

MATHEMATICS
Time: 2:30 hours

Intermediate Part-I, Class 11th (1stA 324)
SUBJECTIVE

PAPER: I GROUP - I
Marks: 80

Note: Section-I is compulsory. Attempt any three (3) questions from Section-II.

SECTION-I

2. Write short answers to any EIGHT questions:

(2 x 8 = 16)

- Define binary operation.
- Show that the set $\{1, -1\}$ possess closure property with respect to multiplication.
- Simplify the following $(-1)^{\frac{21}{2}}$
- Graph the number $-5 - 6i$ on complex plane.
- Write the union and intersection of two sets A and B in set builder notation.
- Write down the difference between induction and deduction.
- Find the value of x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$
- If A and B are non-singular matrices then show that $(AB)^{-1} = B^{-1}A^{-1}$
- Write down two properties of determinant.
- Solve the equation: $x^{1/2} - x^{1/4} - 6 = 0$
- Show that: $x^3 + y^3 + z^3 = (x+y+z)(x^2+xy+y^2)(x^2+yz+z^2)(x^2+y^2+yz)$
- Show that $(x-2)$ is a factor of $x^4 - 13x^2 + 36$

3. Write short answers to any EIGHT questions:

(2 x 8 = 16)

- What is the difference between proper rational fraction and improper rational fraction?
- Find value of A and B if $\frac{x^2+1}{(x+1)(x-1)} = \frac{A}{x+1} + \frac{B}{x-1}$
- Which term of the A.P. 5, 2, -1, is -85?
- Find the sum of infinite G.P.: 2, $\sqrt{2}$, 1,
- Sum the series: 3 + 5 - 7 + 9 + 11 - 13 + 15 + 17 - 19 to 3n terms.
- If $\frac{1}{K}$, $\frac{1}{2K+1}$ and $\frac{1}{4K-1}$ are in harmonic sequence, find K.
- How many permutations of the letters of the word PANAMA can be made, if P is to the first letter in each arrangement?
- Find the number of the diagonals of a 6-sided figure.
- Two dice are thrown twice. What is probability that sum of dots shown in throw is 7?
- Prove that the statement is true: $n! > n^2$ for $n = 4, 5$
- Use Binomial theorem, find the value of $(.98)^{1/2}$ up to three decimal places.
- Find the term involving a^4 in the expansion of $\left(\frac{2}{x} - a\right)^9$

4. Write short answers to any NINE questions:

(2 x 9 = 18)

- Define Radian.
- $\sin \theta = \frac{12}{13}$, terminal arm of the angle is in quadrant I. Find the values of $\sec \theta$, $\cos \theta$
- Prove that $\cos\left(\frac{\pi}{2} - \beta\right) = \sin \beta$

(Turn Over)

(2)

- Prove that $\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ$
- Express the product $\sin 12^\circ \sin 46^\circ$ as sum or difference.
- Prove that period of tangent is π
- Find the period of $3\sin x$
- Draw the graph $y = -\sin x$, $x \in [-2\pi, 2\pi]$
- Find the value of θ if $\cos \theta = 0.9316$
- Solve the right angle triangle in which $\gamma = 90^\circ$, $\alpha = 37^\circ 20'$, $a = 243$
- Solve the triangle ABC, if $\beta = 60^\circ$, $\gamma = 15^\circ$, $b = \sqrt{6}$
- Find the value of $\cos^{-1}(1/2)$
- Solve the equation: $\sin^2 x + \cos x = 1$

SECTION-II

- Show that $\begin{vmatrix} a+\lambda & b & c \\ a & b+\lambda & c \\ a & b & c+\lambda \end{vmatrix} = \lambda^2(a+b+c+\lambda)$ 5
 - If α and β are the roots of $x^2 - 3x + 5 = 0$, form the equation whose roots are: $\frac{1-\alpha}{1+\alpha}$ and $\frac{1-\beta}{1+\beta}$ 5
- Resolve $\frac{x^2}{(x^2+4)(x+2)}$ into partial fractions. 5
 - Find a_n of a G.P if $a_4 = \frac{8}{27}$ and $a_7 = -\frac{64}{729}$ 5
- Prove that: ${}^{n-1}C_r + {}^{n-1}C_{r-1} = {}^nC_r$ 5
 - Show that: $\frac{n^3+2n}{3}$ represents an integer $\forall n \in \mathbb{N}$ 5
- Prove that $\frac{\sin \theta + \sin 3\theta + \sin 5\theta + \sin 7\theta}{\cos \theta + \cos 3\theta + \cos 5\theta + \cos 7\theta} = \tan 4\theta$ 5
 - With usual notations, prove that $a^2 = b^2 + c^2 - 2bc \cos \alpha$ 5
- If $\tan \theta = -\frac{1}{3}$, and terminal arm of angle θ is in quadrant II. Find the values of remaining trigonometric functions. 5
 - Prove that $\tan^{-1} \frac{3}{4} + \tan^{-1} \frac{3}{5} + \tan^{-1} \frac{8}{19} = \frac{\pi}{4}$ 5

