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2019 (A)

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

Roll No: MTN-11-G2-19

THEMATICS PAPER-I GROUP-II

OBJECTIVE

TIME ALLOWED: 30 Minutes

MAXIMUM MARKS: 20

e: You have four choices for each objective type question as A, B, C and D. The choice which you
k is correct, fill that bubble in front of that question number. Use marker or pen to fill the bubbles.
ing or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as
n in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES
not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

o.1

If $a > 0$ then: (A) $2a < 0$ (B) $\frac{1}{a} < 0$ (C) $-a > 0$ (D) $-a < 0$

The number of subsets of a set having 4 elements is: (A) 4 (B) 16 (C) 8 (D) 10

If all the entries of a column of a square matrix A are zero then:
(A) $|A| > 0$ (B) $|A| < 0$ (C) $|A| = 0$ (D) None of these

If A and B are two non-singular matrices then $(AB)^{-1}$ is equal to:
(A) $A^{-1}B^{-1}$ (B) $B^{-1}A^{-1}$ (C) BA (D) AB

If $x^2 - 3 = 0$ then sum of roots is: (A) Zero (B) 3 (C) -3 (D) 1

If one root of $x^2 + 1 = 0$ is i then other root is: (A) -1 (B) $-i$ (C) 1 (D) ± 1

A fraction $\frac{N(x)}{D(x)}$ is called Proper Rational Faction if:
(A) Degree of $N(x) <$ Degree of $D(x)$ (B) Degree of $N(x) >$ Degree of $D(x)$
(C) Degree of $N(x) \leq$ Degree of $D(x)$ (D) Degree of $D(x) \leq$ Degree of $N(x)$

) For an infinite Geometric series for which $|r| < 1$, $S_n =$ ____ where $n \to \infty$
(A) $\frac{a_1(1+r)}{1-r}$ (B) $\frac{a_1}{1+r}$ (C) $\frac{a_1}{2r}$ (D) $\frac{a_1}{1-r}$

) With usual notations, $\sum_{k=1}^{n} k^3$ equal to:
(A) $\frac{n(n+1)}{4}$ (B) $\frac{n(n+1)}{2}$ (C) $\left(\frac{n(n+1)}{2}\right)^2$ (D) $n(n+1)$

10) How many ways 5 keys can be arranged on a circular key ring? (A) 12 (B) 5 (C) 4 (D) 3

11) ${}^nP_r$ equals: (A) ${}^nC_r$ (B) $r! \times {}^nC_r$ (C) $\frac{1}{r!} \times {}^nC_r$ (D) $r \times {}^nC_r$

12) In the expansion of $(1+x)^n$, the sum of binomial coefficients is:
(A) n (B) $n+1$ (C) 2^n (D) 2^{n-1}

(13) $n! > n^2$ is true for integral value of n: (A) $n = 3$ (B) $n = 4$ (C) $n = 2$ (D) $n = 1$

(14) The vertex of an angle in standard form is at: (A) $(1, 0)$ (B) $(0, 1)$ (C) $(1, 1)$ (D) $(0, 0)$

(15) $\sin(\alpha + \beta) + \sin(\alpha - \beta)$ equals:
(A) $2\sin\alpha \cos\beta$ (B) $2\cos\alpha \sin\beta$ (C) $\sin\alpha \cos\beta$ (D) $\sin\alpha$

(16) Domain of $\cos x$ function is: (A) W (B) N (C) $\mathbb{R}$ (D) Z

(17) Circle which passes through vertices of a triangle is called:
(A) Circum circle (B) Incircle (C) e-circle (D) Point circle

(18) With usual notations, $\frac{c^2 \sin\beta \sin\alpha}{2\sin\gamma}$ is equal to: (A) Δ (B) Δ^2 (C) $\frac{\Delta}{2}$ (D) $\frac{\Delta^2}{2}$

(19) $Tan^{-1}\frac{1}{2} + Tan^{-1}\frac{1}{3}$ equals: (A) $Tan^{-1}3$ (B) $Tan^{-1}2$ (C) $Tan^{-1}1$ (D) $Tan^{-1}(-1)$

(20) Solution of equation $\tan x = \frac{1}{\sqrt{3}}$ is in:
(A) I and II quadrant (B) I and III quadrant (C) II and IV quadrant (D) I quadrant

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2019 (A) Roll No: MTN-11-G2-19

INTERMEDIATE PART-I (11^{th} 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) Find the multiplicative inverse of $(-4, 7)$

(ii) Simplify $(i)^{-3}$

(iii) Simplify $\left(-\frac{1}{2}+\frac{\sqrt{3}}{2}i\right)^3$

(iv) Write down the power set of $\{a, \{b, c\}\}$

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

(vi) For $A = \{1, 2, 3, 4\}$ find the relation $\{(x, y) \mid x + y < 5\}$ in A.

