Paper Code Number: **2191**	2023 (1^{st}-A) **INTERMEDIATE PART-I (11^{th} Class)**	**Roll No:** ________

MATHEMATICS PAPER-I GROUP-I MTN-11-1-23

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	The set $\{1, -1\}$ possess closure property under:	Multiplication	Addition	Subtraction	Division
2	If $'p'$ is logic statement then $p \wedge \sim p$ is:	Tautology	Absurdity	Contingency	Conditional
3	Determinant of any unit matrix has value:	Greater than 1	Less than 1	1	Zero
4	If order of a matrix A is $m \times n$ and order of matrix B is $n \times p$ then order of matrix $(AB)^t$ is:	$m \times n$	$n \times m$	$m \times p$	$p \times m$
5	Reciprocal equation remain unchanged when $'X'$ is replaced by:	$-X$	$-\frac{1}{X}$	$\frac{1}{X^2}$	$\frac{1}{X}$
6	If ω is a cube root of unity then $1 + \omega^{28} + \omega^{29}$ is equal to:	Zero	1	ω	ω^2
7	$\frac{x^2+1}{Q(x)}$ will be proper fraction if degree of $Q(x)$ is equal to:	0	1	2	3
8	$(n+1)th$ term of an A.P. is:	$a_1 + (n-1)d$	$a_1 - (n-1)d$	$a_1 + nd$	$a_1 - nd$
9	If A, G, H have their usual meaning, a and b are positive distinct real numbers and $G > 0$ then:	A > G > H	A < G < H	H > G > A	G > H > A
10	In how many ways, 5 persons can be seated at a round table?	23	24	25	26
11	With usual notation $\frac{{}^nP_r}{r!}$ is equal to:	${}^nC_{r-1}$	${}^{n+1}C_r$	${}^nC_r$	${}^{n-1}C_r$
12	Number of terms in expansion of $(1+x)^{2n+1}$, $'n'$ is positive integer are:	$2n+2$	$2n+1$	$2n$	$3n+1$
13	In equality $n! > 2^n - 1$ is valid if:	$n < 4$	$n \geq 4$	$n = 3$	$n < 3$
14	$\frac{\pi}{2}$ is an angle:	Acute	Obtuse	Quadrental	Non-quadrental
15	$\tan(\alpha - 90^o)$ is equal to:	$\cot\alpha$	$-\cot\alpha$	$\tan\alpha$	$-\tan\alpha$
16	Period of $3\sin 3x$ is:	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	π
17	If α, β, γ are angles of an oblique triangle then it must be true that:	$\alpha = 90^o$	$\beta = 90^o$	$\gamma = 90^o$	No angle is 90^o
18	If ABC is right triangle then law of cosines reduces to:	Pythagoras theorem	Law of Sines	Area of triangle	Law of tangents
19	$y = \cos x$ is one to one function in interval:	$\left[0, \frac{2\pi}{3}\right]$	$[0, 2\pi]$	$[0, \infty]$	$[0, \pi]$
20	If $\cos 2x = 0$ then solution in first quadrant is:	30^o	45^o	60^o	15^o

INTERMEDIATE PART-I (11th Class) | 2023 (1st-A) | Roll No:

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-11-1-23

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

(i) Simplify as a simple complex number $(5, -4)\,(-3, -2)$

(ii) Express the complex number $1 + i\sqrt{3}$ in polar form.

(iii) Write the descriptive and tabular form of $\{x | x \in N \wedge x + 4 = 0\}$

(iv) For the sets $A = \{1, 2, 3, 4, 5\}$, $B = \{4, 6, 8, 10\}$ verify the commutative property of intersection.

(v) Show that the statement $\sim (p \to q) \to p$ is a tautology.

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

(vii) Without expansion show that $\begin{vmatrix} 2 & 3 & -1 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{vmatrix} = 0$

(viii) Find the value of λ if matrix $A = \begin{bmatrix} 4 & \lambda & 3 \\ 7 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$ is singular.

(ix) Solve $x^2 - 2x - 899 = 0$ by completing square.

(x) Reduce $x^4 - 6x^2 + 10 - \dfrac{6}{x^2} + \dfrac{1}{x^4} = 0$ to quadratic form.

(xi) Discuss the nature of the roots of the equation $9x^2 - 12x + 4 = 0$

(xii) Prove that the sum of cube roots of unity is zero.

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

(i) Resolve $\dfrac{7x + 25}{(x + 3)(x + 4)}$ into partial fractions.

(ii) Find the number of terms in A.P if $a_1 = 3$, $d = 7$ and $a_n = 59$

(iii) Define a geometric progression (G.P).

(iv) If the numbers $\dfrac{1}{k}, \dfrac{1}{2k + 1}$ and $\dfrac{1}{4k - 1}$ are in harmonic sequence, find k.

(v) Find the sum of the infinite G.P, $2, \sqrt{2}, 1, \ldots\ldots$

(vi) How many terms of the series $-7 + (-4) + (-1) + \ldots\ldots$ amount to 114?

(vii) How many 3 – digit numbers can be formed by using each one of the digits 2, 3, 5, 7, 9 only once?

(viii) Find the value of n, when ${}^nC_5 = {}^nC_4$

(ix) If sample space = $\{1, 2, 3, \ldots\ldots 9\}$, event $A = \{2, 4, 6, 8\}$ and event $B = \{1, 3, 5\}$. Find $P(A \cup B)$

(x) Use mathematical induction to prove that the formula is true for $n = 1$ and $n = 2$ $1 + 4 + 7 + \ldots\ldots(3n - 2) = \dfrac{n(3n - 1)}{2}$

(xi) Calculate $(2.02)^4$ be means of binomial theorem.

(xii) If x is so small that its square and higher powers can be neglected, then show that $\dfrac{\sqrt{1 + 2x}}{\sqrt{1 - x}} \approx 1 + \dfrac{3}{2}x$

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

(i) What is the length of the arc intercepted on a circle of radius 14 cms by the arms of a central angle of 45°?

(ii) Find the values of all the trigonometric functions of 420°.

(iii) Prove that $2\cos^2\theta - 1 = 1 - 2\sin^2\theta$

(iv) Prove that $\cos 330^\circ \sin 600^\circ + \cos 120^\circ \sin 150^\circ = -1$

(v) Prove that $\dfrac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ$

(vi) Find the value of $\cos 15^\circ$ without calculator.

(vii) Write the domain and range of cosecant function.

(viii) Find α if $a = 7$, $b = 7$, $c = 9$.

(ix) With usual notations prove that $\Delta = \sqrt{s(s - a)(s - b)(s - c)}$

(x) Show that $r_3 = s \tan \dfrac{\gamma}{2}$

(xi) Prove that $\sin^{-1} x = \dfrac{\pi}{2} - \cos^{-1} x$

(xii) Find the solution set of $\sin x \cos x = \dfrac{\sqrt{3}}{4}$ in $[0, 2\pi]$

(xiii) Solve the following trigonometric equation $\cot^2\theta = \dfrac{1}{3}$ in $[0, 2\pi]$

SECTION-II

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

5.(a) Use matrices to solve the system of linear equations $x - 2y + z = -1$, $3x + y - 2z = 4$, $y - z = 1$

(b) Solve the equations simultaneously $x + y = a + b$; $\dfrac{a}{x} + \dfrac{b}{y} = 2$

6.(a) Resolve into partial fractions $\dfrac{4x^3}{(x^2 - 1)(x + 1)^2}$

(b) A die is thrown. Find the probability that the dots on the top are prime numbers or odd numbers.

7.(a) Find 'n' so that $\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be harmonic mean between a and b.

(b) If 'x' is so small that its square and higher powers can be neglected, then show that $\dfrac{(9 + 7x)^{\frac{1}{2}} - (16 + 3x)^{\frac{1}{4}}}{4 + 5x} \approx \dfrac{1}{4} - \dfrac{17}{384}x$

8.(a) Find the values of other five trigonometric functions of θ, if $\cos\theta = \dfrac{12}{13}$ and the terminal side of the angle is not in the first quadrant.

