Reg. No ..... Name **23U235**

B. Sc. DEGREE END SEMESTER EXAMINATION : MARCH 2023

SEMESTER 2 : MATHEMATICS FOR B Sc COMPUTER APPLICATIONS

COURSE : **19U2CRCMT2: ANALYTIC GEOMETRY, THEORY OF EQUATIONS AND NUMERICAL METHODS**

(For Regular - 2022 Admission and Improvement / Supplementary – 2021/2020/2019 Admissions)

Time : Three Hours Max. Marks: 75

PART A

Answer any 10 (2 marks each)

1. Evaluate $\Delta\left(\frac{x^2}{\sin 2x}\right)$ interval of differencing being h.
2. Find the distance between two points in the polar co-ordinate system.
3. Find the equation of a circle in polar co-ordinates.
4. If $lx + my + n = 0$ is a normal to the parabola $y^2 = 4ax$, show that $al^3 + 2alm^2 + m^2n = 0$.
5. Evaluate $\int_{-3}^{3} x^4\,dx$ using Simpson's 1/3 rule
6. Show that the tangents at the extremities of a diameter of an ellipse are parallel to the diameter conjugate to it.
7. Find the condition in order that the line $\frac{l}{r} = A\cos\theta + B\sin\theta$ may be a tangent to the conic $\frac{l}{r} = 1 + e\cos\theta$.
8. If α, β, γ are the roots of the equation $x^3 - px^2 + qx + r = 0$.Find the value of $\sum \frac{1}{\beta^2\gamma^2}$.
9. Form the equations whose roots are three times the root of the equation i)$x^3 - x^2 + x + 1 = 0$ and ii) $2x^3 - 5x^2 + 7 = 0$
10. The chord joining 2 points t_1 and t_2 to the parabola $y^2 = 4ax$ pass through the focus. Prove that $t_1t_2 = -1$.
11. Diminish by 3, the roots of the equation $x^5 - 4x^4 + 3x^2 - 4x + 6 = 0$.
12. Find the condition for the lines lx+ my + n = 0 and l'x + m'y + n = 0 to be conjugate with respect to parabola $y^2 = 4ax$.

(2 x 10 = 20)

PART B

Answer any 5 (5 marks each)

13. Evaluate $(\nabla + \Delta)^2\left(x^2 + x\right),\ h = 1$.
14. Solve the equation $x^4 - 8x^3 + 19x^2 - 12x + 2 = 0$ by removing its second term.
15. Find the asymptotes of the hyperbola $3x^2 - 5xy - 2y^2 + 17x + y + 14 = 0$.
16. Use Lagrange's interpolation formula to find y when x=5 from the following data.

x :	0	1	3	8
y :	1	3	13	123

17. Find the equation of asymptotes of the conic $\frac{l}{r} = 1 + e\cos\theta$.
18. The normals at 3 points P, Q, R of the parabola $y^2 = 4ax$ meet at (h, k). Prove that the centroid of the triangle PQR lies on the axis $\frac{2}{3}(h - 2a)$ from the vertex.

19. Solve $x^5 + 6x^4 + 11x^3 + 11x^2 + 6x + 1 = 0$.

20. If PSP' is a focal chord of a conic, S is the focus and SL is the semi latus rectum, then show that $\frac{2}{SL} = \frac{1}{SP} + \frac{1}{SP'}$

(5 x 5 = 25)

PART C

Answer any 3 (10 marks each)

21. a) If the chord PQ of a hyperbola cuts it's asymptotes at R and S, then prove that PR= QS.
b) Show that the eccentric angles of ends of a pair of conjugate diameters differ by a right angle.

22. The following data gives the population of a town during last six censuses. Estimate using Newtons Interpolation formula,the increase in population duirng the period 1946 to 1948

Year	:	1911	1921	1931	1941	1951	1961
Population i(n thousands):		12	15	20	27	39	52

23. a) Find the locus of foot of the perpendicular from a fixed point on a circle upon any tangent.
b) Find the equation of asymptotes of the conic $\frac{l}{r} = 1 + e\cos\theta$.

24. Solve by Cardans method $x^3 - 9x + 28 = 0$.

(10 x 3 = 30)