(i) Printed Pages :3] Roll No. .....

(ii) Questions :8]

Sub. Code : 0145

Exam. Code: 0002

B.A./B.Sc.(General) 2nd Semester

1055

MATHEMATICS

Paper -III : Theory of Equations

Time : 3 Hours] **[Max. Marks : 30**

Note :- Attempt **five** questions, selecting at least **two** questions from each section. All question carry equal marks.

UNIT-I

1. (a) State Euclid's algorithm. Show that the remainder when the polynomial f(x) is divided by $(x - \alpha)(x - \beta)$ where $\alpha \neq \beta$ is:

$$\frac{(x - \beta) f(\alpha) - (x - \alpha) f(\beta)}{\alpha - \beta}.$$ 3

(b) If $ax + bx + c$ has a factor of the form $x + \lambda x + 1$, Show that : $a^2 - c^2 = ab$. 3

2. (a) If $a + \sqrt{b}$ is a root of equation $f(x) = 0$ with rational coefficients of degree ≥ 1, $a, b \in Q$, $b > 0$ but not perfect square show that $a - \sqrt{b}$ is also a root of $f(x) = 0$. 3

(b) Find a real polynomial of least defgree having roots -2, 1- i and satisfying condition f(3) = 15 . 3

III. (a) Solve the equation
$x^3 - 15x^2 + 62x - 72 = 0$,
one root being double the other. 3

(b) Solve the equation:
$x^4 - 8x^3 + 14x^2 + 8x - 15 = 0$,
given that two of its roots are equal in magnitude but opposite in sign . 3

IV. (a) If α, β, γ are roots of $2x^3 + x^2 + x + 1 = 0$, form an equation whose roots are :
$\frac{1}{\beta^2} + \frac{1}{\gamma^2} - \frac{1}{\alpha^2}$, $\frac{1}{\gamma^2} + \frac{1}{\alpha^2} - \frac{1}{\beta^2}$, $\frac{1}{\alpha^2} + \frac{1}{\beta^2} - \frac{1}{\gamma^2}$. 3

(b) Diminish the roots of the equation :
$a_0 x^3 + 3a_1 x^2 + 3a_2 x + a_3 = 0$ by h and find the condition that the second and third terms may be removed simultaneously.
Hence solve the equation.
$x^3 + 6x^2 + 12x - 19 = 0$. 3

UNIT-II

V. (a) Use Cardon's method to solve $28x^3 - 9x^2 + 1 = 0$. 3

(b) Solve by descrate 's method $x^4 - 8x^2 - 24x + 7 = 0$. 3

VI. (a) Apply Ferrari's method to solve $x^4 - 10x^2 - 20x - 16 = 0$. 3

(b) Show that the Parabola $y = x^2$ meets the hyperbola $xy + 8x + 4y + 3 = 0$ in a single point. 3

VII. (a) If the integral roots of $x^5 - 25x^4 + 160x^3 - 281x^2 - 257x - 440 = 0$ lie between -1 and 24. Find them by using Newton's method of divisors. 3

(b) Find the roots of the equation $x^3 - 3x + 1 = 0$ by trigonometric method. 3

VIII. (a) Discuss the nature of roots of the equation $x^3 + 3x + 2 = 0$. 2

(b) Reduce $x^3 - 15x^2 - 357x + 5491 = 0$ to standard form. 2

(c) Find the upper and lower limits of the real roots of the equation:
$3x^4 - 12x^2 + 17x - 19 = 0$ by method of grouping. 2