(b) Show that $\dfrac{\tan\alpha + \tan\beta}{\tan\alpha - \tan\beta} = \dfrac{\sin(\alpha + \beta)}{\sin(\alpha - \beta)}$

9.(a) Prove that $(r_1 + r_2)\tan\dfrac{\gamma}{2} = c$

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

Paper Code Number: 2198	2023 (1st-A) INTERMEDIATE PART-I (11th Class)	Roll No: MTN-11-2-23
MATHEMATICS PAPER-I	GROUP-II	
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	If A is a matrix of order 3×1 then order of $AA^t =$ ____	1×1	1×3	3×1	3×3
2	If $b^2 - 4ac < 0$ for a quadratic equation $ax^2 + bx + c = 0$ then nature of the roots is ____.	Real and unequal	Real and repeated	Complex or imaginary	Real and rational
3	Under what condition one root of $x^2 + px + q = 0$ is additive inverse of other.	$p = 0$	$q = 0$	$p = 1$	$q = 1$
4	Partial fractions of $\frac{1}{(x-1)^2(x+1)}$ are of the type :	$\frac{Ax+B}{(x-1)^2} + \frac{c}{x+1}$	$\frac{A}{x-1} + \frac{B}{x+1}$	$\frac{Ax}{(x-1)^2} + \frac{B}{x-1}$	$\frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{x+1}$
5	Fifth term of geometric progression(G.P) 3, 6, 12, ... is:	24	48	18	30
6	Sum of n term of the series $\sum_{k=1}^{n} k^2$ is:	$\frac{n(n+1)}{2}$	$\left[\frac{n(n+1)}{2}\right]^2$	$\frac{n(n+1)(2n+1)}{6}$	$\left[\frac{n(2n+1)}{2}\right]^2$
7	If ${}^nC_{10} = \frac{12 \times 11}{2!}$ then $n =$ ____	12	8	11	13
8	If A and B are two independent events then $P(A \cap B) =$ ____	$P(A)+P(B)$	$P(A)P(B)$	$P(A)-P(B)$	$P(A)+P(B)-P(A \cup B)$
9	The sum of coefficients in the binomial expansion equals to ____.	2^{n-1}	2^{n+1}	2^{2n-1}	2^n
10	Third term in the expansion of $(1 + 2x)^{-1}$ is:	$2x$	$-2x$	$4x^2$	$-8x^3$
11	The radius r of the circle in which the arm of a central angle of measure 1 radian cut off an arc of length 35cm is ____.	35 cm	36 cm	30 cm	32 cm
12	$3\sin\alpha - 4\sin^3\alpha =$ ____	$\cos 3\alpha$	$\sin 3\alpha$	$\cos 2\alpha$	$\sin 2\alpha$
13	The range of the function $y = \sec x$ is:	$-1 \le y \le 1$	$-\infty < y < +\infty$	$y \le 1$	$y \ge 1$ or $y \le -1$
14	If measures of the sides of the triangle ABC are $a = 13$, $b = 14$, $c = 15$ then $r =$ ____	8.125	10.5	4	14
15	With usual notations the circum-radius $R =$ ____	$\frac{abc}{4\Delta}$	$\frac{4\Delta}{abc}$	$\frac{\Delta}{s}$	$\frac{s}{\Delta}$
16	$\sin^{-1}A + \sin^{-1}B =$ ____	$\sin^{-1}\left(A\sqrt{1+B^2} + B\sqrt{1+A^2}\right)$	$\sin^{-1}\left(A\sqrt{1-B^2} + B\sqrt{1-A^2}\right)$	$\sin^{-1}\left(A\sqrt{1+B^2} - B\sqrt{1+A^2}\right)$	$\sin^{-1}\left(A\sqrt{1-B^2} - B\sqrt{1-A^2}\right)$
17	Solutions of the equation $\sin x = -\sqrt{3}/2$ which lie in $[0, 2\pi]$ are:	$\pi/6, 5\pi/6$	$2\pi/3, 4\pi/3$	$4\pi/3, 5\pi/3$	$\pi/3, 4\pi/3$
18	If $x + iy = r\cos\theta + ir\sin\theta$ be the polar form of complex number then angle $\theta =$ ____	$\tan^{-1}\frac{y}{x}$	$\tan\frac{y}{x}$	$\tan\frac{x}{y}$	$\tan^{-1}\frac{x}{y}$
19	A compound statement of the form if p then q is called:	Conjunction	Disjunction	Conditional	biconditional
20	In a square matrix A all elements below the principal diagonal are zero is called:	Lower triangular matrix	Upper triangular matrix	Symmetric matrix	Singular matrix

INTERMEDIATE PART-I (11th Class)	2023 (1st-A)	Roll No: MTN-11-2-23
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

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

(i) State trichotomy property and transitive property of inequalities of real numbers.

(ii) Separate $\frac{i}{1+i}$ into real and imaginary parts.

(iii) Define Overlapping sets.

(iv) Construct truth table for statement $(p \wedge \sim p) \to q$

(v) Define semi-group.

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

(vii) Write two properties of determinants.

(viii) Define Skew Hermitian Matrix.

(ix) Solve the equation $x^{\frac{1}{2}} - x^{\frac{1}{4}} - 6 = 0$

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

(xi) Use factor theorem to determine if $x - 2$ is a factor of $x^3 + x^2 - 7x + 1$

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

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

(i) Define Proper Rational Fraction.

(ii) Which term of the A.P $5, 2, -1, \ldots\ldots$ is -85?

(iii) If $5, 8$ are two A.Ms between a and b, find a and b.

(iv) Sum the series $3 + 5 - 7 + 9 + 11 - 13 + 15 + 17 - 19 + \ldots\ldots\ldots$ to $3n$ terms.

(v) If A, G and H are arithmetic, geometric and harmonic means between a and b respectively, show that $G^2 = AH$

(vi) Find the sum of n terms of the series whose nth term is $n^2 + 4n + 1$.

(vii) Prove from the first principle that ${}^nP_r = n \cdot {}^{n-1}P_{r-1}$

(viii) How many permutations of the letters of the word PANAMA can be made, if P is to be the first letter in each arrangement?

(ix) If ${}^nC_8 = {}^nC_{12}$, find n.

(x) Use mathematical induction to prove $2 + 4 + 6 + \ldots\ldots\ldots\ldots + 2n = n(n+1)$ for $n = 1, 2$

(xi) Expand by using binomial theorem $(a + 2b)^5$

(xii) Expand $(1 - x)^{\frac{1}{2}}$ up to three terms.

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

(i) Find x, if $\tan^2 45^\circ - \cos^2 60^\circ = x \sin 45^\circ \cos 45^\circ \tan 60^\circ$

(ii) Prove that $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A \operatorname{cosec}^2 A$

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

(iv) If α, β, γ are the angles of a triangle ABC, then prove that $\tan(\alpha + \beta) + \tan\gamma = 0$

(v) Prove that $\sin(45^\circ + \alpha) = \frac{1}{\sqrt{2}}(\sin\alpha + \cos\alpha)$

(vi) Prove the identity $\frac{1-\cos\alpha}{\sin\alpha} = \tan\frac{\alpha}{2}$

(vii) Find the period of $\cot 8x$

(viii) Find the area of triangle ABC, given three sides, $a = 18, b = 24, c = 30$

(ix) Prove that $r_1 r_2 r_3 = rs^2$

(x) A plane flying directly above a post of 6000m away from anti-aircraft gun observes the gun at an angle of depression of 27°. Find the height of the plane.

(xi) Find the value of $\cos\left(\sin^{-1}\frac{1}{\sqrt{2}}\right)$

(xii) Find the solutions of the equation $\cot\theta = \frac{1}{\sqrt{3}}$, θ lie in $[0, 2\pi]$

(xiii) Find the values of θ, $2\sin\theta + \cos^2\theta - 1 = 0$

SECTION-II

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

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

(b) Find the values of a and b if -2 and 2 are the roots of polynomial $x^3 - 4x^2 + ax + b$

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

(b) There are twenty chits marked $1, 2, 3, \ldots\ldots\ldots, 20$ in a bag. Find the probability of picking a chit, the number written on which is a multiple of 4 or a multiple of 7.

7.(a) Find n A.M's between a and b.

