Roll No. _____

MATHEMATICS **Intermediate Part-I , Class 11th (1stA 324- IV)** **PAPER: I** **GROUP - I**

Time: 30 Minutes **OBJECTIVE** **Marks: 20**

Code: 6197

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- A square matrix A is symmetric if $A^t =$

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

2- If $\sin\theta > 0$ and $\sec\theta > 0$, then terminal arm of θ lies in quadrant

(A) I ● (B) II (C) III (D) IV

3- Conditional equation $3x - 1 = 0$ is true only if

(A) $x = 3$ (B) $x = -3$ (C) $x = \frac{1}{3}$ ● (D) $x = -\frac{1}{3}$

4- Reference angle always lies in quadrant

(A) I ● (B) II (C) III (D) IV

5- $\cos\left(\sin^{-1}\frac{1}{\sqrt{2}}\right) =$

(A) $\frac{1}{\sqrt{2}}$ ● (B) 1 (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

6- The value of the determinant $\begin{vmatrix} 1 & 12 & 25 \\ 0 & 3 & 15 \\ 0 & 0 & 8 \end{vmatrix}$ is

(A) 0 (B) 1 (C) 8 (D) 24 ●

7- $\sin(\pi - \theta) =$

(A) $\sin\theta$ ● (B) $-\sin\theta$ (C) $\cos\theta$ (D) $-\cos\theta$

8- If "n" is even , then middle term of $(a + b)^n$ is

(A) $\left(\frac{n}{2}-1\right)^{th}$ term (B) $\left(\frac{n}{2}+1\right)^{th}$ term ● (C) $\left(\frac{n}{2}\right)^{th}$ term (D) $\left(\frac{n}{2}-2\right)^{th}$ term

9- When $3x^4 + 4x^3 + x - 5$ is divided by $x + 1$, then remainder is

(A) -7 ● (B) -6 (C) 6 (D) 7

10- Converse of the conditional $p \rightarrow q$ is

(A) $q \rightarrow p$ ● (B) $\sim q \rightarrow \sim p$ (C) $\sim p \rightarrow \sim q$ (D) $p \rightarrow \sim q$

11- Multiplicative inverse of $-3i$ is

(A) $3i$ (B) $\frac{1}{3}i$ ● (C) $-\frac{1}{3}i$ (D) $-3i$

12- $A' \cap B' =$

(A) $A' - B'$ (B) $A' \cup B'$ (C) $(A \cap B)'$ (D) $(A \cup B)'$ ●

13- In a quadratic equation $ax^2 + bx + c = 0$, if $b^2 - 4ac > 0$, then roots are

(A) real ● (B) equal (C) rational (D) irrational

14- 20^{th} term of 1 , 3 , 5 , ... is

(A) 38 (B) 39 ● (C) 40 (D) 41

(Turn over)

15- $\sqrt{3}$ is

(A) rational number (B) irrational number ● (C) even number (D) odd number

16- $r_2 =$

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

17- Factorial form of $(n+2)(n+1)(n)$ is

(A) $\frac{(n+2)!}{(n+1)!}$ (B) $\frac{(n+1)!}{(n-2)!}$ (C) $\frac{(n+2)!}{n!}$ (D) $\frac{(n+2)!}{(n-1)!}$ ●

18- Tanθ is a periodic function of period

(A) π ● (B) $\frac{\pi}{2}$ (C) $\frac{3\pi}{2}$ (D) 2π

19- Let A={1,2,3}, then the number of its subsets is

(A) 2 (B) 3 (C) 7 (D) 8 ●

20- If $a = 2i$, $b = 4i$, then G =

(A) $\pm 2\sqrt{2}\, i$ ● (B) $\pm 2\, i$ (C) $\pm 4\, i$ (D) $\pm\sqrt{6}\, i$

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MATHEMATICS **Intermediate Part-I , Class 11th (1stA 324)** **PAPER: I** **GROUP - I**

Time: 2:30 hours **SUBJECTIVE** **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)**

i- Define binary operation.

ii- Show that the set $\{1, -1\}$ possess closure property with respect to multiplication.

iii- Simplify the following $(-1)^{\frac{-21}{2}}$

iv- Graph the number $-5 - 6i$ on complex plane.

v- Write the union and intersection of two sets A and B in set builder notation.

vi- Write down the difference between induction and deduction.

vii- Find the value of x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$

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

ix- Write down two properties of determinant.

