MTN-11-G1-18

Paper Code Number: 2195

2018 (A)

Roll No: _____

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 ${}^nC_8 = {}^nC_{12}$, where C stands for combination then value of n is equals to:-

(A) 4 (B) 20 (C) 8 (D) 12

(2) The inequality $n^2 > n+3$ is true for:- (A) $n \geq 2$ (B) $n \geq 3$ (C) $n \geq 0$ (D) $n \geq 1$

(3) The coefficient of the last term in the expansion of $(x-y)^5$ is:- (A) -1 (B) 1 (C) 5 (D) -5

(4) $Sin^2(5\theta) + Cos^2(5\theta) =$ _____ (A) 5 (B) 2 (C) 1 (D) 10

(5) For double angle identities $Sin2\alpha =$ _____

(A) $1-2Sin^2\alpha$ (B) $2\sin\alpha Cos\alpha$ (C) $2Cos^2\alpha - 1$ (D) $Cos^2\alpha - Sin^2\alpha$

(6) The smallest positive number p for which $f(x+p) = f(x)$ is called:-

(A) Index (B) Domain (C) Coefficients (D) Period

(7) For any triangle ΔABC, with usual notations r_2 is equals to:-

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

(8) If ΔABC is right angle triangle such that $m\angle\alpha = 90°$, then with usual notations, the true statement is:-

(A) $a^2 = b^2 + c^2$ (B) $b^2 = a^2 + c^2$ (C) $c^2 = a^2 + b^2$ (D) $a^2 = b^2 = c^2$

(9) The domain of $y = Sin^{-1}x$ is:-

(A) $-1 < x < 1$ (B) $-1 \leq x \leq 1$ (C) $-\pi/2 \leq x \leq \pi/2$ (D) $-\pi/2 < x < \pi/2$

(10) If $Sinx = \frac{1}{2}$ then $x =$ _____

(A) $-\pi/6$, $5\pi/6$ (B) $-\pi/6$, $-5\pi/6$ (C) $\pi/3$, $2\pi/3$ (D) $\pi/6$, $5\pi/6$

(11) If n is prime then $\sqrt{n}$ is:-

(A) Rational number (B) Whole number (C) Natural number (D) Irrational number

(12) If $a, b \in G$, where G is a group then $(ab)^{-1} =$ _____

(A) $a^{-1}b^{-1}$ (B) $b^{-1}a^{-1}$ (C) $\frac{1}{ab}$ (D) $\frac{-1}{ab}$

(13) If $A = \begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$ then co-factor of "4" is:- (A) +1 (B) -1 (C) -4 (D) 3

(14) If $A = [a_{ij}]_{3\times 3}$, then $|KA| =$ _____

(A) $|A|$ (B) $K|A|$ (C) $K^2|A|$ (D) $K^3|A|$

(15) If $x^3 + 4x^2 - 2x + 5$ is divided by $x-1$ then the remainder is:- (A) 10 (B) -10 (C) 8 (D) -8

(16) Nature of the roots of the equation $2x^2 + 5x - 1 = 0$:-

(A) Irrational and unequal (B) Rational and equal (C) Imaginary (D) Rational and unequal

(17) The type of rational fraction $\frac{3x^2-1}{x-2}$ is:- (A) Proper (B) Improper (C) Polynomial (D) Identity

(18) In geometric sequence *nth* term is:-

(A) $a_1 + (n-1)d$ (B) $\frac{n}{2}[2a_1 + (n-1)d]$ (C) $\frac{a_1}{1-r}$ (D) $a_1 r^{n-1}$

(19) For any series $\sum_{k=1}^{n} K =$ _____

(A) $\frac{n(n+1)(2n+1)}{6}$ (B) $\frac{n(n-1)}{2}$ (C) $\frac{n(n+1)}{2}$ (D) $\frac{n^2(n+1)^2}{4}$

(20) For two events A and B if $P(A) = P(B) = \frac{1}{3}$ then probability $P(A \cap B) =$ _____

(A) $\frac{1}{9}$ (B) $\frac{1}{3}$ (C) $\frac{1}{6}$ (D) 1

MTN-11-G1-18

2018 (A) Roll No: _____

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-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) Write Closure Law and Commutative Law of Multiplication of Real Numbers.

(ii) Show that $z^2 + (\bar{z})^2$ is a real number, $\forall\ z \in c$.

(iii) Show that $z.\bar{z} = |z|^2,\ z \in c$.

(iv) Define a semi – group.

(v) Write number of elements of sets $\{a, b\}$ and $\{\{a, b\}\}$.

(vi) If $A = \{1, 2, 3, 4\}$, then write a relation in A for $\{(x, y) / x + y = 5\}$

(vii) Define Symmetric and Skew Symmetric Matrix.