(b) Use mathematical induction to prove that $1 + 2 + 4 + \ldots\ldots + 2^{n-1} = 2^n - 1$

8.(a) Prove the identity $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$

(b) If $\alpha + \beta + \gamma = 180^\circ$ prove that $\cot\beta\cot\alpha + \cot\beta\cot\gamma + \cot\alpha\cot\gamma = 1$

9.(a) Prove that $r_1 + r_2 + r_3 - r = 4R$

(b) Prove that $\sin^{-1}\frac{77}{85} - \sin^{-1}\frac{3}{5} = \cos^{-1}\frac{15}{17}$

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2022 (A) Roll No: (105)

INTERMEDIATE PART-I (11^{th} CLASS)

...EMATICS PAPER-I TIME ALLOWED: 30 Minutes

...UP-I **OBJECTIVE** MAXIMUM MARKS: 20

...te: 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) If $z_1 = 1 + i$, $z_2 = 1 - i$

(A) $z_1 < z_2$ (B) $z_1 > z_2$ (C) $\bar{z}_1 = \bar{z}_2$ (D) $|z_1| = |z_2|$

(2) In $\{P(X), \cap\}$ the identity element is:

(A) ϕ (B) 0 (C) X (D) 1

(3) For a skew symmetric matrix the diagonal elements must be:

(A) 0 (B) 1 (C) -1 (D) 2

(4) If the matrix A is real then $\bar{A}$ equals to:

(A) $-A$ (B) A (C) A^t (D) A^{-1}

(5) Factor of $f(x) = x^n - a^n$, where n is positive integer is:

(A) $x + a$ (B) $x - a$ (C) $x + \frac{1}{a}$ (D) $x - \frac{1}{a}$

(6) Sum of the roots of the quadratic equation $ax^2 - bx + c = 0$ is:

(A) $\frac{-b}{a}$ (B) $\frac{c}{a}$ (C) $\frac{-a}{b}$ (D) $\frac{b}{a}$

(7) $\sin^2\theta + \cos^2\theta = 1$, $\theta \in R$ is:

(A) Algebraic Equation (B) Conditional Equation (C) Identity Equation (D) Radical Equation

(8) If a and b are distinct positive real numbers then:

(A) $A > G$ (B) $A < G$ (C) $A < H$ (D) $G < H$

(9) $\sum_{k=1}^{2n} 1$ equals to:

(A) n (B) $2n$ (C) $3n$ (D) $4n$

(10) Number of ways in which a necklace of 6 heads of different colours be made are:

(A) 5! (B) $\frac{5!}{2}$ (C) 6! (D) $\frac{6!}{2}$

(11) If A and B are mutually exclusive events such that $P(A) = \cdot15$, $P(B) = \cdot35$ then $P(A \cup B)$ equals to:

(A) 0.2 (B) 0.05 (C) 0.005 (D) 0.5

(12) $\forall n \in N$, $1 + 2 + 4 + --- + 2^{n-1}$ equals to:

(A) $3^n - 2$ (B) $4^n - 3$ (C) $2^n - 1$ (D) $5^n - 4$

(13) The exponent of x in 10^{th} term of expansion of $(a + x)^n$ is:

(A) 9 (B) 10 (C) 11 (D) 12

(14) If $\cot\theta > 0$ and $\sin\theta < 0$ then terminal arm of angle lies in:

(A) 1^{st} Quadrant (B) 2^{nd} Quadrant (C) 3^{rd} Quadrant (D) 4^{th} Quadrant

(15) $\cos\left(\frac{3\pi}{2} - \theta\right)$ equals to:

(A) $\sin\theta$ (B) $-\sin\theta$ (C) $\cos\theta$ (D) $-\cos\theta$

(16) Domain of $\sin x$ is:

(A) N (B) W (C) C (D) R

(17) The circle passing through the vertices of a triangle is called:

(A) In-circle (B) Circum-circle (C) Ex-circle (D) Unit circle

(18) With usual notations r equals to:

(A) $\frac{s}{\Delta}$ (B) $\frac{s}{2\Delta}$ (C) $\frac{\Delta}{s}$ (D) $\frac{\Delta}{s-a}$

(19) Range of principal tangent function is:

(A) R (B) N (C) $[-1, 1]$ (D) $[0, +\infty]$

(20) If $\tan x = -1$ then reference angle is:

(A) $\frac{\pi}{4}$ (B) $\frac{-\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{3\pi}{4}$

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2022 (A)

INTERMEDIATE PART-I (11^{th} CLASS)

Roll No: (196)

.HEMATICS PAPER-I

.OUP-I

OBJECTIVE

TIME ALLOWED: 30 Minutes
MAXIMUM MARKS: 20

Note: 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) Domain of $\sin x$ is:
(A) N (B) W (C) C (D) R

(2) The circle passing through the vertices of a triangle is called:
(A) In-circle (B) Circum-circle (C) Ex-circle (D) Unit circle

(3) With usual notations r equals to:
(A) $\frac{s}{\Delta}$ (B) $\frac{s}{2\Delta}$ (C) $\frac{\Delta}{s}$ (D) $\frac{\Delta}{s-a}$

(4) Range of principal tangent function is:
(A) R (B) N (C) $[-1, 1]$ (D) $[0, +\infty]$

(5) If $\tan x = -1$ then reference angle is:
(A) $\frac{\pi}{4}$ (B) $\frac{-\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{3\pi}{4}$

(6) If $z_1 = 1 + i,\ z_2 = 1 - i$
(A) $z_1 < z_2$ (B) $z_1 > z_2$ (C) $\bar{z}_1 = \bar{z}_2$ (D) $|z_1| = |z_2|$

(7) In $\{P(X), \cap\}$ the identity element is:
(A) ϕ (B) 0 (C) X (D) 1

(8) For a skew symmetric matrix the diagonal elements must be:
(A) 0 (B) 1 (C) -1 (D) 2

(9) If the matrix A is real then $\overline{A}$ equals to:
(A) $-A$ (B) A (C) A^t (D) A^{-1}

(10) Factor of $f(x) = x^n - a^n$, where n is positive integer is:
(A) $x + a$ (B) $x - a$ (C) $x + \frac{1}{a}$ (D) $x - \frac{1}{a}$

(11) Sum of the roots of the quadratic equation $ax^2 - bx + c = 0$ is:
(A) $\frac{-b}{a}$ (B) $\frac{c}{a}$ (C) $\frac{-a}{b}$ (D) $\frac{b}{a}$

(12) $\sin^2\theta + \cos^2\theta = 1,\ \theta \in R$ is:
(A) Algebraic Equation (B) Conditional Equation (C) Identity Equation (D) Radical Equation

(13) If a and b are distinct positive real numbers then:
(A) $A > G$ (B) $A < G$ (C) $A < H$ (D) $G < H$

(14) $\sum_{k=1}^{2n} 1$ equals to:
(A) n (B) $2n$ (C) $3n$ (D) $4n$

(15) Number of ways in which a necklace of 6 heads of different colours be made are:
(A) $5!$ (B) $\frac{5!}{2}$ (C) $6!$ (D) $\frac{6!}{2}$

(16) If A and B are mutually exclusive events such that $P(A) = \cdot 15,\ P(B) = \cdot 35$ then $P(A \cup B)$ equals to:
(A) 0.2 (B) 0.05 (C) 0.005 (D) 0.5

(17) $\forall n \in N,\ 1 + 2 + 4 + --- + 2^{n-1}$ equals to:
(A) $3^n - 2$ (B) $4^n - 3$ (C) $2^n - 1$ (D) $5^n - 4$

(18) The exponent of x in 10^{th} term of expansion of $(a + x)^n$ is:
(A) 9 (B) 10 (C) 11 (D) 12

(19) If $\cot\theta > 0$ and $\sin\theta < 0$ then terminal arm of angle lies in:
(A) 1^{st} Quadrant (B) 2^{nd} Quadrant (C) 3^{rd} Quadrant (D) 4^{th} Quadrant

(20) $\cos\left(\frac{3\pi}{2} - \theta\right)$ equals to:
(A) $\sin\theta$ (B) $-\sin\theta$ (C) $\cos\theta$ (D) $-\cos\theta$

ode
Paper: 2192

2022 (A)

INTERMEDIATE PART-I (11th CLASS)

Roll No: 111

MATHEMATICS PAPER-I
GROUP-II

OBJECTIVE

TIME ALLOWED: 30 Minutes
MAXIMUM MARKS: 20

Note: 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) $i^2 . i^4 . i^6 . i^8$ equals to:
(A) 1 (B) 0 (C) -1 (D) i

(2) Set of real numbers between "0" and "1" is:
(A) Finite set (B) Infinite set (C) Empty set (D) Singleton set

(3) If order of matrix A is 7×7 and order of matrix B is 3×7 then:
(A) $B + A$ is possible (B) AB is possible (C) $B - A$ is possible (D) BA is possible