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

xi- Show that : $x^3 + y^3 + z^3 = (x + y + z)(x+\omega y+\omega^2 z)(x+\omega^2 y+\omega z)$

xii- 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)**

i- What is the difference between proper rational fraction and improper rational fraction?

ii- Find value of A and B if $\frac{x^2+1}{(x+1)(x-1)} = \frac{A}{x+1} + \frac{B}{x-1}$

iii- Which term of the A.P 5 , 2 , –1 , ... is –85 ?

iv- Find the sum of infinite G.P : $2, \sqrt{2}, 1, \ldots\ldots$

v- Sum the series : $3 + 5 - 7 + 9 + 11 - 13 + 15 + 17 - 19 \ldots\ldots$ to 3n terms.

vi- If $\frac{1}{K}$, $\frac{1}{2K+1}$ and $\frac{1}{4K-1}$ are in harmonic sequence , find K.

vii- How many permutations of the letters of the word PANAMA can be made, if P is to the first letter in each arrangement?

viii- Find the number of the diagonals of a 6–sided figure.

ix- Two dice are thrown twice. What is probability that sum of dots shown in throw is 7?

x- Prove that the statement is true : $n! > n^2$ for $n = 4, 5$

xi- Use Binomial theorem, find the value of $(.98)^{1/2}$ up to three decimal places.

xii- 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)**

i- Define Radian.

ii- $\sin\theta = \frac{12}{13}$, terminal arm of the angle is in quadrant I. Find the values of $\sec\theta$, $\cos\theta$

iii- Prove that $\cos\left(\frac{\pi}{2} - \beta\right) = \sin\beta$

(Turn Over)

iv- Prove that $\frac{\text{Cos}\,11^\circ + \text{Sin}\,11^\circ}{\text{Cos}\,11^\circ - \text{Sin}\,11^\circ} = \tan 56^\circ$

v- Express the product $\text{Sin}\,12^\circ\ \text{Sin}\,46^\circ$ as sum or difference.

vi- Prove that period of tangent is π

vii- Find the period of $3\text{Sin}x$

viii- Draw the graph $y = -\text{Sin}x\ ,\ x \in [-2\pi\ ,\ 2\pi]$

ix- Find the value of θ if $\text{Cos}\theta = 0.9316$

x- Solve the right angle triangle in which $\gamma = 90^\circ\ ,\ \alpha = 37^\circ 20'\ ,\ a = 243$

xi- Solve the triangle ABC , if $\beta = 60^\circ\ ,\ \gamma = 15^\circ\ ,\ b = \sqrt{6}$

xii- Find the value of $\text{Cos}^{-1}(1/2)$

xiii- Solve the equation : $\text{Sin}^2x + \text{Cos}x = 1$

SECTION-II

5- (a) 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

(b) If α and β are the roots of $x^2 - 3x + 5 = 0$, form the equation whose roots are : 5

$\frac{1-\alpha}{1+\alpha}$ and $\frac{1-\beta}{1+\beta}$

6- (a) Resolve $\frac{x^2}{(x^2+4)(x+2)}$ into partial fractions. 5

(b) Find a_n of a G.P if $a_4 = \frac{8}{27}$ and $a_7 = -\frac{64}{729}$ 5

7- (a) Prove that : ${}^{n-1}C_r + {}^{n-1}C_{r-1} = {}^{n}C_r$ 5

(b) Show that : $\frac{n^3+2n}{3}$ represents an integer $\forall\ n \in N$ 5

8- (a) Prove that $\frac{\text{Sin}\theta + \text{Sin}3\theta + \text{Sin}5\theta + \text{Sin}7\theta}{\text{Cos}\theta + \text{Cos}3\theta + \text{Cos}5\theta + \text{Cos}7\theta} = \tan 4\theta$ 5