Candidate Roll No. _____

MATHEMATICS**Time: 30 Minutes****Intermediate Part-I, Class 11th (1stA 324-1)****OBJECTIVE****Code: 6192****PAPER: I****GROUP: II****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 circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

- 1- 1- Recurring decimal is a _____ number.
(A) prime (B) rational (C) irrational (D) integer
- 2- $(-1)^{-\frac{21}{2}} = \dots\dots$
(A) 1 (B) -1 (C) i (D) $-i$
- 3- Proposition _____ is called biconditional
(A) $p \rightarrow q$ (B) $p \leftrightarrow q$ (C) $p \wedge q$ (D) $p \vee q$
- 4- Set having no proper subset
(A) $\{ \}$ (B) $\{ 1 \}$ (C) $\{ 1, 2 \}$ (D) $\{ 1, 2, 3 \}$
- 5- If $A = \{ 1, 2, 3 \}$ and $B = \{ 4, 5 \}$, which is not element of $A \times B$
(A) $(1, 4)$ (B) $(2, 4)$ (C) $(3, 4)$ (D) $(4, 3)$
- 6- The matrix $\begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$ is _____ matrix.
(A) square (B) unit (C) null (D) row
- 7- If $\begin{bmatrix} x & 1 \\ 3 & 1 \end{bmatrix}$ is singular, then $x = \dots\dots$
(A) -3 (B) 3 (C) 1 (D) -1
- 8- $3^{2x} + 4 \cdot 3^x + 4 = 0$ is _____ equation.
(A) cubic (B) radical (C) reciprocal (D) exponential
- 9- Sum of roots of equation $x^2 - 5x + 6 = 0$
(A) 6 (B) -6 (C) 5 (D) -5
- 10- In $\frac{p(x)}{q(x)}$, degree of $p(x)$ is less than degree of $q(x)$, then fraction is
(A) proper (B) improper (C) combined (D) partial
- 11- a, b and c are in A.P, then
(A) $2a = b - c$ (B) $2b = a + c$ (C) $2b = a - c$ (D) $2a = b + c$
- 12- H is Harmonic mean between a and b then $H = \dots\dots$
(A) $\frac{2ab}{a+b}$ (B) $\frac{a+b}{2ab}$ (C) $\frac{2ab}{a-b}$ (D) $\frac{a-b}{2ab}$
- 13- ${}^nC_8 = {}^nC_{12}$, then value of n is
(A) 8 (B) 12 (C) 16 (D) 20
- 14- Number of radians in semi-circle
(A) $\frac{\pi}{2}$ (B) π (C) 2π (D) $\frac{2\pi}{3}$
- 15- Number of terms in expansion of $(1+x)^{n-1}$ is
(A) $n+2$ (B) $n+1$ (C) n (D) $n-1$
- 16- Co-ratio of Cosine is
(A) sine (B) cosine (C) tangent (D) secant
- 17- Period of $\tan x$ is
(A) $\frac{\pi}{2}$ (B) 3π (C) 2π (D) π
- 18- Sum of opposite angles of cyclic quadrilateral is
(A) 90 (B) 120 (C) 180 (D) 270
- 19- $\cos(\tan^{-1}0) = \dots\dots$
(A) 0 (B) 1 (C) -1 (D) ∞
- 20- $\sin x = \frac{1}{2}$, then $x = \dots\dots$
(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

MATHEMATICS
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Intermediate Part-I, Class 11th (1st A 324) PAPER: I
SUBJECTIVE

GROUP: II
Marks: 80

Note: Section-I is compulsory. Attempt any three (3) questions from Section-II.

