Reg. No ..... Name **21U232**

B Sc DEGREE END SEMESTER EXAMINATION - JULY 2021

SEMESTER 2 : MATHEMATICS FOR B Sc COMPUTER APPLICATIONS

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

(For Regular - 2020 Admission & Improvement / Supplementary 2019 Admission)

Time : Three Hours Max. Marks: 75

PART A

Answer any 10 (2 marks each)

1. Find the condition that the line y = mx + c may touch the parabola $y^2 = 4ax$.
2. Find the equation of polar of (x_1 ,y_1) with respect to ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.
3. Find the locus of the point of intersection of perpendicular tangents to the parabola $y^2 = 4ax$.
4. Prove that if $(\alpha - \beta)$ is constant, the chord joining points α and β on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ touch a fixed ellipse.
5. Find the relation between polar co-ordinates and cartesian co-ordinates.
6. Find the distance between two points in the polar co-ordinate system.
7. Find the general equation of a line in polar co-ordinates.
8. Prove that the equation $x^3 + 2x + 3 = 0$ has one negative real root and two imaginary roots.
9. Find the quiotent and remainder when$2x^3 - 5x^2 - x + 3$ is divisible by x+3 .
10. Given that the roots of the eqauation $4x^3 - 24x^2 + 23x + 18 = 0$ are in A.P.Solve the equation.
11. Evaluate $\Delta\left(e^{2x} \log\ 3x\right)$ interval of differencing being unity.
12. Use Trapezoidal rule to evaluate $\int_1^2 x^3 \, \mathrm{d}\, x$.

(2 x 10 = 20)

PART B

Answer any 5 (5 marks each)

13. Find the equation of the chord of parabola having (x_1, y_1) as it's midpoint.
14. Show that the locus of the feet of perpendicular from the centre to the normals of the hyperbola is $\left(x^2 + y^2\right)^2 \left(a^2y^2 - b^2x^2\right) = \left(a^2 + b^2\right)^2 x^2y^2$.
15. Find the equation of the chord joining the points whose vectrorial 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.
16. Find the equation of the polar of any point (r_1, θ_1) with respect to the conic $\frac{l}{r} = 1 + e\cos\theta$.
17. Solve the equation $x^4 - 10x^3 + 26x^2 - 10x + 1 = 0$.
18. Solve the eqaution $6x^3 - 11x^2 + 6x - 1 = 0$.Given that the roots are in H.P.
19. Evaluate $\int_4^{5.2} \log_e x \, dx$ using Simpson's 1/3 rule.
20. From the following table,find $f'(1.4)$

x	1.2	1.3	1.4	1.5	1.6
f(x)	1.5095	1.6984	1.9043	2.1293	2.3756

(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. a) Derive the polar equation of a conic.
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 $\frac{l}{r} = 1 + e\cos\theta$.

23. Solve by Ferraris method $x^4 + 2x^3 - 7x^2 - 8x + 12 = 0$.

24. The following are data from the steam table :

Temperature $^\circ$C	140	150	160	170	180
Pressure kgf/cm^2	3.685	4.854	6.302	8.076	10.225

Using Newton's formula ,find the pressure of steam for a temperature 142°C

(10 x 3 = 30)