Paper Code Number: 2191

2019 (A) Roll No: MTN-11-G1-19

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-I

TIME ALLOWED: 30 Minutes
MAXIMUM MARKS: 20

OBJECTIVE

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. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) If $i = \sqrt{-1}$, then $i^{14} =$

(A) 1 (B) -1 (C) i (D) $-i$

(2) The symbol used to denote a biconditional between two propositions is:

(A) $\longrightarrow$ (B) $\wedge$ (C) $\longleftrightarrow$ (D) $\vee$

(3) For a non singular matrix A, if $AX = B$, then $X =$

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

(4) If $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & 0 & 1 \\ 4 & 5 & 2 \end{bmatrix}$, then $M_{13} =$ (A) 13 (B) 0 (C) 10 (D) 7

(5) The number of roots of polynomial $8x^6 - 19x^3 - 27 = 0$ are: (A) 2 (B) 4 (C) 6 (D) 8

(6) If s = sum of roots and p = product of roots, then quadratic equation can be written as:

(A) $x^2 + sx + p = 0$ (B) $x^2 - sx - p = 0$ (C) $x^2 - sx + p = 0$ (D) $sx^2 - sx + p = 0$

(7) $\dfrac{2x^2}{(x-3)(x+2)^2}$ is a fraction: (A) Proper (B) Improper (C) Identity (D) Irrational

(8) If $a_n = (-1)^{n+1}$, then $a_{26} =$ (A) 1 (B) -1 (C) i (D) $-i$

(9) Geometric Mean between $4i$ and $-16i$ is: (A) 8 (B) -8 (C) ± 8 (D) ± 64

(10) The factorial form of $n(n-1)(n-2)\cdots(n-r+1)$ is:

(A) $\dfrac{n!}{(n-r)!}$ (B) $(n-1)!$ (C) $n!$ (D) $\dfrac{n!}{(n-r+1)!}$

(11) When A and B are two disjoint events, then $P(A \cup B) =$

(A) $P(A) - P(B)$ (B) $P(A) + P(B) - P(A \cap B)$ (C) $P(A) - P(A \cap B)$ (D) $P(A) + P(B)$

(12) The statement $4^n > 3^n + 4$ is true if: (A) $n < 2$ (B) $n \neq 2$ (C) $n \geq 2$ (D) $n \leq 2$

(13) In the expansion of $(3 - 2x)^8$, 5th term will be its:

(A) Last term (B) 2nd last term (C) 3rd last term (D) Middle term

(14) The measure of angle between hands of a watch at 3 0'clock is: (A) 30° (B) 60° (C) 90° (D) 120°

(15) The angle $\dfrac{3\pi}{2} - \theta$ lies in quadrant: (A) I (B) II (C) III (D) IV

(16) Range of the function $y = \cos x$ is:

(A) $-\infty < x < \infty$ (B) $-\infty < y < \infty$ (C) $-1 \leq y \leq 1$ (D) $-1 \leq x \leq 1$

(17) In a ΔABC with usual notation $\sqrt{\dfrac{s(s-a)}{bc}} =$ (A) $\sin\dfrac{\alpha}{2}$ (B) $\cos\dfrac{\alpha}{2}$ (C) $\cos\dfrac{\beta}{2}$ (D) $\sin\dfrac{\beta}{2}$

(18) Area of ΔABC in terms of measure of its all sides is:

(A) $\dfrac{1}{2}bc\sin\alpha$ (B) $\dfrac{c^2\sin\alpha\sin\beta}{2\sin\gamma}$ (C) $\dfrac{1}{2}ca\sin\beta$ (D) $\sqrt{s(s-a)(s-b)(s-c)}$

(19) $Tan\left(Tan^{-1}(-1)\right) =$ (A) -1 (B) 1 (C) 2 (D) -2

(20) Solution set of $\sin x = \dfrac{1}{2}$ is:

(A) $\left\{\dfrac{4\pi}{3}, \dfrac{5\pi}{3}\right\}$ (B) $\left\{\dfrac{\pi}{6}, \dfrac{5\pi}{6}\right\}$ (C) $\left\{\dfrac{\pi}{3}, \dfrac{4\pi}{3}\right\}$ (D) $\{0, \pi\}$

2019 (A) Roll No: MTN-11-19

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-I

TIME ALLOWED: 2.30 Hours

MAXIMUM MARKS: 80

SUBJECTIVE

G-I Group-I

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) Express $(2+\sqrt{-3})(3+\sqrt{-3})$ in the form of $a+bi$ and simplify.

