| Paper Code Number: 2197 | 2024 (1st-A) INTERMEDIATE PART-I (11th Class) | Roll No: _____ |
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**MATHEMATICS PAPER-I GROUP-I** MTN-I-24

| TIME ALLOWED: 30 Minutes | OBJECTIVE | MAXIMUM MARKS: 20 |
|---|---|---|

**Q.No.1** **You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.**

| S.# | QUESTIONS | A | B | C | D |
|---|---|---|---|---|---|
| 1 | Inverse of square matrix exists if it is: | Singular | Non-singular | Null | Symmetric |
| 2 | If $A$ is skew symmetric, then $A^2$ will be _____. | Symmetric | Skew symmetric | Hermitian | Skew Hermitian |
| 3 | Product of roots of $x^2-5x+6=0$ is: | $-6$ | 6 | 5 | $-5$ |
| 4 | Roots of equation $cx^2+ax+b=0$ are complex if: | $b^2-4ac<0$ | $c^2-4ab<0$ | $a^2-4bc<0$ | $a^2-4ac<0$ |
| 5 | $\frac{1}{x^3+1}=\frac{1}{x+1}+\frac{\text{-----}}{x^2-x+1}$ (Numenator of $x^2-x+1$) | $Bx+c$ | $B$ | $C$ | $B+C$ |
| 6 | Next term of 1, 3, 12, 60, _____ is: | 120 | 180 | 240 | 360 |
| 7 | General term of $-2, 1, 4, 7,$ _____ is: | $3n-2$ | $3n-4$ | $3n-3$ | $3n-5$ |
| 8 | A die is rolled, probability that dots on top are greater than 4: | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{4}$ | $\frac{1}{6}$ |
| 9 | Sum of odd coefficients in expansion of $(1+x)^4$ is: | 8 | 16 | 18 | 6 |
| 10 | $-1035^o$ is coterminal with _____ | $60^o$ | $30^o$ | $45^o$ | $35^o$ |
| 11 | $\cos(\alpha+\beta)-\cos(\alpha-\beta)=$ _____ | $-2\cos\alpha\cos\beta$ | $2\cos\alpha\cos\beta$ | $2\sin\alpha\sin\beta$ | $-2\sin\alpha\sin\beta$ |
| 12 | Period of $\sec x$ is: | $\pi$ | $2\pi$ | $3\pi$ | $\frac{\pi}{2}$ |
| 13 | $\sqrt{\frac{s(s-a)}{bc}}=$ _____ | $\cos\frac{\alpha}{2}$ | $\sin\frac{\alpha}{2}$ | $\tan\frac{\alpha}{2}$ | $\cot\frac{\alpha}{2}$ |
| 14 | $\tan[\tan^{-1}(-1)]=$ _____ | 1 | $-1$ | $\frac{\pi}{4}$ | $-\frac{\pi}{4}$ |
| 15 | $\sin x\cos x=\frac{\sqrt{3}}{4}$, then $x=$ _____ | $\frac{\pi}{2}$ | $\frac{\pi}{3}$ | $\frac{\pi}{6}$ | $\frac{\pi}{4}$ |
| 16 | $3x+y^2i=1-2i^2$, then value of $x$ is: | $\frac{1}{3}$ | 1 | 3 | Zero |
| 17 | If $z=\sqrt{3}+i$, then $\lvert z\rvert=$ _____ | 4 | $\sqrt{3}-i$ | $-\sqrt{3}+i$ | 2 |
| 18 | Inverse of $p\to q$ is _____. | $\sim p\to\sim q$ | $\sim q\to\sim p$ | $\sim q\to p$ | $q\to\sim p$ |
| 19 | Set $A$ contains 4 elements, then number of elements in its power set $P(A)$: | 8 | 12 | 16 | 4 |
| 20 | $\{1,-1\}$ is group with respect to: | Addition | Subtraction | Square root | Multiplication |

**MATHEMATICS PAPER-I GROUP-I**

| TIME ALLOWED: 2.30 Hours | SUBJECTIVE | MAXIMUM MARKS: 80 |
|---|---|---|

**NOTE: Write same question number and its parts number on answer book, as given in the question paper.**

MTN-I-24

## SECTION-I

**2. Attempt any eight parts.** $8 \times 2 = 16$

| | | | |
|---|---|---|---|
| (i) | Simplify $(2, 6) \div (3, 7)$ | (ii) | Separate into real and imaginary parts $\frac{i}{1+i}$ |
| (iii) | $\forall z \in C$, prove that $\lvert -z\rvert = \lvert z\rvert = \lvert \bar{z}\rvert = \lvert -\bar{z}\rvert$ | (iv) | Find the multiplicative inverse of $-3-5i$. |
| (v) | Express $\{x \mid x \in N \wedge x \leq 10\}$ in descriptive and tabular form. | | |
| (vi) | Show $B - A$ by Venn diagram when $A \subseteq B$. | (vii) | Find $x$ and $y$ if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$ |
| (viii) | If $A = \begin{bmatrix} 1 & -1 \\ a & b \end{bmatrix}$, $A^2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find the values of $a$ and $b$. | (ix) | Without expansion show that $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 0$ |
| (x) | Find roots of the equation $5x^2 - 13x + 6 = 0$ by using quadratic formula. | | |
| (xi) | Find four $4^{th}$ roots of unity. | (xii) | Solve the equation $4^x = \frac{1}{2}$ |