(b) With usual notations, prove that $a^2 = b^2 + c^2 - 2bc\text{Cos}\alpha$ 5

9- (a) If $\tan\theta = -\frac{1}{3}$, and terminal arm of angle θ is in quadrant II. Find the values of remaining trignometric functions. 5

(b) Prove that $\tan^{-1}\frac{3}{4} + \tan^{-1}\frac{3}{5} + \tan^{-1}\frac{8}{19} = \frac{\pi}{4}$ 5

Roll No. _____

MATHEMATICS **Intermediate Part-I , Class 11th (1st A 324- IV)** **PAPER: I** **GROUP: II**

Time: 30 Minutes **OBJECTIVE** **Marks: 20**

Code: 6198

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- a , b and c are in A.P , then

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

2- Number of terms in expansion of $(1 + x)^{n-1}$ is

(A) $n + 2$ (B) $n + 1$ (C) n ● (D) $n - 1$

3- H is Harmonic mean between a and b then H = _____ .

(A) $\frac{2ab}{a+b}$ ● (B) $\frac{a+b}{2ab}$ (C) $\frac{2ab}{a-b}$ (D) $\frac{a-b}{2ab}$

4- $\cos(\tan^{-1}0) =$ _____

(A) 0 (B) 1 ● (C) –1 (D) ∞

5- 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

6- Set having no proper subset

(A) { } (B) { 1 } ● (C) { 1 , 2} (D) { 1 , 2 , 3 }

7- Recurring decimal is a _____ number.

(A) prime (B) rational ● (C) irrational (D) integer

8- Sum of roots of equation $x^2 - 5x + 6 = 0$

(A) 6 (B) –6 (C) 5 ● (D) –5

9- ${}^nC_8 = {}^nC_{12}$, then value of n is

(A) 8 (B) 12 (C) 16 (D) 20 ●

10- Proposition _____ is called biconditional

(A) $p \rightarrow q$ (B) $p \leftrightarrow q$ ● (C) $p \wedge q$ (D) $p \vee q$

11- $\sin x = \frac{1}{2}$, then x = _____.

(A) $\frac{\pi}{6}$ ● (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

12- Number of radians in semi-circle

(A) $\frac{\pi}{2}$ (B) π ● (C) 2π (D) $\frac{2\pi}{3}$

13- $3^{2x} + 4.3^x + 4 = 0$ is _____ equation.

(A) cubic (B) radical (C) reciprocal (D) exponential ●

14- Period of tanx is

(A) $\frac{\pi}{2}$ (B) 3π (C) 2π (D) π ●

15- $(-1)^{-\frac{21}{2}} =$ .....

(A) 1 (B) –1 (C) i (D) $-i$ ●

16- If $\begin{bmatrix} x & 1 \\ 3 & 1 \end{bmatrix}$ is singular, then x = _____ .

(A) –3 (B) 3 ● (C) 1 (D) –1

17- Sum of opposite angles of cyclic quadrilateral is

(A) 90 (B) 120 (C) 180 ● (D) 270

18- The matrix [1 2 3] is _____ matrix.

(A) square (B) unit (C) null (D) row ●

19- Co-ratio of Cosine is

(A) sine (B) cosine (C) tangent (D) secant ●

20- If A = {1 , 2 , 3} and B = {4 , 5} , which is not element of A x B

(A) (1 , 4) (B) (2 , 4) (C) (3 , 4) (D) (4 , 3) ●

M... ...EMATICS | Intermediate Part-I , Class 11th (1st A 324) | PAPER: I | GROUP: II
Time: 2:30 hours | SUBJECTIVE | 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)**

i- Write trichotomy and transitive properties of inequalities of real numbers.
ii- Simplify $(2, 6) \div (3, 7)$
iii- Find the modulus of $3 + 4i$
iv- Express the complex number $1 + i\sqrt{3}$ in polar form
v- Write inverse , converse and contrapositive of the conditional $\sim p \rightarrow \sim q$
vi- 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 $\frac{9}{4} + \frac{3}{2} + 1 + \frac{2}{3} + \ldots\ldots\infty$
vi- Find the 8^{th} term of H.P ; $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, \ldots\ldots\ldots$
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 Bionomial Theorem.
xii- Expand $(1 - x)^{1/2}$ upto 4 terms.