(4) Determinant of a triangular matrix is equal to the product of entries on its:
(A) Secondary diagonal (B) First column (C) Main diagonal (D) First row

(5) The degree of the polynomial $0x^{15} + 3x^{14} + 7x^9 + 8$ is:
(A) 15 (B) 9 (C) 14 (D) 8

(6) Condition that the roots of the equation $x^2 + px + q = 0$ are multiplicative inverse of each other is:
(A) $p = 0$ (B) $q = 0$ (C) $q = 1$ (D) $q = -1$

(7) An equation $\sin\theta = 1$ is:
(A) Identity (B) Algebraic (C) Reciprocal (D) Conditional

(8) Fifth term of H.P $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, ----$ is:
(A) $\frac{1}{4}$ (B) 11 (C) 14 (D) $\frac{1}{14}$

(9) $\sum_{k=1}^{n} 4$ equals to:
(A) n (B) $4n$ (C) $8n$ (D) $2n$

(10) Possible ways to write the name of a triangle with vertices A, B, C are:
(A) 3 (B) 2 (C) 1 (D) 6

(11) ${}^nC_r \times r!$ equals to:
(A) ${}^nP_r$ (B) ${}^nP_n$ (C) ${}^nC_{n-r}$ (D) ${}^nP_{n-r}$

(12) There is no natural no. for which 3^n is:
(A) Odd (B) An integer (C) Even (D) Prime

(13) 6th term from the end in expansion of $(a + x)^{11}$ is:
(A) 7th term from beginning (B) 6th term from beginning (C) 5th term from beginning (D) 8th term from beginning

(14) If $\sec\theta < 0$ and $\sin\theta < 0$, then terminal arm of angle lies in:
(A) 4th Quadrant (B) 3rd Quadrant (C) 2nd Quadrant (D) 1st Quadrant

(15) If α, β, γ are the angles of a triangle then $\sin(\alpha + \beta)$ equals to:
(A) $\sin\beta$ (B) $-\sin\beta$ (C) $\sin\gamma$ (D) $-\sin\gamma$

(16) The minimum value of $\cos\theta$ is:
(A) 0 (B) 1 (C) $-\infty$ (D) -1

(17) If the sides of a triangle are a, b, c then semi perimeter of the triangle is equal to:
(A) $a + b + c$ (B) $\frac{a + b + c}{2}$ (C) $\frac{2}{a + b + c}$ (D) $a + b - c$

(18) In any triangle ABC with usual notations, $\frac{a^2 + c^2 - b^2}{2ac}$ equals to:
(A) $\cos\beta$ (B) $\cos\alpha$ (C) $\cos\gamma$ (D) $\sin\beta$

(19) Inverse of a function exists only if the function is:
(A) One to one (B) Onto (C) Bijective (D) Into

(20) If $\sin\theta = 0$ then θ equals to:
(A) $\left\{2n\pi + \frac{\pi}{2}\right\}, n \in z$ (B) $\left\{n\pi + \frac{\pi}{2}\right\}, n \in z$ (C) $\left\{\frac{n\pi}{2} + n\pi\right\}, n \in z$ (D) $\{n\pi\}, n \in z$

2022 (A) Roll No: ____________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I TIME ALLOWED: 2.30 Hours

GROUP-I **SUBJECTIVE** MAXIMUM MARKS: 80

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

SECTION-I

2. Attempt any eight parts. **8 × 2 = 16**

(i) Separate into real and imignary parts the complex number $\frac{i}{1+i}$

(ii) Find the multiplicative inverse of $a + bi$

(iii) Show that $\forall\, z \in C$; $(z - \bar{z})^2$ is a real number.

(iv) Write two proper subsets of set $\{a, b, c\}$

(v) Construct truth table for $p \wedge \sim q$

(vi) Define Tautology.

(vii) Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} -1 & 1 \\ -3 & 2 \end{bmatrix}$

(viii) Prove that $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 0$

(ix) If 'A' is a non-singular matrix, then show that $(A^{-1})^{-1} = A$

(x) Show that sum of cube roots of unity is zero.

(xi) Evaluate $\omega^{28} + \omega^{29} + 1$ when $\omega^3 = 1$

(xii) Prove that roots of equation $x^2 - 2\left(m + \frac{1}{m}\right)x + 3 = 0;$ $m \neq 0$ are real.

3. Attempt any eight parts. **8 × 2 = 16**

(i) Define proper fraction and give one example.

(ii) For the identity $\frac{1}{(x-1)(2x-1)(3x-1)} = \frac{A}{x-1} + \frac{B}{2x-1} + \frac{C}{3x-1}$ Calculate the value of A.

(iii) Determine whether -19 is the term of A.P. 17, 13, 9, -------- or not.

(iv) Find the next two terms of 1, 3, 4, 15, 31, ---------

(v) Find the number of terms in A.P. in which $a_1 = 11$, $a_n = 68$, $d = 3$

(vi) Find the 12th term of G.P. $1 + i$, $2i$, $-2 + 2i$, -------

(vii) Find three A.Ms between $\sqrt{2}$ and $3\sqrt{2}$

(viii) Show that ${}^{16}C_{11} + {}^{16}C_{10} = {}^{17}C_{11}$

(ix) What is sample space and event?

(x) State the principle of mathematical induction.

(xi) Calculate $(9.98)^4$ by means of binomial theorem.

(xii) Prove that $n! > 2^n - 1$ for $n = 4, 5$

(104)

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

(i) Find 'r' when $\ell = 5cm$, $\theta = \frac{1}{2}$ radian.

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

(iii) Prove that $(\tan\theta + \cot\theta)^2 = \sec^2\theta\, \text{cosec}^2\theta$

(iv) Find the value of $\cos 15^0$. (without using calculator)

(v) Prove that $\frac{\sin 2\alpha}{1 + \cos 2\alpha} = \tan\alpha$

(vi) If $\sin\alpha = \frac{12}{13}$ where $0 < \alpha < \frac{\pi}{2}$. Find the value of $\cos 2\alpha$

(vii) Find the period of $\tan\frac{x}{7}$

(viii) Find the area of triangle ABC, when three sides are $a = 18,\ b = 24,\ c = 30$

(ix) Prove that $r_1 r_2 r_3 = rs^2$ (with usual notations)

(x) Show that $r = (s - a)\tan\frac{\alpha}{2}$ (with usual notations)

(xi) Find the value of $\sec\left(\sin\left(-\frac{1}{2}\right)\right)$

(xii) Find the solutions of $\sec x = -2$ which lies in $[0,\ 2\pi]$

(xiii) Solve the equation $\sin x = \frac{1}{2}$

SECTION-II

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

5.(a) Show that $\begin{vmatrix} a+\ell & a & a \\ a & a+\ell & a \\ a & a & a+\ell \end{vmatrix} = \ell^2(3a + \ell)$

(b) Show that the roots of $x^2 + (mx + c)^2 = a^2$ will be equal, if $c^2 = a^2(1 + m^2)$

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

(b) Insert four H.Ms between $\frac{7}{3}$ and $\frac{7}{11}$

7.(a) Prove that ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$

(b) Prove by Mathematical induction

$$a + (a + d) + (a + 2d) + \cdots + [a + (n-1)d] = \frac{n}{2}[2a + (n-1)d]$$

8.(a) Prove that $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta.\cos^2\theta$

(b) Prove that $\frac{\sin\theta + \sin 3\theta + \sin 5\theta + \sin 7\theta}{\cos\theta + \cos 3\theta + \cos 5\theta + \cos 7\theta} = \tan 4\theta$

9.(a) In any triangle ABC, with usual notation, prove that $\sin\frac{\alpha}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$

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

2022 (A) Roll No: 109

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I TIME ALLOWED: 2.30 Hours

GROUP-II **SUBJECTIVE** MAXIMUM MARKS: 80

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

SECTION-I

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

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

(ii) Find real and imaginary parts of complex number; $(\sqrt{3}+i)^3$

(iii) Prove that $\bar{z} = z$ iff z is real.

(iv) Write the set $\{x \mid x \in P \wedge x < 12\}$ in the descriptive and tabular form.

(v) Show $B - A$ by venn diagram, when $B \subseteq A$

(vi) Convert the theorem $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ to logical form.

(vii) Find the matrix X if: $X \begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 12 & 3 \end{bmatrix}$

(viii) Find the value of x if: $\begin{vmatrix} 1 & 2 & 1 \\ 2 & x & 2 \\ 3 & 6 & x \end{vmatrix} = 0$

(ix) Define skew symmetric matrix.

