MTN-11-G2-18

Paper Code Number: 2198

2018 (A)

Roll No: ____________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-II

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. 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) A reciprocal equation, remains unchanged when variable x is replaced by:-
(A) $\frac{-1}{x}$ (B) $\frac{1}{x^2}$ (C) $-x$ (D) $\frac{1}{x}$

(2) $f(x) = 3x^4 + 4x^3 + x - 5$ is divided by $x + 1$ then remainder is:- (A) -6 (B) 7 (C) 6 (D) -7

(3) Types of rational fractions are:- (A) Two (B) Three (C) Four (D) Infinite

(4) Harmonic Mean between a and b is:- (A) $\frac{ab}{a+b}$ (B) $\frac{a+b}{ab}$ (C) $\frac{2ab}{a+b}$ (D) $\frac{a-b}{ab}$

(5) If $a = -1$ and $b = 5$ then $A \times H$ is equal to:- (where A = A.M and H = H.M)
(A) -5 (B) $\frac{-5}{2}$ (C) 5 (D) $\frac{2}{5}$

(6) ${}^nC_{r-1} + {}^nC_{r-2}$ is equal to:- (where C is combination)
(A) ${}^nC_{r-1}$ (B) ${}^{n+1}C_{r-1}$ (C) ${}^{n+1}C_{r-2}$ (D) ${}^nC_{r-2}$

(7) The value of n when ${}^{11}P_n = 11 \times 10 \times 9$ is:- (where P is permutation)
(A) 0 (B) 1 (C) 2 (D) 3

(8) In the expansion of $(3 + x)^4$ middle term will be:- (A) 81 (B) $54x^2$ (C) $26x^2$ (D) x^4

(9) The inequality $4^n > 3^n + 4$ is valid if n is:-
(A) $n = 2$ (B) $n = 1$ (C) $n = -1$ (D) $n = -2$

(10) The angle $\frac{\pi}{12}$ in degree measure is:- (A) 30° (B) 20° (C) 45° (D) 15°

(11) $\tan(\pi - \alpha)$ equals:-
(A) $\tan\alpha$ (B) $-\tan\alpha$ (C) $\cot\alpha$ (D) $-\cot\alpha$

(12) Period of $\cot 8x$ is:-
(A) $\frac{\pi}{8}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) π

(13) In any triangle ΔABC, with usual notation, $\sqrt{\frac{s(s-c)}{ab}}$ is equal to:-
(A) $\sin\frac{\gamma}{2}$ (B) $\cos\frac{\gamma}{2}$ (C) $\sin\frac{\alpha}{2}$ (D) $\cos\frac{\alpha}{2}$

(14) In a right angle triangle no angle is greater than:-
(A) 90° (B) 30° (C) 45° (D) 60°

(15) The value of $\sin^{-1}\left(\cos\frac{\pi}{6}\right)$ is equal to:-
(A) $\frac{\pi}{2}$ (B) $\frac{3\pi}{2}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{3}$

(16) If $\sin x = \frac{1}{2}$ then x is equal to:-
(A) $\frac{\pi}{6}, \frac{5\pi}{6}$ (B) $\frac{-\pi}{6}, \frac{-5\pi}{6}$ (C) $\frac{-\pi}{6}$ (D) $\frac{-5\pi}{6}$

(17) Multiplicative inverse of complex number $(\sqrt{2}, -\sqrt{5})$ is:-
(A) $\left(\frac{\sqrt{2}}{\sqrt{7}}, \frac{\sqrt{5}}{\sqrt{7}}\right)$ (B) $\left(\frac{-\sqrt{2}}{\sqrt{7}}, \frac{-\sqrt{5}}{\sqrt{7}}\right)$ (C) $\left(\frac{\sqrt{2}}{7}, \frac{\sqrt{5}}{\sqrt{7}}\right)$ (D) $\left(\frac{\sqrt{2}}{7}, \frac{\sqrt{5}}{7}\right)$

(18) If A, B are two sets then $A \cap (A \cup B)$ equals:- (A) A (B) $A \cup B$ (C) B (D) ϕ

(19) A square matrix A is called skew symmetric if $A' =$ ____
(A) A (B) $\bar{A}$ (C) $-A'$ (D) $-A$

(20) If $\begin{vmatrix} 2 & \lambda \\ 3 & 7 \end{vmatrix} = 2$, then $\lambda =$ ______ (A) 1 (B) 2 (C) 3 (D) 4

MTN-11-G2-18

2018 (A) Roll No: ______________

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-II 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. **$8 \times 2 = 16$**

(i) Prove that $\frac{7}{12} - \frac{5}{18} = \frac{-21-10}{36}$ by justifying each step. (writing each property)

(ii) Simplify the following $(5, -4) \div (-3, -8)$

(iii) Prove that $\bar{z} = z$ if and only if z is real.

