Paper Code Number: 2198	2024 (1st-A) INTERMEDIATE PART-I (11th Class)	Roll No:
MATHEMATICS PAPER-I GROUP-II	MTN-2-24	
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	Sum of binomial coefficients is:	2^n	n	$2n$	n^2
2	Trigonometric ratio of -330^o is same as:	60^o	30^o	45^o	90^o
3	$\frac{3\pi}{2}+\theta$ lies in quadrant:	1^{st}	2^{nd}	3^{rd}	4^{th}
4	Range of $y=\sin x$ is:	$(-1, 1)$	$[-1, 1)$	$[-1, 1]$	$(-1, 1]$
5	In right triangle, no angle is greater than:	45^o	80^o	60^o	90^o
6	Domain of $y=\sin^{-1}(x)$ is:	$-1\le x\le 1$	$-1\ge x\ge 1$	$-1<x<1$	$0\le x\le 1$
7	If $cox\,x=\frac{1}{\sqrt{2}}$, then reference angle is:	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
8	Every non-recurring, non terminating decimals represents:	Rational number	Natural number	Irrational number	Whole number
9	The multiplicative inverse of complex number $(0, 1)$ is:	$(0, -1)$	$(0, 1)$	$(-1, 0)$	$(0, 0)$
10	How many inverse elements correspond to each element of group?	At least two	Two	At least one	Only one
11	Set containing elements A or B is denoted by:	$A\cap B$	$A\cup B$	$A\subseteq B$	$B\supseteq A$
12	$p\to q$ is called converse of:	$\sim p\to q$	$p\to q$	$q\to p$	$\sim q\to p$
13	The inverse of square matrix exists if A is:	Singular	Non-singular	Symmetric	Rectangular
14	If A is a square matrix of order 2×2 then $\lvert KA\rvert$ equals:	$K\lvert A\rvert$	$\frac{1}{K}\lvert A\rvert$	$K^2\lvert A\rvert$	$2K\lvert A\rvert$
15	If $4^x=\frac{1}{2}$ then x is equal to:	$-\frac{1}{2}$	-2	$\frac{1}{2}$	$\frac{1}{4}$
16	The roots of the equation $x^2-5x+6=0$ are:	$2, -3$	$-2, -3$	$2, 3$	$-2, 3$
17	The fraction $\frac{x-3}{x+1}$ is:	Improper	Proper	Identity	Equivalent
18	G.M between $\frac{1}{a}$ and $\frac{1}{b}$ is:	$-\frac{1}{ab}$	$\pm\sqrt{\frac{1}{ab}}$	ab	$-\sqrt{ab}$
19	$\sum_{k=1}^{n}1$ is equal to:	1	n^3	n	n^2
20	$\frac{3!}{0!}$ is equal to:	3	6	$\propto$	12

MATHEMATICS PAPER-I GROUP-II

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.

SECTION-I

MTN-2-24

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

(i) Simplify $(2, 6) \div (3, 7)$

(ii) Find multiplicative inverse of $a + ib$

(iii) Show that for all $z \in C$, $z\bar{z} = |z|^2$

(iv) Simplify $\frac{3}{\sqrt{6} - \sqrt{-12}}$

(v) For $A = \{1, 2, 3, 4\}$, state the domain and range of relation $\{(x, y) \mid x + y = 5\}$

(vi) Define Semi group.

(vii) If $A = \begin{bmatrix} -2 & 3 \\ -4 & 5 \end{bmatrix}$, find A^{-1}

(viii) If $A = \begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix}$, then show that $4A - 3A = A$

(ix) If $A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & -2 & 0 \\ -2 & -2 & 1 \end{bmatrix}$, then find A_{12}, A_{22}

(x) Discuss the nature of roots of $2x^2 + 5x + 1 = 0$

(xi) Evaluate $(1 + \omega - \omega^2)^8$

(xii) Solve by completing the square $x^2 + 6x - 567 = 0$

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

(i) Define Identity. Give one example.

(ii) Write $\frac{2x-3}{x(2x+3)(x-1)}$ in partial fraction form without finding constants.

(iii) If $a_{n-3} = 2n - 5$, then find nth term of sequence.

(iv) Find b if $5, 8$ are two A.Ms. between a and b.

(v) If $y = 1 + \frac{x}{2} + \frac{x^2}{4} + \_\_\_\_$, then find the interval in which the series is convergent.

(vi) If $\frac{1}{k}, \frac{1}{2k+1}, \frac{1}{4k-1}$ are in H.P, then find k.

(vii) In how many ways can 4 keys be arranged on a circular key ring?

(viii) Find the number of diagonals of 12 sided figure.

(ix) If $P(A) = \frac{1}{2}$; $P(B) = \frac{1}{2}$; $P(A \cap B) = \frac{1}{3}$, then find $P(A \cup B)$

(x) Prove that $4^n > 3^n + 2^{n-1}$ for $n = 2$ and $n = 3$

(xi) Expand $\left(3a - \frac{x}{3a}\right)^4$ by binomial theorem.

(xii) If x is so small that its square and higher powers be neglected, then show that $\sqrt{\frac{1-x}{1+x}} = 1 - x$

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

(i) Prove that $\sin^2\frac{\pi}{6} + \sin^2\frac{\pi}{3} + \tan^2\frac{\pi}{4} = 2$

(ii) Show that $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = 2\sec^2\theta$

(iii) Prove that $\sin(180^\circ + \alpha) \cdot \sin(90^\circ - \alpha) = -\sin\alpha \cdot \cos\alpha$

(iv) Find the value of $\cos 105^\circ$

(v) Show that $\frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta} = 2$

(vi) Write domain and range of $y = \sin x$

(vii) Find the period of $\tan 4x$

(viii) Draw the graph of $y = \sin x$ from 0 to π

(ix) In ΔABC if $\beta = 60^\circ$; $\gamma = 15^\circ$; $b = \sqrt{6}$, then find a and γ

(x) Find area of ΔABC in which $\alpha = 45^\circ 17'$; $\gamma = 36^\circ 41'$; $b = 25.4$

(xi) Define inscribed circle

(xii) Find the value of $\sec\left[\sin^{-1}\left(-\frac{1}{2}\right)\right]$

(xiii) Define trigonometric equation. Give one example.

SECTION-II

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

5.(a) Find the inverse of $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{bmatrix}$ and show that $A^{-1}A = I_3$

(b) Prove that $\frac{x^2}{a^2} + \frac{(mx+c)^2}{b^2} = 1$ will have equal roots, if $c^2 = a^2m^2 + b^2$; $a \neq 0$, $b \neq 0$

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

(b) The sum of three numbers in an A.P is 24 and their product is 440. Find the numbers.

7.(a) A number is chosen out of first fifty natural numbers. What is probability that chosen number is multiple of 3 or of 5.

(b) Show that $\left[\frac{n}{2(n+N)}\right]^{\frac{1}{2}} = \frac{8n}{9n-N} - \frac{n+N}{4n}$ where n and N are nearly equal.

8.(a) Prove without using calculator that $\sin 19^\circ \cos 11^\circ + \sin 71^\circ \sin 11^\circ = \frac{1}{2}$

(b) Find the area of the triangle ABC, when $\alpha = 35^\circ 17'$, $\gamma = 45^\circ 13'$ and $b = 42.1$

9.(a) Prove the identity and state the domain of θ $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$

(b) Prove that $\tan^{-1}\frac{1}{11} + \tan^{-1}\frac{5}{6} = \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{2}$