

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper: 948

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Unique Paper Code

2352202002

Name of the Paper

Theory of Equations and

Symmetries

Name of the Course

: B.A. (Prog.) with

Mathématics - DSC

Semester.

: III

Duration: 3 Hours

Maximum Marks: 90

Instructions for Candidates

- 1... Write your Roll No. on the top immediately on receipt of this question paper.
- 2. Attempt all questions by selecting two parts from each question.
- 3. All questions carry equal marks.
- 4. Use of Calculator not allowed.
 - (a) Solve the equation $x^3 13x^2 + 15x + 189 = 0$, given that one of the roots exceeds another by 2.

P.T.O.

(b) Find the nature of the roots of the equation, using Descartes's Rule of signs

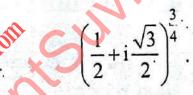
$$x^4 - 2x^3 - 1 = 0.$$

- (c) Find a necessary condition for the roots of the equation $x^3 px^2 + qx r = 0$ to be in harmonic progression.
- 2. (a) Using De Moivre's Theorem, show that

$$(1 + \cos\theta + i\sin\theta)^n + (1 + \cos\theta - i\sin\theta)^n =$$

$$2^{n+1}\cos^n(\theta/2) \cos n(\theta/2)$$

(b) Find all the values of



- (c) Solve the equation $x^7 1 = 0$.
- 3. (a) Solve the following cubic equation by Cardon's Method

$$y^3 - 9y + 28 = 0$$
.

(b) Find the equation whose roots are diminished by 3 the roots of $x^4 - 7x^3 + 3x^2 - 11x + 17 = 0$:

(c) Solve the following biquadratic equation by Descartes Method

$$z^4 - 6z^2 - 16z - 15 = 0$$
.

- 4. (a) Find the solution of equation $y^3 15y 126 = 0$ by Cardon's Method.
 - (b) Find the equation whose roots are the reciprocals of the roots of the equation

$$x^{6} + \frac{3}{4}x^{5} - \frac{12}{5}x^{4} + \frac{12}{5}x^{2} - \frac{3}{4}x - 1 = 0.$$

- (c) Find the solution of equation $z^4 + 3z^2 + 2z + 12 = 0$ by Descartes Method.
- 5. (a) Find the equation whose roots are 6 times the roots $0.5 \times 3 + 3 \times 2 + 8 \times + 5 = 0$.
 - (b) If α , β and γ are the roots of the equation $x^3 + 2x^2 3x 1 = 0$, then find the value of $\alpha^{-3} + \beta^{-3} + \gamma^{-3}$.
 - (c) Find an equation whose roots are the reciprocals of the roots of the equation

$$x^4 - 3x^3 + 7x^2 - 8x + 2 = 0.$$

- 6. (a) If α , β and γ are the roots of the equation $x^3 px^2 + qx r = 0$. Find
 - (i) $\sum \alpha^2$
 - (ii) $\sum \alpha^2 \beta$

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- (b) If α , β , γ are the roots of $x^3 + qx + r = 0$, find the value of $\Sigma(\beta + \gamma)^2$.
- (c) If α , β , γ and δ are the roots of $x^4 + px^3 + qx^2 + rx + s = 0$, find the value of

 $\sum \frac{1}{\alpha}$