(x) Solve the equation by factorization $x(x+7) = (2x-1)(x+4)$

(xi) Show that $x^3 - y^3 = (x-y)(x-\omega y)(x-\omega^2 y)$

(xii) If α, β are roots of equation $3x^2 - 2x + 4 = 0$ find the value of $\alpha^2 - \beta^2$

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

(i) Define proper rational fraction. Give one example.

(ii) Write only into partial fractions form the expression $\dfrac{4x^3}{(x^2-1)(x+1)^2}$

(iii) Find the nth term of sequence $\left(\frac{4}{3}\right)^2, \left(\frac{7}{3}\right)^2, \left(\frac{10}{3}\right)^2, ------$

(iv) Calculate the sum of series $\frac{3}{\sqrt{2}} + 2\sqrt{2} + \frac{5}{\sqrt{2}} + ---- + a_{13}$

(v) How many terms of series $-7 + (-5) + (-3) + ----$ amount to 65?

(vi) Find the sum of infinite geometric series $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + ------$

(vii) Calculate A and G for $a = 9,\ b = 4$

(viii) Write $n(n-1)(n-2)$ into factorial form.

(ix) How many words can be formed from PLANE using all letters and no letter is repeated?

(x) Using mathematical induction, prove that $2 + 4 + 6 + ------ + 2n = n(n+1)$ is true for $n = 1$ and $n = 2$

(xi) Find 'r' for finding term independent of x in $\left(\frac{x}{2} + \frac{2}{x^2}\right)^{12}$

(xii) Evaluate $\sqrt[4]{17}$ correct to three places of decimal.

P.T.O.

4. **Attempt any nine parts.** **9 × 2 = 18**

(i) Find 'r' when $\ell = 56cm$, $\theta = 45^o$

(ii) If $\cot\theta = \frac{5}{2}$ and terminal arm of angle is in I quadrant, find value of $\frac{3\sin\theta + 4\cos\theta}{\cos\theta - \sin\theta}$

(iii) Show that $\cot^4\theta + \cot^2\theta = \operatorname{cosec}^4\theta - \sec^2\theta$ where θ is not an integral Multiple of $\frac{\pi}{2}$.

(iv) Prove that $\sin 780^o \sin 480^o + \cos 120^o \sin 30^o = \frac{1}{2}$

(v) Prove the identity $\cos\frac{\alpha}{2} = \pm\sqrt{\frac{1+\cos\alpha}{2}}$

(vi) Express the given product as sum or difference: $\cos(2x + 30^o)\cos(2x - 30^o)$

(vii) Define period of trigonometric function.

(viii) Solve triangle ABC by half angle formula when $a = 283$, $b = 317$, $c = 428$

(ix) Find R, r, r_1, r_2, r_3 if measure of sides of triangle are $a = 13$, $b = 14$, $c = 15$

(x) Area of triangle is 2437. If $a = 79$, and $c = 97$. Find angle β.

(xi) Show that $\tan(\sin^{-1} x) = \frac{x}{\sqrt{1-x^2}}$

(xii) Find value of θ satisfying the equation $\tan^2\theta - \sec\theta - 1 = 0$

(xiii) Solve $\sin x = \frac{1}{2}$

SECTION-II

NOTE: Attempt any three questions. **3 × 10 = 30**

5.(a) Find A^{-1} if $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 1 & -1 & 1 \end{bmatrix}$

(b) Find the values of a and b if -2 and 2 are the roots of the polynomial $x^3 - 4x^2 + ax + b$

6.(a) Resolve $\frac{6x^3 + 5x^2 - 7}{2x^2 - x - 1}$ into partial fractions.

(b) Find five numbers in A.P whose sum is 25 and the sum of whose squares is 135.

7.(a) Prove that ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$

(b) Use mathematical induction to prove the formula for every +ve integer n

$$1^2 + 3^2 + 5^2 + \cdots + (2n-1)^2 = \frac{n(4n^2-1)}{3}$$

8.(a) Find the values of the remaining trigonometric function, if $\sin\theta = \frac{-1}{\sqrt{2}}$ and the terminal arm of the angle is not in quad III.

(b) Prove that $\frac{2\sin\theta\sin 2\theta}{\cos\theta + \cos 3\theta} = \tan 2\theta \tan\theta$

9.(a) Prove that in an equilateral triangle $r : R : r_1 = 1 : 2 : 3$

(b) Prove that $\sin^{-1}\frac{1}{\sqrt{5}} + \cot^{-1} 3 = \frac{\pi}{4}$

ɪr Code Number: 2191

2022 (2^{nd}-A) Roll No: 303

INTERMEDIATE PART-I (11^{th} CLASS)

MATHEMATICS PAPER-I

TIME ALLOWED: 30 Minutes

OBJECTIVE

MAXIMUM MARKS: 20

Note: 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) The set {1, −1} possesses closure property under:
(A) Addition (B) Subtraction (C) Multiplication (D) Negation

(2) Ƶ is a group under:
(A) Division (B) Multiplication (C) Addition (D) Subtraction

(3) $(A^{-1})^t =$
(A) A^{-1} (B) A^t (C) $(A^t)^{-1}$ (D) $|A^t|$

(4) For homogeneous system of linear equation, non-trivial solution exist if $|A| =$
(A) 1 (B) 2 (C) 3 (D) 0

(5) Four fourth roots of $X^4 = 81$ are:
(A) $\pm 3, \pm 3i$ (B) $\pm 9, \pm 9i$ (C) $\pm 3, \pm 9$ (D) $\pm 3i, \pm 9i$

(6) If $b^2 - 4ac > 0$ but not a perfect square then roots of $ax^2 + bx + c = 0,\ a \neq 0$ are:
(A) Real and irrational (B) Real and Rational (C) Equal (D) Imaginary

(7) If an equation holds good for particular values of variable involved is called:
(A) Identity (B) Conditional equation (C) Open sentence (D) Partial fraction

(8) $\sum_{k=1}^{n} k$ is equal to:
(A) $\frac{n(n+1)}{2}$ (B) $\frac{n(n-1)}{2}$ (C) $\frac{n+1}{2}$ (D) $\frac{n(n+1)^2}{2}$

(9) $S_n = \frac{a_1(1-r^n)}{1-r}$ is convergent if:
(A) $|r| = 0$ (B) $|r| > 1$ (C) $|r| < 1$ (D) $r = -1$

(10) Non-occurance of an event E is denoted by $\overline{E}$ then $P(\overline{E}) = ?$
(A) $P(\overline{E}) - 1$ (B) $1 - P(\overline{E})$ (C) $1 - P(E)$ (D) $P(E) - 1$

(11) 0 !
(A) 0 (B) 1 (C) −1 (D) Does not exist

(12) Number of terms in expansion of $(1 + x)^{\frac{1}{2}}$:
(A) 6 (B) 7 (C) $\frac{1}{2}$ (D) Infinite

(13) In equality $n! > 2^n + 1$ is valid if:
(A) $n < 4$ (B) $n \geq 4$ (C) $n \leq 3$ (D) $n = 3$

(14) Which angle is quadrental?
(A) 120° (B) 270° (C) 60° (D) 45°

(15) If α, β, γ are angles of a triangle then $\tan(\alpha + \beta) + \tan\gamma = ?$
(A) 0 (B) 1 (C) 2 (D) −1

(16) Range of cotangent function is:
(A) N (B) Ƶ (C) R (D) C

(17) Notation for radius of in-circle is:
(A) r (B) Ƶ (C) r_1 (D) r_3

(18) In an equilateral triangle $r_1 : r_2 : r_3 =$
(A) 1 : 2 : 3 (B) 1 : 3 : 3 (C) 2 : 3 : 3 (D) 3 : 3 : 3

(19) $\cos(2\sin^{-1} x)$ is equal to:
(A) $\sqrt{1 + x^2}$ (B) $\sqrt{1 - x^2}$ (C) $\sqrt{1 + 2x^2}$ (D) $1 - 2x^2$

(20) Reference angle of $\tan\theta = -1$ is:
(A) $\frac{\pi}{4}$ (B) $-\frac{\pi}{4}$ (C) $-\pi$ (D) $\frac{\pi}{2}$

2022 (2^{nd}-A) Roll No: 307

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I TIME ALLOWED: 2.30 Hours

SUBJECTIVE MAXIMUM MARKS: 80

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

SECTION-I

2. Attempt any eight parts. **8 × 2 = 16**

(i) Simplify and justifying each step. $\frac{4+16x}{4}$

(ii) Simplify $(5,-4)\cdot(-3,-2)$

(iii) Find the multiplicative inverse of $-3-5i$

(iv) Show $A-B$ and $B-A$ by Venn diagram when A and B are overlapping.