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

(iii) Factorize $9a^2 + 16b^2$

(iv) Define union of two sets and give an example.

(v) If A and B are any two sets then prove $(A \cup B)' = A' \cap B'$

(vi) Define tautology and absurdity.

(vii) If A and B are non singular matrices then prove $(AB)^{-1} = B^{-1}A^{-1}$

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

(ix) If $A = \begin{bmatrix} 0 & 2-3i \\ -2-3i & 0 \end{bmatrix}$ then show that A is skew-hermitian.

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

(xi) Using factor theorem show that $(x-1)$ is a factor of $x^2 + 4x - 5$

(xii) The sum of a positive number and its reciprocal is $\frac{26}{5}$. Find the number.

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

(i) Define "Proper Rational Fraction".

(ii) Resolve $\frac{x^2+1}{(x+1)(x-1)}$ into Partial Fractions.

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

(iv) Find the next two terms of the sequence: 1, 3, 7, 15, 31, ----

(v) If the nth term of the A.P is $3n-1$, find its first three terms.

(vi) Find the 11th term of the geometric sequence: $1+i, 2, \frac{4}{1+i}, ---$

(vii) Insert two G. Ms. between 1 and 8.

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

(ix) Find the value of n when ${}^{n}P_4 : {}^{n-1}P_3 = 9:1$

(x) Prove the formula for $n=1$ and $n=2$: $1+4+7+---+(3n-2) = \frac{n(3n-1)}{2}$

(xi) Calculate $(0.97)^3$ by using binomial theorem.

(xii) Expand upto 4 terms: $(2-3x)^{-2}$ taking the values of x such that expansion is valid.

P.T.O.

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

(i) Find θ, if $\ell = 1.5cm$, $r = 2.5cm$

(ii) Prove $2\sin 45^\circ + \frac{1}{2}\operatorname{cosec} 45^\circ = \frac{3}{\sqrt{2}}$

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

(iv) Prove $\frac{\tan\alpha + \tan\beta}{\tan\alpha - \tan\beta} = \frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$

(v) Prove $\frac{\tan\frac{\theta}{2} + \cot\frac{\theta}{2}}{\cot\frac{\theta}{2} - \tan\frac{\theta}{2}} = \sec\theta$

(vi) Prove $\sin\left(\frac{\pi}{4} - \theta\right)\sin\left(\frac{\pi}{4} + \theta\right) = \frac{1}{2}\cos 2\theta$

(vii) Find the period of $\cos 2x$.

(viii) Find the area of a ΔABC, if $b = 37$, $c = 45$, $\alpha = 30°50'$

(ix) Prove $R = \frac{abc}{4\Delta}$

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

(xi) Prove $\cos(Sin^{-1}x) = \sqrt{1 - x^2}$

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

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

SECTION-II

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

5.(a) Show that the set $\{1, w, w^2\}$ when $w^3 = 1$ is an abelian group w.r.t. ordinary multiplication. 5

(b) Find n so that $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ may be A.M between a and b. 5

6.(a) Find the inverse of the matrix $A = \begin{bmatrix} 2 & 5 & -1 \\ 3 & 4 & 2 \\ 1 & 2 & -2 \end{bmatrix}$ by using column operation. 5

(b) A die is thrown twice. What is the probability that the sum of dots shown is 3 or 11. 5

7.(a) Find the condition that $\frac{a}{x-a} + \frac{b}{x-b} = 5$ may have roots equal in magnitude but opposite in signs. 5

(b) Use binomial theorem to prove that $1 + \frac{1}{4} + \frac{1.3}{4.8} + \frac{1.3.5}{4.8.12} + ----- = \sqrt{2}$ 5

8.(a) If $\cot\theta = \frac{5}{2}$ and the terminal arm of the angle is in the I quadrant, then find the value of 5

$$\frac{3\sin\theta + 4\cos\theta}{\cos\theta - \sin\theta}$$

(b) Find the value of $\sin 18^\circ$ without using table or calculator. Hint: $5\theta = 2\theta + 3\theta = 90^\circ$ 5

9.(a) Prove that $\frac{1}{2rR} = \frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}$ 5

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