K26FY0624 Pages: 2 Reg No:.....
Name:.....

Fourth Semester FYUGP Degree (Reg) Examination April 2026

KU4VACCMT202 - COMPLEX NUMBERS AND THEORY OF EQUATIONS

2024 Admission onwards

Time : 1.5 hours Maximum Marks : 50

Section A

Answer any 6 questions. Each carry 2 marks.

1. Find $z\overline{z}$ if $z = 1 - 2i$.
2. Write the real part of $\frac{-2-i}{2i}$.
3. Write the steps for identifying negative real roots of an equation using Strum's theorem.
4. Define Strum's functions.
5. Define reciprocal equation.
6. Find the number of real roots of the equation $x^4 - 8x^3 + 3x - 6 = 0$.
7. Find the remainder obtained when $f(x) = x^3 + 4x^2 - 5x + 8$ is divided by $x - 3$.
8. Write an expression for the sum of the r^{th} powers of the roots of an n^{th} degree equation.

Section B

Answer any 4 questions. Each carry 6 marks.

9. Transform the equation $x^n + p_1x^{n-1} + p_2x^{n-2} + ... + p_n = 0$ into another whose roots are m times that of the given equation.
10. If $\alpha_1, \alpha_2, ..., \alpha_n$ are the roots of the equation $x^n + p_1x^{n-1} + p_2x^{n-2} + ... + p_n = 0$ transform the equation whose roots are $\frac{1}{\alpha_1}, \frac{1}{\alpha_2}, ..., \frac{1}{\alpha_n}$.
11. Prove that the equation $x^4 + 3x - 1 = 0$ has two real and two imaginary roots.
12. Frame an equation with rational coefficients, one of whose roots is $\sqrt{5} + \sqrt{3}$
13. Find the sum of the cubes of the roots of the equation $x^5 - 6x^2 + 11x - 6 = 0$.
14. If α, β, γ are the roots of the equation $x^3 + ax^2 + bx + c = 0$ form the equation whose roots are $\alpha\beta, \beta\gamma, and \gamma\alpha$.

Section C

Answer any 1 questions. Each carry 14 marks.

15. (a)If $z_1 = 3 - 9i$ and $z_2 = 3 + 2i$ verify that $\overline{z_1z_2} = \overline{z}_1\overline{z}_2$ and $\overline{\left(\frac{z_1}{z_2}\right)} = \frac{\overline{z}_1}{\overline{z}_2}$
(b)Prove that $arg(\frac{z_1}{z_2}) = arg(z_1) - arg(z_2)$
16. Find the value of a for which $ax^3 - 9x^2 + 12x - 5 = 0$ has equal roots and solve the equation in one case.