(viii) If the matrix $\begin{bmatrix} 4 & \lambda & 3 \\ 7 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$ is symmetric, then find value of λ.

(ix) Without expansion, show that $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \alpha+\gamma & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$

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

(xi) Show that the polynomial $(x - 1)$ is a factor of polynomial $x^2 + 4x - 5$ by using factor theorem.

(xii) Discuss nature of roots of equation $x^2 + 2x + 3 = 0$.

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

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

(ii) Write the first four terms of the sequence, if $a_n = (-1)^n n^2$.

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

(iv) Find the geometric mean between $-2i$ and $8i$.

(v) Find the sum of the infinite geometric series $4 + 2\sqrt{2} + 2 + \sqrt{2} + 1 +$ -------

(vi) Write two important relations between arithmetic, geometric and harmonic means.

(vii) Write the following in factorial form $(n + 2)(n + 1)(n)$

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

(ix) A die is rolled. Find the probability that top shows 3 or 4 dots.

(x) Use mathematical induction to verify for $n = 1, 2$

$$1 + \frac{1}{2} + \frac{1}{4} + \text{\_\_\_\_\_} + \frac{1}{2^{n-1}} = 2\left[1 - \frac{1}{2^n}\right].$$

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

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

(i) Convert the angle $54^\circ\ 45'$ into radians.

(ii) Find r, when $\ell = 56\,cm$ $\theta = 45^\circ$ in a circle.

(iii) Prove that $\dfrac{1}{1+Sin\theta} + \dfrac{1}{1-Sin\theta} = 2\,Sec^2\theta$

(iv) If $Cos\alpha = \dfrac{3}{5}$, find the value of $Cot\alpha$, where $0 < \alpha < \dfrac{\pi}{2}$

(v) If α, β, γ are angles of a triangle ΔABC, then prove that $Sin(\alpha + \beta) = Sin\gamma$

(vi) Prove that $Sin3\alpha = 3\,Sin\alpha - 4\,Sin^3\alpha$

(vii) Find the period of $\tan\dfrac{x}{3}$

(viii) State the Law of Cosines.

(ix) Find the area of ΔABC with $a = 200$, $b = 120$ included angle $\gamma = 150^\circ$

(x) Find R if $a = 13$, $b = 14$, $c = 15$ are the sides of triangle ΔABC.

(xi) Find the value of $Sin\left(Cos^{-1}\dfrac{\sqrt{3}}{2}\right)$

(xii) Solve the equation $Sin\,x = \dfrac{1}{2}$

(xiii) Solve $Sin\,x + Cos\,x = 0$

SECTION-II

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

5.(a) Prove that all non-singular matrices of order 2×2 over real field form a non-abelian group under multiplication. 5

(b) Find the value of λ for which the following system does not possess a unique solution. Also solve the system for the value of λ. 5

$$x_1 + 4x_2 + \lambda x_3 = 2$$
$$2x_1 + x_2 - 2x_3 = 11$$
$$3x_1 + 2x_2 - 2x_3 = 16$$

6.(a) Show that the roots of the equation $x^2 - 2\left(m + \dfrac{1}{m}\right)x + 3 = 0$, $m \neq 0$, are real. 5

(b) Resolve $\dfrac{x^4}{1-x^4}$ into partial fraction. 5

7.(a) Sum the series:- $\dfrac{1}{1+\sqrt{x}} + \dfrac{1}{1-x} + \dfrac{1}{1-\sqrt{x}} + \text{-----}$ to n terms. 5

(b) Determine the middle terms in the expansion of $\left(\dfrac{3}{2}x - \dfrac{1}{3x}\right)^{11}$ 5

8.(a) Prove the following identity:- $\sin^6\theta - \cos^6\theta = \left(\sin^2\theta - \cos^2\theta\right)\left(1 - \sin^2\theta\cos^2\theta\right)$ 5

(b) Prove that:- $\dfrac{\sin\theta + \sin3\theta + \sin5\theta + \sin7\theta}{\cos\theta + \cos3\theta + \cos5\theta + \cos7\theta} = \tan4\theta$ 5

9.(a) Prove that $(r_1 + r_2)\,Tan\dfrac{\gamma}{2} = c$ (with usual notations) 5

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

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 $\left(\sqrt{2}, -\sqrt{5}\right)$ 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^t = ___

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

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

MTN-11-G12-18

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 × 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 × 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 $y = \frac{x}{2} + \frac{x^2}{4} + \frac{x^3}{8} + \text{-----} \infty$ 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 ${}^{n}C_5 = {}^{n}C_4$ (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 $\frac{\sqrt{1+2x}}{\sqrt{1-x}} \approx 1 + \frac{3x}{2}$

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 $Sin15^\circ$

(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"

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

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