**3. Attempt any eight parts.** $8 \times 2 = 16$

| | | | |
|---|---|---|---|
| (i) | Define Rational fraction. | | |
| (ii) | Write in to partial fractions $\frac{8x^2}{(x^2+1)^2(1-x^2)}$ without finding constants. | | |
| (iii) | Write the first four terms of the sequence $a_n = (-1)^n (2n-3)$ | | |
| (iv) | How many terms are there in A.P in which $a_1 = 11$, $a_n = 68$, $d = 3$? | | |
| (v) | Sum the series $1+4-7+10+13-16+19+22-25+$_____ to $3n$ terms. | | |
| (vi) | Find the sum of the infinite series $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} +$ _____ | | |
| (vii) | How many signals can be made with 4-different flags when any number of them are to be used at a time? | | |
| (viii) | If ${}^nC_8 = {}^nC_{12}$, find $n$. | | |
| (ix) | Determine the probability of getting 2 heads in two successive tosses of a balanced coin. | | |
| (x) | Prove $2+6+18+$_____$+2 \times 3^{n-1} = 3^n - 1$ for $n = 1, 2$ | | |
| (xi) | Calculate $(21)^5$ by means of Binomial theorem. | (xii) | Expand $(1+x)^{\frac{-1}{3}}$ up to 4 terms. |

**4. Attempt any nine parts.** $9 \times 2 = 18$

| | | | |
|---|---|---|---|
| (i) | In a right angle triangle $ABC$, prove that $\sin^2\theta + \cos^2\theta = 1$ | | |
| (ii) | Prove that $\cot^2\theta - \cos^2\theta = \cot^2\theta \cos^2\theta$ | (iii) | Prove that $\sin 3\alpha = 3\sin\alpha - 4\sin^3\alpha$ |
| (iv) | Express the product as sum or difference $\sin 12^\circ \sin 46^\circ$ | (v) | Prove that $\tan\left(\frac{\pi}{4} - \theta\right) + \tan\left(\frac{3\pi}{4} + \theta\right) = 0$ |
| (vi) | Define period of a trigonometric function. | (vii) | Find the period of $\operatorname{cosec}\frac{x}{4}$ |
| (viii) | Draw the graph of $y = \tan x$ for $-\pi \leq x \leq \pi$. | | |
| (ix) | Find area of triangle $ABC$, if $a = 4.33$, $b = 9.25$, $\gamma = 56^\circ 44'$ | | |
| (x) | Find $R$, if sides of triangle $ABC$ are $a = 13$, $b = 14$, $c = 15$ | (xi) | Show that $\frac{1}{2rR} = \frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}$ |
| (xii) | Without using calculator, show that $\cos^{-1}\frac{4}{5} = \cot^{-1}\frac{4}{3}$ | (xiii) | Find the solution of $\sin x \cos x = \frac{\sqrt{3}}{4}$ |

## SECTION-II

**NOTE: Attempt any three questions.** $3 \times 10 = 30$

| | | | |
|---|---|---|---|
| 5.(a) | Use synthetic division to find the values of $p$ and $q$ if $x+1$ and $x-2$ are the factors of the polynomial $x^3 + px^2 + qx + 6$ | | |
| (b) | Use matrices to solve the system of equations $x_1 - 2x_2 + x_3 = -4$, $2x_1 - 3x_2 + 2x_3 = -6$, $2x_1 + 2x_2 + x_3 = 5$ | | |
| 6.(a) | Resolve into partial fractions $\frac{1}{(x-1)^2(x+1)}$ | | |
| (b) | Show that the sum of $n$ A.Ms. between $a$ and $b$ is equal to $n$ times their A.M. | | |
| 7.(a) | Find values of $n$ and $r$ when ${}^nC_r = 35$, ${}^nP_r = 210$ | | |
| (b) | Using Mathematical induction to show that $1+2+2^2+$_____$+2^n = 2^{n+1} - 1$ for all non-negative integers $n$. | | |
| 8.(a) | Prove without using calculator $\sin 19^\circ \cos 11^\circ + \sin 71^\circ \sin 11^\circ = \frac{1}{2}$ | | |
| (b) | Solve the triangle $ABC$ in which $a = 36.21$, $c = 30.14$ and $\beta = 78^\circ 10'$. | | |
| 9.(a) | Prove that $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \tan\theta + \sec\theta$ | (b) | Prove that $\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65} = \frac{\pi}{2}$ |