(FOR THE CANDIDATES ADMITTED

DURING THE ACADEMIC YEAR 2022 ONLY)

22UMS204

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS :MAY-2023

COURSE NAME: B.Sc.-MATHEMATICS **MAXIMUM MARKS: 50**

SEMESTER: II **TIME : 3 HOURS**

PART - III

ANALYTICAL GEOMETRY

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS. (K1)

1. A circle will cut a parabola in four pints and the algebraic sum of the ordinates of the four points is ___________
   a) 0 b) 1 c) ∞ d) -1
2. In a conic the semi-latus rectum is the ___________ between the segments of a fical chord
   a) Arithmetic mean b) geometric mean c) harmonic mean d) chord
3. The centre of the sphere $x^2 + y^2 + z^2 - 2x - 2y - 2z = 6$ is _______
   a) (1, 1, 1) b) (2, 2, 2) c) (1, 2, 1) d) (-1, -1, -1)
4. A cone whose equation is of second degree is called a ______ cone.
   a)straight b) quadric c) cubic d) biquadratic
5. A function $f(x, y, z)$ which is such that $f(tx, ty, tz) = t^n f(x, y, z)$ is said to be _____
   a) homogeneous function b) harmonic function
   c) logarithmic function d) arithmetic function

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)

6. What is the pole of the line $lx + my + n = 0$ with respect to the parabola Y^2=4ax.
7. What is conic form?
8. Write the standard equation of the sphere.
9. Define the guiding curve of the cylinder.
10. Define a cylinder.

SECTION – B (5 X 3 = 15 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) Find the equation of the circle passing through the points (0, 1), (2, 3), and (-2, 5).

(OR)

b) Find the centre and eccentricity of the ellipse $9x^2 + 25y^2 - 18x - 100y - 116 = 0$.

12.a) Find the locus of the foot of the perpendiculars drawn from the pole to the tangents to the circle $r = 2a\cos\theta$

(OR)

b) Find the condition in order that the line $\frac{l}{r} = A\cos\theta + B\sin\theta$ may be a tangent to the conic $\frac{l}{r} = 1 + e\cos\theta$.

(CONTD……2)

13. a) Find the equation of the sphere whose centre is $(6, -1, 2)$ and which touches the plane $2x - y + 2z = 2$

(OR)

b) Find the centre and radius of the circle of intersection of the plane $2x - 2y + z = 27$ and the sphere $x^2 + y^2 + z^2 = 225$.

14. a) Show that a homogeneous equation $f(x, y, z) = 0$, of degree n, represents a cone with its vertex at the origin O.

(OR)

b) Find the equation of the cylinder which has the circle $x^2 + y^2 = a^2, z = 0$ as its guiding curve and has its generators parallel to the z axis.

15. a) Show that a second degree equation which represents a cone with its vertex at the origin, is a homogeneous equation.

(OR)

b) Find the equation of the cylinder having the circle $x^2 + y^2 + z^2 = a^2, z = 0$ as the guiding curve and having its generators parallel to the line whose d. r.' sare $\lambda,\ \mu,\ \nu$.

SECTION – C (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4 (Or) K5)

16. a) Find the centre, eccentricity, foci and directrices of the hyperbola

$$9x^2 - 16y^2 + 72x - 32y - 16 = 0$$

(OR)

b) Find the locus of the point of intersection of two tangents to the parabola $y^2 = 4ax$ which make an angle α with one another.

17. a) Trace the conic $\frac{2}{r} = 1 + \cos\theta + \sin\theta$.

(OR)

b) If the normal at α, β, γ on $\frac{l}{r} = 1 + \cos\theta$ meet in the point (ρ, ϕ) show that

(1) $tan\frac{\alpha}{2} + tan\frac{\beta}{2} + tan\frac{\gamma}{2} = 0$

(2) $\alpha + \beta + \gamma = 2n\pi + 2\phi$

18. a) 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 passes through the origin.

(OR)

b) A moving plane intersects the coordinate axes in A, B, C. If the plane always passes through a fixed point (α, β, γ), find the locus of the centre of the sphere through (0, 0, 0), A, B, C.

19. a) Find the equation of the right circular cylinder whose base radius is a r and axis is $\frac{x-\alpha}{\lambda} = \frac{y-\beta}{\mu} = \frac{z-\gamma}{\nu}$

(OR)

b) Show that, if the quadric cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$ has three mutually perpendicular generators, then $a + b + c = 0$.

20. a) Obtain by homogenizing the equation of the cone having C as its guiding curve and the origin as its vertex.

(OR)

b) Obtain the condition so that the general second degree equation $f(x, y, z) = 0$, that is, $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy + 2ux + 2vy + 2wz + e = 0$ may represent a cone.

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ETHICAL PAPER