MATHEMATICS Intermediate Part-I, Class 11th (1stA 324) PAPER: I GROUP: II

Time: 2:30 hours SUBJECTIVE Marks: 80

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

SECTION-I

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

i- Write trichotomy and transitive properties of inequalities of real numbers.

ii- Simplify $(2, 6) \div (3, 7)$

iii- Find the modulus of $3 + 4i$

iv- Express the complex number $1 + i\sqrt{3}$ in polar form

v- Write inverse, converse and contrapositive of the conditional $\sim p \rightarrow \sim q$

vi- Define groupoid.

vii- If $A = \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$, show that $A^4 = I_2$

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 and B are non-singular matrices, then show that $(AB)^{-1} = B^{-1}A^{-1}$

x- Find the three cube roots of -27

xi- Use the factor theorem to determine if $x - 1$ is a factor of $x^2 + 4x - 5$

xii- If α, β are the roots of $3x^2 - 2x + 4 = 0$, find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$

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

i- Resolve into Partial Fractions $\frac{3x}{(x-1)(x+2)}$

ii- Define the term Partial Fraction.

iii- Write the first four terms of the sequence, if $a_n - a_{n-1} = n + 2$, $a_1 = 2$

iv- If 5, 8 are two A.Ms between a and b, find a and b.

v- Find the sum of infinite Geometric Series $\frac{9}{4} + \frac{3}{2} + 1 + \frac{2}{3} + \ldots\ldots$

vi- Find the 8th term of H.P; $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, \ldots\ldots$

vii- Prove that ${}^nC_r = {}^nC_{n-r}$

viii- Find the value of n when ${}^{11}P_n = 11.10.9$

ix- What is the probability that a slip of numbers divisible by 4 are picked from the slips bearing numbers 1,2,3, ……, 10 ?

x- Prove that the inequality $n^2 > n + 3$ for $n = 3, 4$

xi- Calculate $(9.9)^5$ by means of Bionomial Theorem.

xii- Expand $(1 - x)^{1/2}$ upto 4 terms.

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

i- Find r when $\ell = 5\text{cm}$, $\theta = \frac{1}{2}$ radian

ii- Evaluate $\dfrac{\tan\frac{\pi}{3} - \tan\frac{\pi}{6}}{1 + \tan\frac{\pi}{3} \cdot \tan\frac{\pi}{6}}$

iii- Prove that $\sin(\alpha + \beta)\sin(\alpha - \beta) = \cos^2\beta - \cos^2\alpha$

(Turn Over)

iv- Prove that $\frac{\text{Cos}8^\circ - \text{Sin}8^\circ}{\text{Cos}8^\circ + \text{Sin}8^\circ} = \tan 37^\circ$

v- Express as product : $\text{Cos}7\theta - \text{Cos}\theta$

vi- Define Periodicity.

vii- Find period of $3\text{Cos}\frac{x}{5}$

viii- Draw graph of Sinx when $x \in [0, \pi]$

ix- Find a and c for the right angle triangle ABC, when $\alpha = 58^\circ 13'$, $b = 125.7$, $\gamma = 90^\circ$

x- A vertical pole is 8m high and length of its shadow is 6m. What is angle of elevation of the sum at that moment?

xi- Solve the triangle ABC if $b = 125$, $\gamma = 53^\circ$, $\alpha = 47^\circ$

xii- Show that $\tan(\text{Sin}^{-1}x) = \frac{x}{\sqrt{1-x^2}}$

xiii- Solve the trignometric equation $\text{Sin}x = -\frac{\sqrt{3}}{2}$

SECTION-II

5- (a) Solve the system of linear equations by Cramer's Rule : 5

$$\begin{aligned} 2x + 2y + z &= 3 \\ 3x - 2y - 2z &= 1 \\ 5x + y - 3z &= 2 \end{aligned}$$

(b) Show that the roots of $(mx + c)^2 = 4ax$ will be equal if $c = \frac{a}{m}$, $m \neq 0$ 5

6- (a) Resolve $\frac{x^2 + x - 1}{(x+2)^3}$ into partial fractions. 5

(b) The sum of an infinite Geometric Series is 9 and the sum of the squares of its terms is $\frac{81}{5}$. Find the series. 5

7- (a) Two dice are thrown. E_1 is the event that the sum of their dots is an odd number and E_2 is the event that 1 is the dot on the top of the first die. Show that $P(E_1 \cap E_2) = P(E_1) \cdot P(E_2)$ 5

(b) Find the term independent of x in expansion of $\left(\sqrt{x} + \frac{1}{2x^2}\right)^{10}$ 5

8- (a) Prove that $\text{Sin}\frac{\pi}{9}\text{Sin}\frac{2\pi}{9}\text{Sin}\frac{\pi}{3}\text{Sin}\frac{4\pi}{9} = \frac{3}{16}$ 5

(b) Show that $r_2 = 4R\,\text{Cos}\frac{\alpha}{2}\text{Sin}\frac{\beta}{2}\text{Cos}\frac{\gamma}{2}$ 5

9- (a) Find x if $\tan^2 45^\circ - \text{Cos}^2 60^\circ = x\text{Sin}45^\circ\,\text{Cos}45^\circ \tan 60^\circ$ 5

(b) Prove that $\text{Sin}^{-1}\frac{4}{5} + \text{Sin}^{-1}\frac{5}{13} + \text{Sin}^{-1}\frac{16}{65} = \frac{\pi}{2}$ 5