Paper Code Number: 2197	2024 (1st-A) INTERMEDIATE PART-I (11^{th} Class)	Roll No: ________

MATHEMATICS PAPER-I GROUP-I MTN-1-24

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	$\frac{1}{x^3+1}=\frac{1}{x+1}+\frac{-----}{x^2-x+1}$ (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:	π	2π	3π	$\frac{\pi}{2}$
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.

SECTION-I

MTN-1-24

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

- (i) Simplify $(2, 6) \div (3, 7)$
- (ii) Separate into real and imaginary parts $\dfrac{i}{1+i}$
- (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 $4^x = \dfrac{1}{2}$

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

- (i) Define Rational fraction.
- (ii) Write in to partial fractions $\dfrac{8x^2}{(x^2+1)^2\,(1-x^2)}$ 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 $\dfrac{1}{2} + \dfrac{1}{4} + \dfrac{1}{8} +$ ______
- (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 $\tan\left(\dfrac{\pi}{4}-\theta\right) + \tan\left(\dfrac{3\pi}{4}+\theta\right) = 0$
- (vi) Define period of a trigonometric function.
- (vii) Find the period of $\operatorname{cosec}\dfrac{x}{4}$
- (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 $\dfrac{1}{2rR} = \dfrac{1}{ab} + \dfrac{1}{bc} + \dfrac{1}{ca}$
- (xii) Without using calculator, show that $\cos^{-1}\dfrac{4}{5} = \cot^{-1}\dfrac{4}{3}$
- (xiii) Find the solution of $\sin x \cos x = \dfrac{\sqrt{3}}{4}$

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 $\dfrac{1}{(x-1)^2\,(x+1)}$

(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 $\sin 19^\circ \cos 11^\circ + \sin 71^\circ \sin 11^\circ = \dfrac{1}{2}$

(b) Solve the triangle ABC in which $a = 36.21,\ c = 30.14$ and $\beta = 78^\circ 10'$.

9.(a) Prove that $\dfrac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \tan\theta + \sec\theta$

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

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:	1st	2nd	3rd	4th
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 $z\in C$, $z\bar{z}=\lvert z\rvert^2$	(iv)	Simplify $\dfrac{3}{\sqrt{6}-\sqrt{-12}}$
(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 $\dfrac{2x-3}{x(2x+3)(x-1)}$ 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 $y=1+\dfrac{x}{2}+\dfrac{x^2}{4}+\_\_\_\_\_$, then find the interval in which the series is convergent.		
(vi)	If $\dfrac{1}{k}, \dfrac{1}{2k+1}, \dfrac{1}{4k-1}$ 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 $P(A)=\dfrac{1}{2}$; $P(B)=\dfrac{1}{2}$; $P(A\cap B)=\dfrac{1}{3}$, then find $P(A\cup B)$		
(x)	Prove that $4^n>3^n+2^{n-1}$ for $n=2$ and $n=3$	(xi)	Expand $\left(3a-\dfrac{x}{3a}\right)^4$ by binomial theorem.
(xii)	If x is so small that its square and higher powers be neglected, then show that $\sqrt{\dfrac{1-x}{1+x}}=1-x$		

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

(i)	Prove that $\sin^2\dfrac{\pi}{6}+\sin^2\dfrac{\pi}{3}+\tan^2\dfrac{\pi}{4}=2$	(ii)	Show that $\dfrac{1}{1+\sin\theta}+\dfrac{1}{1-\sin\theta}=2\sec^2\theta$
(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 $\dfrac{\sin 3\theta}{\sin\theta}-\dfrac{\cos 3\theta}{\cos\theta}=2$	(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 $\alpha=45^\circ17'$; $\gamma=36^\circ41'$; $b=25.4$	(xi)	Define inscribed circle
(xii)	Find the value of $\sec\left[\sin^{-1}\left(-\dfrac{1}{2}\right)\right]$	(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 $\dfrac{x^2}{a^2}+\dfrac{(mx+c)^2}{b^2}=1$ will have equal roots, if $c^2=a^2m^2+b^2$; $a\neq 0$, $b\neq 0$

6.(a) Resolve $\dfrac{x^2+1}{x^3+1}$ 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 $\left[\dfrac{n}{2(n+N)}\right]^{\frac{1}{2}}=\dfrac{8n}{9n-N}-\dfrac{n+N}{4n}$ where n and N are nearly equal.

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

(b) Find the area of the triangle ABC, when $\alpha=35^\circ17'$, $\gamma=45^\circ13'$ 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 $\tan^{-1}\dfrac{1}{11}+\tan^{-1}\dfrac{5}{6}=\tan^{-1}\dfrac{1}{3}+\tan^{-1}\dfrac{1}{2}$