

Reg. No.....

Name.....

20U232

**B.Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2020**

**SEMESTER -2: MATHEMATICS (CORE COURSE FOR B.Sc. COMPUTER APPLICATIONS)**

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

*(For Regular - 2019 Admission)*

Time: Three Hours

Max. Marks: 75

PART A

(Answer any **Ten** questions. Each question carries 2 marks)

1. Find the constant  $c$  so that the line  $-4x + y - c = 0$  touches the parabola  $y^2 = 16x$
2. Find the polar of the line  $lx + my + n = 0$  with respect to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
3. Two conjugate diameter of an ellipse with axes parallel to the co-ordinate axes are parallel to  $2x + 6y = 7$  and  $4y = 4x + 5$ . Find the eccentricity of the ellipse.
4. Find the asymptotes to the hyperbola  $3x^2 - 5xy - 2y^2 + 17x + y + 14 = 0$
5. Find the general equation of a line in polar co-ordinates.
6. Find the condition that line  $A \cos \theta + B \sin \theta$  may be tangent to a cone  $\frac{l}{r} = 1 + e \cos \theta$
7. State division algorithm and remainder theorem
8. Find quotient and remainder when  $x^5 + x^2 - 10x + 113$  is divisible by  $x + 4$  using synthetic division method
9. Find the equation whose roots are  $\frac{1}{2}$  times the roots of  $x^4 + 2x^3 + 4x^2 + 6x + 8 = 0$
10. Prove that  $x^3 + 2x + 3 = 0$  has two imaginary roots.
11. Show that  $E \equiv 1 + \Delta$  and  $\nabla \equiv 1 - E^{-1}$
12. Use Trapezoidal rule to evaluate  $\int_1^2 x^3 dx$

(10 × 2 = 20)

## PART B

(Answer any **Five** questions. Each question carries 5 Marks )

13. Show that the locus of mid points of chords of a parabola which a right angle at the vertex is another parabola of the half latus rectum of the original parabola
14. Show that the eccentric angles of the ends of a pair of conjugate diameter differ by a right angle
15. If  $PSP'$  is a focal chord of a cone, S is a focus and SL is the semi latusrectum. Show that  $\frac{2}{SL} = \frac{1}{SP} + \frac{1}{SP'}$ .
16. Derive the polar equation of a conic
17. Transform the equation  $2x^3 - 9x^2 + 13x - 6 = 0$  into one in which the second term is missing and hence solve.
18. Solve  $6x^4 - 25x^3 + 37x^2 - 25x + 6 = 0$
19. Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  using Simpson's  $\frac{3}{8}$  th rule take  $h = \frac{1}{6}$
20. Prove that (a)  $hD = \log(1 + \Delta) = -\log(1 - \nabla) = \sinh^{-1}(\mu\delta)$   
(b)  $\mu^2 = 1 + \frac{1}{4}\delta^2$

(5 × 5 = 25)

## PART C

(Answer any **Three** questions. Each question carries 10 Marks)

21. (a) Derive the equation of rectangular hyperbola referred to its asymptotes as the axes of the coordinate  
(b) Find the condition that the line  $lx + my + n = 0$  is a normal to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$
22. Find the locus of the foot of the perpendicular drawn from a fixed point on the circle upon any tangent
23. Solve by Ferraris method  $x^4 - 10x^3 + 35x^2 - 50x + 24 = 0$
24. Find the first, second and third derivative of the function tabulated below at  $x = 1.5$

|      |       |   |        |    |        |    |
|------|-------|---|--------|----|--------|----|
| x    | 1.5   | 2 | 2.5    | 3  | 3.5    | 4  |
| f(x) | 3.375 | 7 | 13.625 | 24 | 38.875 | 59 |

(3 × 10 = 30)