(iv) Write two proper subsets of the set of real numbers R.

(v) Construct truth table for the following $(p \wedge \sim p) \rightarrow q$.

(vi) For a set $A = \{1, 2, 3, 4\}$, find the relation $R = \{(x, y) / x + y < 5\}$ in A. Also state the domain of R.

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

(viii) If $A = [a_{ij}]_{3\times 4}$, then show that $I_3 A = A$

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

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

(xi) Show that $x^3 - y^3 = (x-y)(x-\omega y)(x-\omega^2 y)$, where ω is a cube root of unity.

(xii) Use remainder theorem to find the remainder, when $x^2 + 3x + 7$ is divided by $x+1$.

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

(i) Define a Partial Fraction.

(ii) If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in arithmetic progression, show that $b = \frac{2ac}{a+c}$

(iii) Find the arithmetic mean between $3\sqrt{5}$ and $5\sqrt{5}$.

(iv) If the series $y = \frac{x}{2} + \frac{x^2}{4} + \frac{x^3}{8} + ------ \infty$ and $0 < x < 2$. Then prove that $x = \frac{2y}{1+y}$

(v) If 5 is Harmonic mean between "2" and "b". Find "b".

(vi) Prove that $\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$

(vii) How many 5 digits multiples of "5" can be formed from the digits 2, 3, 5, 7, 9 when no digit is to be repeated?

(viii) Find n if ${}^nC_5 = {}^nC_4$ (C is used for combination)

(ix) What is the probability that a slip of numbers divisible by 4 is picked from slips bearing numbers 1, 2, 3, _____, 10?

(x) Use Binomial Theorem, find $(21)^5$.

(xi) Expand up to four terms $(8-2x)^{-1}$

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

P.T.O.

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

(i) Find "ℓ"(arc length) when $r = 18mm$ and $\theta = 65^\circ 20'$.

(ii) If $\sec\theta < 0$ and $\sin\theta < 0$, in which quadrant terminal arm of 'θ' lies.

(iii) Show that $Sin^2 \pi/6 + Sin^2 \pi/3 + \tan^2 \pi/4 = 2$

(iv) Prove that $Sin(180^\circ + \theta)\ Sin(90^\circ - \theta) = -Sin\theta Cos\theta$

(v) Find the value of $Sin 15^\circ$

(vi) Prove that $\tan 2\theta = \dfrac{2\tan\theta}{1 - \tan^2\theta}$

(vii) Find the period of $Cos\, x/6$

(viii) In a right ΔABC, if $b = 30.8$, $c = 37.2$ and $\gamma = 90^\circ$. Find α and β

(ix) Find the area of ΔABC in which $b = 21.6$, $c = 30.2$ and $\alpha = 52^\circ 40'$.

(x) Define "Inscribed Circle".

(xi) Show that $Cos\left(Sin^{-1}x\right) = \sqrt{1 - x^2}$

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

(xiii) Solve the equation $4Cos^2 x - 3 = 0$, where $x \in [0, 2\pi]$

SECTION-II

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

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

(b) Without expansion verify that $\begin{vmatrix} -a & 0 & c \\ 0 & a & -b \\ b & -c & 0 \end{vmatrix} = 0$ 5

6.(a) Resolve $\dfrac{x^2 + 1}{x^3 + 1}$ into Partial Fraction. 5

(b) Solve the equation $\sqrt{3x^2 - 7x - 30} - \sqrt{2x^2 - 7x - 5} = x - 5$ 5

7.(a) Find the value of n so that $\dfrac{a^n + b^n}{a^{n-1} + b^{n-1}}$ may be the Arithmetic Mean between a and b. 1 + 3 + 1

(b) Use mathematical induction to prove that the following formula holds for every positive integer "n"

$$\frac{1}{2 \times 5} + \frac{1}{5 \times 8} + \frac{1}{8 \times 11} + ------ + \frac{1}{(3n-1)(3n+2)} = \frac{n}{2(3n+2)}$$ 1 + 1 + 3

8.(a) Prove that $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\ \cos^2\theta$ 5

(b) Prove that $\sin\dfrac{\pi}{9}\sin\dfrac{2\pi}{9}\sin\dfrac{\pi}{3}\sin\dfrac{4\pi}{9} = \dfrac{3}{16}$ 5

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° 5

(b) Prove that $Cos^{-1}\dfrac{63}{65} + 2\tan^{-1}\dfrac{1}{5} = Sin^{-1}\dfrac{3}{5}$ 5