(v) Construct the truth table for $(p \rightarrow \sim p) \vee (p \rightarrow q)$

(vi) Write the inverse of relation $\{(x, y) \mid y = 2x+3,\ x \in \mathbb{R}\}$ is its inverse a function or not?

(vii) Find the value of x if $\begin{vmatrix} 1 & x-1 & 3 \\ -1 & x+1 & 2 \\ 2 & -2 & x \end{vmatrix} = 0$

(viii) If the matrices A and B are symmetric and $AB = BA$, show that AB is symmetric.

(ix) Show that $\begin{vmatrix} mn & \ell & \ell^2 \\ n\ell & m & m^2 \\ \ell m & n & n^2 \end{vmatrix} = \begin{vmatrix} 1 & \ell^2 & \ell^3 \\ 1 & m^2 & m^3 \\ 1 & n^2 & n^3 \end{vmatrix}$

(x) Prove that $(x^3+y^3) = (x+y)(x+\omega y)(x+\omega^2 y)$

(xi) If α, β are roots of $ax^2+bx+c=0$, $a \neq 0$, find the value of $(\alpha-\beta)^2$

(xii) Show that roots of equation $(p+q)x^2 - px - q = 0$ will be rational.

3. Attempt any eight parts. **8 × 2 = 16**

(i) Differentiate between an equation and an identity.

(ii) Convert $\frac{3x^2+1}{x-2}$ to mixed fraction form.

(iii) If $\frac{1}{a}, \frac{1}{b}$ and $\frac{1}{c}$ are in A.P., then show that $b = \frac{2ac}{a+c}$

(iv) Calculate the sum of all the integral multiples of 3 between 4 and 97.

(v) Find G.M between $-2i$ and $8i$.

(vi) With usual notation, derive the relation $G^2 = A \times H$

(vii) If the numbers $\frac{1}{k}, \frac{1}{2k+1}$ and $\frac{1}{4k-1}$ are in the harmonic sequence, find k.

(viii) How many arrangements of the letters of the word ATTACKED can be made, if each arrangement begins with C and ends with K.

(ix) Find the value of n when ${}^nC_{12} = {}^nC_6$

(x) Prove that $\frac{1}{3}+\frac{1}{3^2}+ \ldots\ldots\ldots + \frac{1}{3^n} = \frac{1}{2}\left[1-\frac{1}{3^n}\right]$ for $n = 1, 2$

(xi) Write the binomial series with its condition on x.

(xii) Expand $(2+i)^5 - (2-i)^5$ and simplify.

P.T.O.

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

(i) Convert 21.256° to the $D^\circ M' S''$ form.

(ii) Define angle in the standard position with figure.

(iii) Verify $\cos 2\theta = 2\cos^2\theta - 1$ when $\theta = 30^\circ, 45^\circ$

(iv) Show that $\dfrac{\tan\alpha + \tan\beta}{\tan\alpha - \tan\beta} = \dfrac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$

(v) Express $\cos(x+y)\sin(x-y)$ as sum or difference.

(vi) Show that $\sin\left(\dfrac{\pi}{2} + \alpha\right) = \cos\alpha$

(vii) Find the period of $\sin\dfrac{x}{5}$

(viii) Solve the right triangle ABC in which $\gamma = 90^\circ$, $a = 3.28$, $b = 5.74$

(ix) The area of triangle is 2437. If $a = 79$, $c = 97$, then find angle β.

(x) Find the area of the triangle ABC, if $b = 37$, $c = 45$ and $\alpha = 30^\circ 56'$

(xi) Evaluate without using calculator $\cos^{-1}\left(-\dfrac{1}{2}\right)$

(xii) Solve $\sin^2 x + \cos x = 1$ where $x \in [0, 2\pi]$

(xiii) Define trigonometric equation with one example.

SECTION-II

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

5.(a) Prove that $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$

(b) If α and β are roots of $5x^2 - x - 2 = 0$, form the equation whose roots are $\dfrac{3}{\alpha}$ and $\dfrac{3}{\beta}$.

6.(a) Resolve into partial fraction $\dfrac{2x^3 + x^2 - 5x + 3}{2x^3 + x^2 - 3x}$

(b) How many terms of series $-7 + (-5) + (-3) + \ldots\ldots$ amount to 65?

7.(a) A die is rolled twice: Event E_1 is the appearance of even number of dots and event E_2 is the appearance of more than 4 dots. Prove that $P(E_1 \cap E_2) = P(E_1) \cdot P(E_2)$.

(b) Use Mathematical induction to prove that

$$1 \times 2 + 3 \times 4 + 5 \times 6 + \ldots\ldots + (2n-1) \times 2n = \frac{n(n+1)(4n-1)}{3}$$

8.(a) If $\operatorname{cosec}\theta = \dfrac{m^2+1}{2m}$ and $m > 0$, $\left(0 < \theta < \dfrac{\pi}{2}\right)$, find the values of the remaining trigonometric ratios.

(b) Prove that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \dfrac{1}{16}$

9.(a) If $a = 93$, $c = 101$ and $\beta = 80^\circ$. Solve the triangle, using first law of tangents and then law of sines.

(b) Prove that $\tan^{-1}\dfrac{3}{4} + \tan^{-1}\dfrac{3}{5} - \tan^{-1}\dfrac{8}{19} = \dfrac{\pi}{4}$

Paper Code Number:	2197

2021 (A) Roll No: ____________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I MTN-G1-21 TIME ALLOWED: 30 Minutes

GROUP-I **OBJECTIVE** MAXIMUM MARKS: 20

Note: 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) The product of roots of the equation $3x^2 + 5x = 0$
(A) $\frac{-5}{3}$ (B) $\frac{5}{3}$ (C) 5 (D) 0

(2) An equation which is true for all values of unknown is called:
(A) Identity (B) Algebric equation (C) Algebric relation (D) Conditional equation

(3) The A.M between $1 - x + x^2$ and $1 + x + x^2$ is: (A) $x + 1$ (B) $x^2 + 1$ (C) $\frac{x+1}{2}$ (D) $\frac{x^2+1}{2}$

(4) G.M between 2 and 8 is/are: (A) 5 (B) 8 (C) ± 4 (D) 16

(5) The sum of an infinite geometric series with $|r| < 1$, where first term is a and r is common ratio:
(A) $\frac{a}{1+r}$ (B) $\frac{a}{1-r^2}$ (C) $\frac{a}{1-r}$ (D) $\frac{a}{1+r^2}$

(6) If ${}^nP_2 = 30$, then $n =$ (A) 6 (B) 4 (C) 5 (D) 8

(7) General term in the expansion of $(a + x)^n$ is:
(A) $\binom{n}{r} a^{n-r} x^r$ (B) $\binom{n}{r} a^r x^n$ (C) $\binom{n}{r} a^n x^{n-r}$ (D) $\binom{n}{r} a^n x^n$

(8) $\frac{5\pi}{4}$ radian = (A) 360^o (B) 225^o (C) 335^o (D) 270^o

(9) $(\cos 2\theta)^2 + (\sin 2\theta)^2 =$ (A) 0 (B) 2 (C) 4 (D) 1

(10) $\sin(180^0 + \alpha) =$ (A) $-\cos\alpha$ (B) $\sin\alpha$ (C) $\cos\alpha$ (D) $-\sin\alpha$

(11) Period of $\tan\frac{x}{3}$ is: (A) π (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) 3π

(12) In any triangle ABC, with usual notation, $r_1 =$
(A) $\frac{\Delta}{s-a}$ (B) $\frac{\Delta}{s-b}$ (C) $\frac{\Delta}{s-c}$ (D) $\frac{\Delta}{s}$

(13) Circum radius $R =$
(A) $\frac{\Delta}{abc}$ (B) $\frac{\Delta}{s}$ (C) $\frac{abc}{4\Delta}$ (D) $\frac{\Delta}{s-a}$