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 $\text{Sin}(\alpha + \beta)\ \text{Sin}(\alpha - \beta) = \text{Cos}^2\beta - \text{Cos}^2\alpha$

(Turn Over)

iv- Prove that $\frac{\text{Cos}8^\circ - \text{Sin}8^\circ}{\text{Cos}8^\circ + \text{Sin}8^\circ} = \tan 37^\circ$

v- Express as product : $\text{Cos}7\theta - \text{Cos}\theta$

vi- Define Periodicity.

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

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

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

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

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

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

xiii- Solve the trignometric equation $\text{Sin}x = -\frac{\sqrt{3}}{2}$

SECTION-II

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

$$2x + 2y + z = 3$$
$$3x - 2y - 2z = 1$$
$$5x + y - 3z = 2$$

(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 $\frac{x^2 + x - 1}{(x+2)^3}$ into partial fractions. 5

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

Find the series.

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 $\text{Sin}\frac{\pi}{9}\text{Sin}\frac{2\pi}{9}\text{Sin}\frac{\pi}{3}\text{Sin}\frac{4\pi}{9} = \frac{3}{16}$ 5

(b) Show that $r_2 = 4R\,\text{Cos}\frac{\alpha}{2}\text{Sin}\frac{\beta}{2}\text{Cos}\frac{\gamma}{2}$ 5

9- (a) Find x if $\tan^2 45° - \text{Cos}^2 60° = x\text{Sin}45°\,\text{Cos}45°\tan 60°$ 5

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

Roll No. _____

MATHEMATICS **Intermediate Part-I, Class 11th (1st A 323-I)** **PAPER: I** **GROUP - I**

Time: 30 Minutes **OBJECTIVE** **Marks: 20**

Code: 6191

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- The multiplicative inverse of complex number (0, 1) is

(A) (0, −1) (B) (−1, 0) (C) (1, 0) (D) (1, 1)

2- Converse of $p \rightarrow q$ is

(A) $\sim p \rightarrow q$ (B) $p \rightarrow \sim q$ (C) $q \rightarrow p$ (D) $\sim q \rightarrow p$

3- $(A^{-1})^t =$

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

4- The trivial solution of the system $a_1x + b_1y = 0$ and $a_2x + b_2y = 0$ is

(A) (1, 0) (B) (0, 1) (C) (0, 0) (D) (1, 1)

5- Sum of all four fourth roots of unity is

(A) 1 (B) −1 (C) 0 (D) i

6- Roots of the equation $ax^2 + bx + c = 0$ are real and distinct if

(A) $b^2 - 4ac = 0$ (B) $b^2 - 4ac > 0$ (C) $b^2 - 4ac < 0$ (D) $a^2 - 4ac > 0$

7- A relation in which the equality is true for any value of unknowns is called

(A) identity (B) equation (C) fraction (D) conditional

8- The sequence 3, 6, 12, ... is

(A) A.P. (B) G.P (C) H.P (D) infinite

9- Harmonic mean between 3 and 7 is

(A) $\frac{5}{21}$ (B) $\frac{21}{5}$ (C) 5 (D) 21

10- Factorial form of $n(n-1)(n-2) =$ _____

(A) $\frac{n!}{(n-1)!}$ (B) $\frac{n!}{(n-2)!}$ (C) $\frac{n!}{(n-3)!}$ (D) $\frac{n!}{(n+3)!}$

11- If A and B are independent events and $P(A) = 0.8$, $P(B) = 0.7$ then $P(A \cap B) =$

(A) 0.56 (B) $\frac{8}{7}$ (C) $\frac{7}{8}$ (D) 0.1

12- The sum of exponents of a and b in every term of the expansion of $(a+b)^n$ is

