S.No.: 365 BATCH: 87 – 2017 Reg. No.:

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END OF SEMESTER EXAMINATIONS, NOVEMBER – 2018
MATHEMATICS PAPER – IV
SUBJECT CODE : 14UBMA08

MAJOR : B.Sc.(Chemistry) SEMESTER : II
TIME : 3 HOURS MAX. MARKS: 75

## SECTION – A (5 X 2 = 10)

**Answer ALL the Questions:**

1. Define radical centre of a circle.

[OR]

2. Define the limiting points of the coaxial system.
3. Prove that the sum of the squares of two conjugate semi – diameters of an ellipse is constant.

[OR]

4. Write the equation of the normal at the point $(a\cos\theta, b\sin\theta)$ of an ellipse.
5. Write any two properties of the general conic.

[OR]

6. Write down the Direction cosines of X axis and Y axis.
7. What is the general from of the equation of a plane?

[OR]

8. Write the Intercept form of the equation of a plane.
9. Define Sphere.

[OR]

10. Write the characteristics equation of a sphere.

## SECTION – B (5 X 4 = 20)

**Answer ALL the Questions:**

11. Find the radical centre of the three circles $x^2+y^2-x+3y-3=0$, $x^2+y^2-2x+2y+2=0$ and $x^2+y^2+2x+3y-9=0$.

[OR]

12. Find the equation of the circle passing through the intersection of two circles $x^2+y^2-6=0$, $x^2+y^2+4y-1=0$ and through the point $(-1,1)$.
13. Show that the tangents at the ends of a pair of conjugate diameters of an ellipse form a parallelogram of constant area.

[OR]

14. Show that the product of the focal distances of a point on an ellipse is equal to the square of the semi – diameter which is conjugate to the diameter through the point.
15. Derive equation of the normal at the point P of a $Conic \frac{1}{r}=1+e\cos\theta$ whose vertical angle is $\alpha$.

[OR]

16. Find the condition in order that the line $\frac{1}{r}=A\cos\theta+B\sin\theta$ may be tangent to the $Conic \frac{1}{r}=1+e\cos\theta$.
17. Find the equation to the plane, which passes through $(4,2,1),(0,2,3)$ and $(5,4,-1)$.

[OR]

18. Show that the lines $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ and $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-4}{5}$ are coplanar and find the equation of the plane containing them.

19. Find the centre and radius of the sphere $3x^2+3y^2+3z^2-4x+6y-9z+1=0$.

[OR]

20. Find the equation of the sphere with centre at the point $(2,-3,1)$ and touching the plane $2x+2y-z+12=0$.

## SECTION – C (5 X 9 = 45)

**Answer ALL the Questions:**

21. Obtain the equation of a circle which passes through the point $(1,2)$ and bisects the circumference of the circle $x^2+y^2=9$ cuts orthogonally the circle $x^2+y^2-2x+8y-7=0$.

[OR]

22. Find the equation of the circles which passes through the points of intersection of $x^2+y^2-2x+1=0$; $x^2+y^2-5x-6y+4=0$ and which touch the line $2x-y+3=0$.

23. If $P$ *and* $Q$ are extremities of two conjugate diameters of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and $S$ is a focus, then prove that $PQ^2-(SP-SQ)^2=2b^2$.

[OR]

24. Prove that the acute angle between two conjugate diameters of an ellipse is a minimum when they are equal.

25. A circle passing through the focus of a conic whose latus rectum is $2l$ meets the Conic in four points, whose distance from the focus are $r_1, r_2, r_3$ and $r_4$. Prove that $\frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3}+\frac{1}{r_4}=\frac{2}{l}$.

[OR]

26. If the normal at $\alpha,\beta,\gamma$ on $\frac{l}{r}=1+\cos\theta$ meet in the point $(\rho,\phi)$ show that

i. $\tan\frac{\alpha}{2}+\tan\frac{\beta}{2}+\tan\frac{\gamma}{2}=0$

ii. $\alpha+\beta+\gamma=2n\pi+2\theta$

27. Find the equation of the planes bisecting the angle between the planes $2x+2y+z+6=0$ and $3x+12y-4z-10=0$.

[OR]

28. Find the equation of the plane passing through the line of intersection of the planes $x+2y+2z+4=0$ , $3x+3y+2z+8=0$ and perpendicular to the plane $5x-y+4z=6$.

29. Find the equation of the sphere passing through the points $(2,0,1)$, $(1,-5,-1)$, $(0,-2,3)$ and $(4,-1,2)$.

[OR]

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

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