(14) $\cos\left(\sin^{-1}\frac{1}{\sqrt{2}}\right) =$ (A) $\frac{1}{\sqrt{2}}$ (B) $\frac{1}{2}$ (C) $\frac{\pi}{4}$ (D) $-\frac{\pi}{4}$

(15) If $\sin x = \frac{\sqrt{3}}{2}$ and $x \in [0, 2\pi]$ then $x =$
(A) $\frac{5\pi}{3}, \frac{4\pi}{3}$ (B) $\frac{\pi}{4}, \frac{3\pi}{4}$ (C) $\frac{\pi}{3}, \frac{2\pi}{3}$ (D) $\frac{\pi}{6}, \frac{5\pi}{6}$

(16) If A and B are non empty disjoint sets then:
(A) $A \cap B = A$ (B) $A \cap B = B$ (C) $A \cap B = \phi$ (D) $A \cap B \neq \phi$

(17) If $z = -2 + 3i$, then $\bar{z} =$
(A) $-2 - 3i$ (B) $2 - 3i$ (C) $-2 + 3i$ (D) $2 + 3i$

(18) If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then Adj $A =$
(A) $\begin{bmatrix} -a & -b \\ c & d \end{bmatrix}$ (B) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ (C) $\begin{bmatrix} a & -b \\ -c & d \end{bmatrix}$ (D) $\begin{bmatrix} -a & -b \\ c & -d \end{bmatrix}$

(19) If $|A| = 5$ then $|A^t| =$ (A) $\frac{1}{5}$ (B) 0 (C) -5 (D) 5

(20) Sum of all the four fourth roots of unity is: (A) 0 (B) 1 (C) -1 (D) 4

2021 (A) Roll No: ____________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I MTN-G1-21 TIME ALLOWED: 2.30 Hours

GROUP-I **SUBJECTIVE** MAXIMUM MARKS: 80

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

SECTION-I

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

(i) Find the modulus of the complex number $1 - i\sqrt{3}$

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

(iii) Name the property used in the following equation $a(b-c) = ab - ac$

(iv) Write two proper subsets of the set $\{a, b, c\}$

(v) Construct the truth table of the following statement $(p \wedge \sim p) \to q$

(vi) Find the solution of the linear equation $xa = b$, where a and b belong to group G.

(vii) Find x and y if $\begin{bmatrix} 2 & 0 & x \\ 1 & y & 3 \end{bmatrix} + 2\begin{bmatrix} 1 & x & y \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 4 & -2 & 3 \\ 1 & 6 & 1 \end{bmatrix}$

(viii) Without expansion verify $\begin{vmatrix} 1 & a^2 & \frac{a}{bc} \\ 1 & b^2 & \frac{b}{ca} \\ 1 & c^2 & \frac{c}{ab} \end{vmatrix} = 0$

(ix) Solve the equation by using the quadratic formula $16x^2 + 8x + 1 = 0$

(x) Evaluate $(1 + \omega - \omega^2)(1 - \omega + \omega^2)$

(xi) Find the inverse of matrix $\begin{bmatrix} -2 & 3 \\ -4 & 5 \end{bmatrix}$

(xii) If α, β are roots of the equation $x^2 - px - p - c = 0$ then prove that $(1+\alpha)(1+\beta) = 1 - c$

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

(i) Resolve $\dfrac{1}{(x+1)^2(x^2-1)}$ into partial fractions without finding the constants.

(ii) Resolve $\dfrac{4x^2}{(x^2+1)^2(x-1)}$ into partial fractions without finding constants.

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

(iv) Find A.M. between $x - 3$ and $x + 5$

(v) If 5 is harmonic mean between 2 and b, Find b.

(vi) Find the 12th term of the harmonic sequence $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, -----$

(vii) Find the value of n if ${}^{n}p_4 : {}^{n-1}p_3 = 9:1$

(viii) How many necklaces can be made by 6 beads of different colours?

(ix) How many diagonals can be made by 8 sided figure?

(x) Verify the statement $2 + 6 + 18 + ----- + 2 \times 3^{n-1} = 3^n - 1$ for $n = 1, 2$

(xi) Expand $(4 - 3x)^{1/2}$ upto 3 terms.

(xii) If x be so small that its square and higher powers be neglected, prove that $\dfrac{1-x}{\sqrt{1+x}} \approx 1 - \dfrac{3}{2}x$

P.T.O.

MTN-G1-21

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

(i) Find r, when $\ell = 5cm$, $\theta = \frac{1}{2}$ radian.

(ii) Write any two fundamental identities of trigonometry.

(iii) Evaluate $\dfrac{1 - \tan^2 \pi/3}{1 + \tan^2 \pi/3}$

(iv) If α, β, γ are angles of triangle ABC then prove that $\cos(\alpha + \beta) = -\cos\gamma$

(v) Prove that $\tan(45^o + A)\tan(45^o - A) = 1$

(vi) Prove that $\dfrac{\sin 8x + \sin 2x}{\cos 8x + \cos 2x} = \tan 5x$

(vii) Find the period of $\sin\dfrac{x}{5}$

(viii) A kite is flying at a height of $67.2m$ is attached to a fully stretched string inclined at an angle of 55^o to the horizontal. Find the length of string.

(ix) Find the area of triangle ABC, when $b = 37$, $c = 45$, $\alpha = 30^o50'$

(x) Prove that $r r_1 r_2 r_3 = \Delta^2$

(xi) Show that $\tan(\sin^{-1} x) = \dfrac{x}{\sqrt{1 - x^2}}$

(xii) Solve the equation $\sin x = \dfrac{1}{2}$, where $x \in [0, 2\pi]$

(xiii) Find solution of the equation $\sec x = -2$ which lies in the interval $[0, 2\pi]$

SECTION-II

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

5.(a) If $A = \begin{bmatrix} -1 & 2 \\ 1 & 4 \\ 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ -2 & 1 \end{bmatrix}$ then verify $(AB)^t = B^t A^t$

(b) If 'ω' is a root of $x^2 + x + 1 = 0$ show that its other root is ω^2 and prove that $\omega^3 = 1$

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

(b) Find four Arithmetic Means (A.Ms) between $\sqrt{2}$ and $\dfrac{12}{\sqrt{2}}$

7.(a) Find the values of n and r, when ${}^nC_r = 35$ and ${}^nP_r = 210$

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

8.(a) Prove that $\sin^6\theta - \cos^6\theta = (\sin^2\theta - \cos^2\theta)(1 - \sin^2\theta\cos^2\theta)$

(b) Prove that $\dfrac{2\sin\theta\,\sin(2\theta)}{\cos\theta + \cos(3\theta)} = \tan(2\theta)\tan\theta$

9.(a) The sides of a triangle are $x^2 + x + 1$, $2x + 1$ and $x^2 - 1$. Prove that the greatest angle of the triangle is 120^o.

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

Paper Code Number: 2194	2021 (A)	Roll No: ______________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I MTN-42-21 TIME ALLOWED: 30 Minutes

GROUP-II **OBJECTIVE** MAXIMUM MARKS: 20

Note: 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. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) The A.M between $\sqrt{2}$, $3\sqrt{2}$ is: (A) $\sqrt{6}$ (B) $-2\sqrt{2}$ (C) $2\sqrt{2}$ (D) $-\sqrt{6}$

(2) Common ratio of G.P $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ is:
(A) $\pm\sqrt{\frac{a}{c}}$ (B) $\pm\sqrt{\frac{c}{a}}$ (C) $\pm\sqrt{\frac{b}{c}}$ (D) $\pm\sqrt{\frac{c}{b}}$

(3) H.M between 3 and 7 is: (A) 5 (B) $\sqrt{21}$ (C) $\frac{21}{5}$ (D) $\frac{5}{21}$

(4) If A and B are two independent events, then $P(A\cap B) =$
(A) $P(A)+P(B)$ (B) $P(A)-P(B)$ (C) $P(A\cup B)$ (D) $P(A)\cdot P(B)$

(5) The number of terms in the expansion of $(a+x)^n$ are:
(A) n (B) $n+1$ (C) $n-1$ (D) $2n$

(6) The value of $\tan\theta$ for $\theta = 30^o$ is: (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{2}{\sqrt{3}}$ (D) $\frac{\sqrt{3}}{2}$

(7) $\frac{5\pi}{6}$ radian = (A) 150^o (B) 130^o (C) 120^o (D) 60^o

(8) If $\sin\alpha = 4/5$, $0<\alpha<\pi/2$, then $\cos\alpha =$ (A) $\frac{2}{5}$ (B) $\frac{1}{5}$ (C) $\frac{4}{5}$ (D) $\frac{3}{5}$

