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$; $\frac{x+3}{-3}=\frac{y+7}{2}=\frac{z-6}{4}$

Determine also its equations.

29. Find the equation of the sphere which has it centre in the plane $5x+y-4z+3=0$ and passing through the circle.

**(OR)**

30. Show that the intersection of the two spheres $x^2+y^2+z^2-2x-4y+6z-2=0$; $x^2+y^2+z^2-4x-6y+4z+4=0$ is a circle lying in the plane $x+y+z=3$. Find its centre and radius.

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