SECTION-I

2. Write short answers to any EIGHT questions:

(2 x 8 = 16)

- Write trichotomy and transitive properties of inequalities of real numbers.
- Simplify $(2, 6) \div (3, 7)$
- Find the modulus of $3 + 4i$
- Express the complex number $1 + i\sqrt{3}$ in polar form
- Write inverse, converse and contrapositive of the conditional $p \rightarrow q$
- Define groupoid.

vii- If $A = \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$, show that $A^4 = I_2$

viii- Without expansion verify that $\begin{vmatrix} \alpha & \beta + \gamma & 1 \\ \beta & \gamma + \alpha & 1 \\ \gamma & \alpha + \beta & 1 \end{vmatrix} = 0$

ix- If A and B are non-singular matrices, then show that $(AB)^{-1} = B^{-1}A^{-1}$

x- Find the three cube roots of -27

xi- Use the factor theorem to determine if $x - 1$ is a factor of $x^2 + 4x - 5$

xii- If α, β are the roots of $3x^2 - 2x + 4 = 0$, find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$

3. Write short answers to any EIGHT questions:

(2 x 8 = 16)

i- Resolve into Partial Fractions $\frac{3x}{(x-1)(x+2)}$

ii- Define the term Partial Fraction.

iii- Write the first four terms of the sequence, if $a_n - a_{n-1} = n + 2$, $a_1 = 2$

iv- If 5, 8 are two A.Ms between a and b, find a and b.

v- Find the sum of infinite Geometric Series $\frac{9}{4} + \frac{3}{2} + 1 + \frac{2}{3} + \dots$

vi- Find the 8th term of H.P; $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, \dots$

vii- Prove that ${}^nC_r = {}^nC_{n-r}$

viii- Find the value of n when ${}^{11}P_n = 11.10.9$

ix- What is the probability that a slip of numbers divisible by 4 are picked from the slips bearing numbers 1, 2, 3, ..., 10?

x- Prove that the inequality $n^2 > n + 3$ for $n = 3, 4$

xi- Calculate $(9.9)^5$ by means of Binomial Theorem.

xii- Expand $(1-x)^{1/2}$ upto 4 terms.

4. Write short answers to any NINE questions:

(2 x 9 = 18)

i- Find r when $\ell = 5\text{cm}$, $\theta = \frac{1}{2}$ radian

ii- Evaluate $\frac{\tan \frac{\pi}{3} - \tan \frac{\pi}{6}}{1 + \tan \frac{\pi}{3} \cdot \tan \frac{\pi}{6}}$

iii- Prove that $\sin(\alpha + \beta) \sin(\alpha - \beta) = \cos^2 \beta - \cos^2 \alpha$

(Turn Over)

(2)

iv- Prove that $\frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ} = \tan 37^\circ$

v- Express as product: $\cos 7\theta - \cos \theta$

vi- Define Periodicity.

vii- Find period of $3\cos \frac{x}{5}$

viii- Draw graph of $\sin x$ when $x \in [0, \pi]$

ix- Find a and c for the right angle triangle ABC, when $\alpha = 58^\circ 13'$, $b = 125.7$, $\gamma = 90^\circ$

x- A vertical pole is 8m high and length of its shadow is 6m. What is angle of elevation of the sun at that moment?

xi- Solve the triangle ABC if $b = 125$, $\gamma = 53^\circ$, $\alpha = 47^\circ$

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

xiii- Solve the trigonometric equation $\sin x = -\frac{\sqrt{3}}{2}$

SECTION-II

5- (a) Solve the system of linear equations by Cramer's Rule:

$$2x + 2y + z = 3$$

$$3x - 2y - 2z = 1$$

$$5x + y - 3z = 2$$

5

(b) Show that the roots of $(mx + c)^2 = 4ax$ will be equal if $c = \frac{a}{m}$, $m \neq 0$

5

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

5

(b) The sum of an infinite Geometric Series is 9 and the sum of the squares of its terms is $\frac{81}{5}$. Find the series.

5

7- (a) Two dice are thrown. E_1 is the event that the sum of their dots is an odd number and E_2 is the event that 1 is the dot on the top of the first die. Show that $P(E_1 \cap E_2) = P(E_1) \cdot P(E_2)$

5

(b) Find the term independent of x in expansion of $\left(\sqrt{x} + \frac{1}{2x^2}\right)^{10}$

5

8- (a) Prove that $\sin \frac{\pi}{9} \sin \frac{2\pi}{9} \sin \frac{\pi}{3} \sin \frac{4\pi}{9} = \frac{3}{16}$

5

(b) Show that $r_2 = 4R \cos \frac{\alpha}{2} \sin \frac{\beta}{2} \cos \frac{\gamma}{2}$

5

9- (a) Find x if $\tan^2 45^\circ - \cos^2 60^\circ = x \sin 45^\circ \cos 45^\circ \tan 60^\circ$

5

(b) Prove that $\sin^{-1} \frac{4}{5} + \sin^{-1} \frac{5}{13} + \sin^{-1} \frac{16}{65} = \frac{\pi}{2}$

5