(9) π is the period of: (A) $\sec\theta$ (B) $\operatorname{cosec}\theta$ (C) $\cot\theta$ (D) $\sin 3\theta$

(10) In any triangle ABC, with usual notation $\sqrt{\frac{s(s-c)}{ab}} =$
(A) $\cos\frac{\gamma}{2}$ (B) $\cos\frac{\alpha}{2}$ (C) $\cos\frac{\beta}{2}$ (D) $\sin\frac{\alpha}{2}$

(11) Radius of e-circle opposite to vertex 'A' of ΔABC is:
(A) $\frac{\Delta}{s-a}$ (B) $\frac{\Delta}{s-c}$ (C) $\frac{\Delta}{s}$ (D) $\frac{\Delta}{s-b}$

(12) $2\tan^{-1}(A) =$
(A) $\tan^{-1}\left(\frac{A}{1-A^2}\right)$ (B) $\tan^{-1}\left(\frac{A}{1+A^2}\right)$ (C) $\tan^{-1}\left(\frac{2A}{1-A^2}\right)$ (D) $\tan^{-1}\left(\frac{2A}{1+A^2}\right)$

(13) Reference angle of $\sin x = \frac{1}{2}$ is: (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

(14) Every non terminating, non recurring decimal represents:
(A) Rational number (B) Irrational number (C) Natural number (D) Whole number

(15) If A and B are any subsets of U, then $A-B =$
(A) $A\cup B^C$ (B) $(A\cup B)^C$ (C) $(A\cap B)^C$ (D) $A\cap B^C$

(16) A square matrix $A=[a_{ij}]$ is called upper triangular matrix if:
(A) $a_{ij}=0$ for $i<j$ (B) $a_{ij}=0$ for $i>j$ (C) $a_{ij}\neq 0$ for $i>j$ (D) $a_{ij}=k$ for $i<j$

(17) The trivial solution of system of homogeneous linear equation in three variables is:
(A) $(0,0,1)$ (B) $(0,1,0)$ (C) $(0,0,0)$ (D) $(0,-1,0)$

(18) If α, β are the roots of $x^2-px-p-c=0$, then $\alpha\beta =$
(A) $-p-c$ (B) $p+c$ (C) $p-c$ (D) $-p+c$

(19) Sum of all the four fourth roots of unity is: (A) 1 (B) 0 (C) -1 (D) 2

(20) Partial fraction of $\frac{x^2+1}{(x+1)(x-1)}$ will be of the form:
(A) $\frac{A}{x-1}+\frac{B}{x+1}$ (B) $\frac{A}{x+1}+\frac{Bx+C}{x-1}$ (C) $\frac{Ax+B}{x^2-1}$ (D) $1+\frac{A}{x+1}+\frac{B}{x-1}$

2021 (A) Roll No: ____________

INTERMEDIATE PART-I (11^{th} CLASS)

MATHEMATICS PAPER-I MTW-G2-21 TIME ALLOWED: 2.30 Hours

GROUP-II **SUBJECTIVE** MAXIMUM MARKS: 80

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

SECTION-I

2. Attempt any eight parts. **8 × 2 = 16**

(i) Prove the following rule of addition $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$

(ii) Find the multiplicative inverse of $(-4, 7)$

(iii) If Z_1 and Z_2 are the complex numbers then prove that $|Z_1 \cdot Z_2| = |Z_1| \cdot |Z_2|$

(iv) Write the set $\{x \mid x \in N \wedge x \leq 10\}$ into (i) Descriptive form (ii) Tabular form

(v) Determine that $p \rightarrow (p \vee q)$ is a tautology or not.

(vi) Find the domain and range of the relation $\{(x, y) | x + y > 5\}$ if $A = \{1, 2, 3, 4\}$

(vii) Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$

(viii) If A and B are two square matrices of same order, then explain why in general $(A+B)(A-B) \neq A^2 - B^2$

(ix) Without expansion, show that $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 0$

(x) Find four fourth roots of unity.

(xi) Find the number, if sum of a positive number and its reciprocal is $\frac{26}{5}$

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

3. Attempt any eight parts. **8 × 2 = 16**

(i) Resolve into partial fractions $\frac{1}{(x-1)(2x-1)(3x-1)}$

(ii) Resolve into partial fractions, without finding the constants $\frac{x^2+15}{(x^2+2x+5)(x-1)}$

(iii) If $\frac{1}{a}, \frac{1}{b}$ and $\frac{1}{c}$ are in A.P, show that $b = \frac{2ac}{a+c}$

(iv) How many terms of the series $-7 + (-5) + (-3) + ---$, amount to 65?

(v) Find geometric means between 2 and 16.

(vi) If $y = \frac{x}{2} + \frac{1}{4}x^2 + \frac{1}{8}x^3 + ---$ and if $0 < x < 2$, prove that $x = \frac{2y}{1+y}$

(vii) Prove that ${}^nP_r = n \cdot {}^{n-1}P_{r-1}$

(viii) How many arrangements of the letters of word, taken all together, can be made "PAKISTAN"?

(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) Show that the inequality $4^n > 3^n + 4$ is true for integral values of $n = 2, 3$

(xi) Expand upto three terms $(4-3x)^{1/2}$

(xii) If x is so small that its square and higher powers can be neglected, then show that $\frac{1-x}{\sqrt{1+x}} \approx 1 - \frac{3}{2}x$

MTN-G2-21

9 × 2 = 18

4. **Attempt any nine parts.**

(i) If $\sin\theta = -\frac{1}{\sqrt{2}}$ R (θ) is in 3rd quadrant. Find the value of $\cot\theta$

(ii) Verify that $2\sin 45^o + \frac{1}{2}\operatorname{cosec}45^o = \frac{3}{\sqrt{2}}$

(iii) Verify that $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

(iv) Express $\sin 319^o$ as a trigonometric function of an angle of positive degree measure of less than 45^o.

(v) Prove that $\tan(45^o + A).Tan(45^o - A) = 1$

(vi) Prove that $1 + \tan\alpha \,.\, \tan 2\alpha = \sec 2\alpha$

(vii) Find the period of $3\cos\frac{x}{5}$

(viii) Solve for C in a triangle ΔABC if $\gamma = 90^o$, $\alpha = 62^o40'$ and $b = 796$

(ix) In an equilateral triangle find the value of R.

(x) Prove that $(r_1 + r_2)\tan\frac{\gamma}{2} = c$

(xi) Find the value of $\operatorname{cosec}(\tan^{-1}(-1))$

(xii) Solve $\sin x + \cos x = 0$ for $x \in [0, 2\pi]$

(xiii) Find the solution of $\cot\theta = 1/\sqrt{3}$ for $\theta \in [0, \pi]$

SECTION-II

NOTE: Attempt any three questions. **3 × 10 = 30**

5.(a) Solve the system of linear equations by Cramer's rule.
$2x_1 - x_2 + x_3 = 8,\quad x_1 + 2x_2 + 2x_3 = 6,\quad x_1 - 2x_2 - x_3 = 1$

(b) If the roots of $px^2 + qx + q = 0$ are α and β, then prove that $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} + \sqrt{\frac{q}{p}} = 0$

6.(a) Resolve $\frac{3x + 7}{(x^2 + 4)(x + 3)}$ into partial fractions.

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

7.(a) If $y = \frac{1}{3} + \frac{1\cdot 3}{2!}\left(\frac{1}{3}\right)^2 + \frac{1\cdot 3\cdot 5}{3!}\left(\frac{1}{3}\right)^3 + \text{------}$ then prove that $y^2 + 2y - 2 = 0$

(b) Find the values of n and r when ${}^nC_r = 35$ and ${}^nP_r = 210$

8.(a) Find the values of the trigonometric function $\frac{-17\pi}{3}$

(b) Prove that $\frac{2\sin\theta\sin 2\theta}{\cos\theta + \cos 3\theta} = \tan 2\theta\tan\theta$

9.(a) Solve the triangle ABC if $a = 53$; $\beta = 88^o36'$; $\gamma = 31^o54'$

(b) Prove that $\sin^{-1}\left(\frac{5}{13}\right) + \sin^{-1}\left(\frac{7}{25}\right) = \cos^{-1}\left(\frac{253}{325}\right)$