(vii) State any two properties of determinants.

(viii) Show that for a non-singular matrix A, $(A^{-1})^{-1} = A$

(ix) Without expansion prove that $\begin{vmatrix} 1 & 2 & 3x \\ 2 & 3 & 6x \\ 3 & 5 & 9x \end{vmatrix} = 0$

(x) Reduce $2x^4 - 3x^3 - x^2 - 3x + 2 = 0$, into quadratic form.

(xi) Solve the equation $x^3 + x^2 + x + 1 = 0$

(xii) Define exponential equation.

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

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

(ii) Define improper rational fraction.

(iii) For the identity $\frac{1}{(x+1)^2(x^2-1)} \equiv \frac{A}{x-1} + \frac{B}{x+1} + \frac{C}{(x+1)^2} + \frac{D}{(x+1)^3}$

Calculate the values of A and D.

(iv) Write first four terms of the sequence $a_n = 3n - 5$

(v) Find the 13^{th} term of the sequence $x, 1, 2-x, 3-2x, -----$

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

(vii) Insert two G.Ms. between "2" and "16".

(viii) Write two relations between A, G, H, in which A = Arithmetic Mean, G = Geometric Mean, H = Harmonic Mean.

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

(x) Prove the given formula for $n = 1, 2$ $\quad 1 + \frac{1}{2} + \frac{1}{4} + ----- + \frac{1}{2^{n-1}} = 2\left[1 - \frac{1}{2^n}\right]$

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

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

P.T.O.

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

(i) Prove that $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A \operatorname{cosec}^2 A$ where $A \neq \frac{n\pi}{2}, n \in \mathbb{Z}$

(ii) Write two fundamental identities.

(iii) Show that $\cot^4\theta + \cot^2\theta = \operatorname{cosec}^4\theta - \operatorname{cosec}^2\theta$

(iv) Prove that $\tan(45^\circ + A)\tan(45^\circ - A) = 1$

(v) Express $\sin 5x + \sin 7x$ as a product.

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

(vii) Write down domain and range of $y = \tan x$

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

(ix) Show that $r = (s - a)\tan\frac{\alpha}{2}$

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

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

(xii) Solve the equation $\sin 2x = \cos x$

(xiii) Define trigonometric equation. Give one example

SECTION-II

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

5.(a) Show that the set $\{1, -1, i, -i\}$ is an abelian group under multiplication where $i^2 = -1$ 5

(b) If $y = \frac{2}{3}x + \frac{4}{9}x^2 + \frac{8}{27}x^3 + \cdots$ and if $0 < x < \frac{3}{2}$, then show that $x = \frac{3y}{2(1+y)}$ 5

6.(a) Prove that $\begin{vmatrix} b+c & a & a^2 \\ c+a & b & b^2 \\ a+b & c & c^2 \end{vmatrix} = (a+b+c)(a-b)(b-c)(c-a)$ 5

(b) Find the probability that the sum of dots appearing in two successive throws of two dice is every time 7. 5

7.(a) Use synthetic division to find the values of p and q if $x + 1$ and $x - 2$ are the factors of the polynomial $x^3 + px^2 + qx + 6$ 5

(b) If x is so small that its cube and higher powers can be neglected, then show that $\sqrt{1 - x - 2x^2} \approx 1 - \frac{1}{2}x - \frac{9}{8}x^2$ 5

8.(a) Prove that $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \tan\theta + \sec\theta$ 5

(b) If α, β, γ are the angles of ΔABC then prove that $\tan\frac{\alpha}{2}\tan\frac{\beta}{2} + \tan\frac{\beta}{2}\tan\frac{\gamma}{2} + \tan\frac{\gamma}{2}\tan\frac{\alpha}{2} = 1$ 5

9.(a) Prove that $r_1 + r_2 + r_3 - r = 4R$ 5

(b) Prove that $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$ 5