thematics **(INTER PART-I) 319** **GROUP: I** **PAPER: I**

ıe: 2:30 hours **SUBJECTIVE** **Marks: 80**

te: Section I is compulsory. Attempt any three (3) questions from Section II.

SECTION I

Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Find modulus of $1 - i\sqrt{3}$

ii- Prove that sum as well as the product of any two conjugate complex numbers is a real number.

iii- Does the set $\{1, -1\}$ posses closure properties with respect to addition and multiplication?

iv- Define a binary relation from a set A to a set B.

v- Let $A = \{1, 2, 3\}$. Determine the relation r such that $x r y$ iff $x < y$.

vi- What is proposition?

vii- Define row and column matrices.

viii- Without expansion, verify that $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$

ix- If $A = \begin{vmatrix} 2 & -1 \\ 3 & 1 \end{vmatrix}$, verify that $(A^{-1})^t = (A^t)^{-1}$

x- Prove that $(-1+\sqrt{-3})^4 + (-1-\sqrt{-3})^4 = -16$

xi- If α, β are the roots of $3x^2 - 2x + 4 = 0$, then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

xii- Show that $x - 2$ is a factor of $x^4 - 13x^2 + 36$

Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Define improper rational fraction.

ii- If $\frac{x}{(x-a)(x-b)(x-c)} = \frac{A}{x-a} + \frac{B}{x-b} + \frac{C}{x-c}$ then find value of A.

iii- Write partial fraction form $\frac{2x^4 - 3x^3 - 4x}{(x^2+2)^2(x+1)^2}$

iv- Define a sequence.

v- Which term of the A.P (with usual notation) $-2, 4, 10, \ldots\ldots$ is 148 ?

vi- Sum the series $(-3) + (-1) + 1 + 3 + 5 + \ldots\ldots\ldots a_{16}$

vii- Insert three G. Ms between 2 and 32

viii- Find the 12^{th} term of the harmonic sequence $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, \ldots\ldots\ldots$

ix- If ${}^nC_8 = {}^nC_{12}$ find n.

x- Find the fifth term of $\left(\frac{3x}{2} - \frac{1}{3x}\right)^{11}$

xi- Use binomial theorem to calculate $(21)^5$ upto three decimal places.

xii- Prove that the result $3^n < n!$ is true for $n = 7, 8$

(Turn over)

4. Write short answers to any NINE questions: **(2 x 9 = 18)**

i- Convert $154^\circ 20''$ to radian measure.

ii- Verify that $\sin^2\frac{\pi}{6} + \sin^2\frac{\pi}{3} + \tan^2\frac{\pi}{4} = 2$

iii- Prove the identity $\frac{\cot^2\theta - 1}{1+\cot^2\theta} = 2\cos^2\theta - 1$

iv- Express $\sin 319^\circ$ as a trigonometric function of an angle of positive degree measure of less than 45°.

v- Show that $\frac{\tan\alpha + \tan\beta}{\tan\alpha - \tan\beta} = \frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$

vi- If $\cos\alpha = \frac{3}{5}$ then find the value of $\sin 2\alpha$ where $0 < \alpha < \frac{\pi}{2}$

vii- Find the period of tan x.

viii- In the triangle ABC if $c = 16.1$, $\alpha = 42^\circ 45'$ and $\gamma = 74^\circ 32'$. Find a

ix- Define escribed circle.

x- Find the area of triangle ABC if $a = 18$, $b = 24$, $c = 30$

xi- Define inverse sine function.

xii- Solve the equation $\sin 2x = \cos x$ where $x \in [0, 2\pi]$

xiii- Solve $\sin x = -\frac{\sqrt{3}}{2}$ where $x \in [0, 2\pi]$

SECTION II

5- (a) Convert $A \cup (B \cup C) = A \cup (B \cup C)$ into logical form and prove by constructing the truth table. **5**

(b) Show that the sum of 'n' A.Ms between 'a' and 'b' is equal to 'n' times their A.M. **5**

6- (a) Solve the system of linear equations: **5**

$$x + 2y + z = 2$$
$$2x + y + 2z = -1$$
$$2x + 3y - z = 9$$

(b) Find the number of 6 digit numbers that can be formed from the digits 2, 2, 3, 3, 4, 4. How many of them will lie between 400000 and 430000 ? **5**

7- (a) Solve the system of equations: **5**

$$x^2 - 5xy + 6y^2 = 0 \quad ;$$
$$x^2 + y^2 = 45$$

(b) Find the coefficient of x^5 in the expansion of $\left(x^2 - \frac{3}{2x}\right)^{10}$ **5**

Prove that $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \tan\theta + \sec\theta$ **5**

$\frac{2\sin\theta \sin 2\theta}{\cos\theta + \cos 3\theta} = \tan\theta \tan 2\theta$ **5**

a triangle are $x^2 + x + 1$, $2x + 1$ and $x^2 - 1$. Prove that the greatest e triangle is 120°. **5**

at $\sin^{-1}\frac{77}{85} - \sin^{-1}\frac{3}{5} = \cos^{-1}\frac{15}{17}$ **5**