21U505 (Pages: 2) Name: ……..……..……..

Reg. No: …….

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

(CBCSS-UG)

(Regular/Supplementary/Improvement)

CC20U MTS5 B09 - INTRODUCTION TO GEOMETRY THEORY OF EQUATIONS

(Mathematics – Core Course)

(2020 Admission onwards)

Time: 2 Hours Maximum: 60 Marks

Credit: 3

Section A

Answer ***all*** questions. Each question carries 2 marks.

1. Find the focus and directrix of the parabola $y^2 = x$.
2. Classify the conic $11x^2 + 4xy + 14y^2 - 4x - 28y - 16 = 0$
3. Define auxiliary circle of an Ellipse. Find auxiliary circle of $\frac{x^2}{9} + \frac{y^2}{4} = 1$
4. Determine the equations of the tangent to the ellipse with parametric equations $x = 3\cos t\,, y\ = \sin t$ at the point with parameter $t\ = \frac{\pi}{4}$.
5. Determine whether or not the transformation $t(x) = \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix} x + \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ of R^2 is a Euclidean transformation.
6. State Identity Theorem.
7. State Fundamental Theorem of Algebra.
8. Find the quotient and remainder when dividing $5x^5 - 9x^3 + 6x^2 - 2x + 7 = 0$ by $x - 2$.
9. Find the sum of squares of roots of the equation $2x^4 - 8x^3 + 6x^2 - 3 = 0$.
10. Distinguish between upper limit and lower limit.
11. State Rolle's Theorem.
12. Find the number of imaginary roots of the equation $5x^7 - 2x^6 - 3x^2 - 5 = 0$.

(Ceiling: 20 Marks)

Section B

Answer ***all*** questions. Each question carries 5 marks.

13. State and prove Focal distance property of Hyperbola.
14. Determine the image of the line $y\ = \ 2x$ under the affine transformation $t(x) = \begin{pmatrix} 4 & 1 \\ 2 & 1 \end{pmatrix} x + \begin{pmatrix} 2 \\ -1 \end{pmatrix}$
15. Prove that a parallel projection preserves ratios of lengths along a given straight line.
16. By the method of detached coefficients divide $x^8 + \ x^7 + 3x^4 - 1$ by $x^4 - 3\,x^3 + 4x + 1$.

17. Solve the cubic equation $x^3 + 9x - 2 = 0$.
18. Solve the biquadratic equation $x^4 - 8x^2 - 4x + 3 = 0$.
19. Separate the roots of the equation $f(x) = 3x^4 - x^3 - 6x^2 + x + 1 = 0$.

(Ceiling: 30 Marks)

Section C

Answer any ***one*** question. The question carries 10 marks.

20. State and prove Reflection property of Ellipse.
21. Find the integral roots of the equation
    $x^5 + x^4 - 20x^3 - 44x^2 - 21x - 45 = 0$. Also solve the equation.

(1 × 10 = 10 Marks)

****