

B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2024
SEMESTER 2 - MATHEMATICS FOR B Sc COMPUTER APPLICATIONS
COURSE : 19U2CRCMT2 - ANALYTIC GEOMETRY, THEORY OF EQUATIONS AND NUMERICAL METHODS

(For Regular - 2023 Admission and Improvement / Supplementary – 2022/2021/2020/2019 Admissions)

Time : Three Hours

Max. Marks: 75

PART A**Answer any 10 (2 marks each)**

1. Evaluate $\Delta \left(\frac{2^x}{(x+1)!} \right)$ interval of differencing being unity.
2. Find the equation of a straight line whose perpendicular distance from pole is 'p' and the perpendicular making angle α with initial line.
3. Find the equation of polar of (x_1, y_1) with respect to hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.
4. Find the condition for the line $lx + my + n = 0$ to be a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.
5. Find the locus of the point of intersection of perpendicular tangents to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.
6. Find the general equation of a line in polar co-ordinates.
7. Solve $x^4 - 4x^2 + 8x + 35 = 0$. Given $2 + i\sqrt{3}$ is a root
8. Find the equation of the chord joining the points $(at_1^2, 2at_1)$ and $(at_2^2, 2at_2)$ on the parabola $y^2 = 4ax$.
9. Find the condition in order that the line $\frac{l}{r} = A \cos \theta + B \sin \theta$ may be a tangent to the conic $\frac{l}{r} = 1 + e \cos \theta$.
10. Find the quotient and remainder when $2x^3 - 5x^2 - x + 3$ is divisible by $x+3$.
11. Prove that $\Delta \left[\frac{f(x)}{g(x)} \right] = \frac{g(x)\Delta f(x) - f(x)\Delta g(x)}{g(x+h)g(x)}$
12. Prove that the equation $x^3 + 2x + 3 = 0$ has one negative real root and two imaginary roots.

(2 x 10 = 20)**PART B****Answer any 5 (5 marks each)**

13. Find the locus of foot of the perpendicular from a fixed point on a circle upon any tangent.
14. The following table gives corresponding values of x and y. From the difference table express y as a function of x:

x:	0	1	2	3	4
y:	3	6	11	18	27

 Using Newtons forward interpolation formula.
15. Solve $x^4 + x^3 - 33x^2 + 61x - 14 = 0$. Given that $2 + \sqrt{3}$ is a root.
16. Solve the equation $6x^5 + 11x^4 - 33x^3 - 33x^2 + 11x + 6 = 0$.
17. Evaluate $\int_4^{5.2} \log_e x \, dx$ using Simpson's 1/3 rule.
18. Find the equation of the chord joining the points whose vectorial angles are θ_1 and θ_2 on the circle $r = 2a \cos \theta$. Hence deduce equation of the tangent to the circle at θ_1 .

19. Find the equation of chord of contact of tangents from (x_1, y_1) to parabola $y^2 = 4ax$.
20. Find the equation of the normal at the point θ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

(5 x 5 = 25)

PART C

Answer any 3 (10 marks each)

21. Use Newton's difference formula to find $f(x)$ from following data.

x	0	1	2	4	5	6
f(x)	1	14	15	5	6	19

22. Solve by Ferraris method $x^4 - 2x^3 - 12x^2 + 10x + 3 = 0$.
23. a) Show that the chords of the parabola which subtend a right angle at the vertex meet the axes at a fixed point.
b) Prove that the orthocentre of a triangle inscribed in a rectangular hyperbola lies on the rectangular hyperbola.
24. Find the equation of the tangent at a point on the conic $\frac{l}{r} = 1 + e \cos \theta$ whose vectorial angle is α .

(10 x 3 = 30)