Paper Code Number: 2197	2021 (A) INTERMEDIATE PART-I (11th CLASS)	Roll No: _____

MATHEMATICS PAPER-I MTN-91-21 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° (B) 225° (C) 335° (D) 270°

(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 × 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 $(p \wedge \sim p) \rightarrow q$

(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 × 2 = 16**

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

(ii) Resolve $\frac{4x^2}{(x^2+1)^2(x-1)}$ 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 $(4 - 3x)^{\frac{1}{2}}$ upto 3 terms.

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

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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 $\frac{1 - \tan^2 \pi/3}{1 + \tan^2 \pi/3}$

(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 $\frac{\sin 8x + \sin 2x}{\cos 8x + \cos 2x} = \tan 5x$

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

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

(xii) Solve the equation $\sin x = \frac{1}{2}$, 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 $\frac{x^2 + 1}{x^3 + 1}$ into partial fractions.

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

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 $\left(x^2 - \frac{3}{2x}\right)^{10}$

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

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 $\tan^{-1}\frac{1}{11} + \tan^{-1}\frac{5}{6} = \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{2}$