(A) 1 (B) 0 (C) 2n (D) n

13- The expansion of $(1+2x)^{-3}$ is valid only if

(A) $|x| < 2$ (B) $|x| < \frac{1}{2}$ (C) $|x| < \frac{1}{3}$ (D) $|x| < \frac{1}{6}$

14- If length of arc and radius of circle are measured in cm then unit of Q is

(A) degree (B) radians (C) cm^2 (D) cm

15- $\cos 2\alpha =$

(A) $2\cos^2\alpha + 1$ (B) $2\cos^2\alpha - 1$ (C) $2\sin^2\alpha - 1$ (D) $2\sin^2\alpha + 1$

16- The smallest positive number P for which $f(x+P) = f(x)$ is called

(A) domain (B) co-domain (C) range (D) period

17- In any triangle ABC, $c^2 =$ _____

(A) $a^2 + c^2 - 2ac\cos\beta$ (B) $a^2 + b^2 - 2ab\cos\gamma$

(C) $b^2 + c^2 - 2bc\cos\alpha$ (D) $a^2 + b^2 - 2ab\cos\alpha$

18- Point of intersection of the angle bisectors of a triangle is called

(A) circum–centre (B) in–centre (C) ex–centre (D) ortho–centre

19- $2\tan^{-1}A =$

(A) $\tan^{-1}\frac{A}{1-A^2}$ (B) $\tan^{-1}\frac{2A}{1+A^2}$ (C) $\tan^{-1}\left(\frac{2A}{1-A^2}\right)$ (D) $\tan^{-1}\left(\frac{2A}{2-A^2}\right)$

20- If $\sin x + \cos x = 0$ then $x =$ _____

(A) $\frac{\pi}{4}, -\frac{\pi}{4}$ (B) $-\frac{\pi}{4}, -\frac{\pi}{2}$ (C) $-\frac{\pi}{4}, \frac{3\pi}{4}$ (D) $\frac{\pi}{4}, \frac{3\pi}{4}$

MATHEMATICS **Intermediate Part-I , Class 11th (1st A 323)** **PAPER: I** **GROUP - I**

Time: 2:30 hours **SUBJECTIVE** **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)**

i- Check the closure property with respect to multiplication on the set $\{-1, 1\}$

ii- Simplify the complex numbers $(5, -4)(-3, -2)$

iii- Write down the descriptive and tabular form of $\{x \mid x \in P \wedge x < 12\}$

iv- Verify commutative property of union and intersection for sets $A = \{1,2,3,4,5\}$, $B = \{4,6,8,10\}$

v- Write down the inverse and contrapositive of the conditional $\sim p \rightarrow q$

vi- Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$

vii- If A and B are non-singular matrices. Then show that $(AB)^{-1} = B^{-1}A^{-1}$

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

ix- Solve the equation $x^2 - 7x + 10 = 0$ by factorization.

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

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

xii- Define reciprocal equation.

3. Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Resolve into partial fractions of $\frac{x^2+1}{(x-1)(x+1)}$ without finding values of constants.

ii- Write down next two terms of sequence $-1, 2, 12, 40, \ldots\ldots$

iii- Insert two G.Ms. between 1 and 8

iv- Find n^{th} term of $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, \ldots\ldots$

v- Prove that $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

vi- If 5 , 8 are two A.Ms. between a and b. Find a and b.

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

viii- How many arrangements of letters of word PAKPATTAN, taken all together, can be made ?

ix- Two dice are thrown twice. What is probability that sum of dots shown in first throw is 7 and that of second throw is 11 ?

x- Show that in-equality $4^n > 3^n + 4$ holds for $n = 2$, $n = 3$

xi- Using binomial theorem, expand $(a+2b)^5$

xii- Expand up to 4 terms, taking the value of x such that expansion is valid: $(8-2x)^{-1}$

4. Write short answers to any NINE questions: **(2 x 9 = 18)**

i- What is the length of the arc intercepted on a circle of radius 14cm by the arms of central angle of 45° ?

ii- Verify that $\text{Sin}^2\frac{\pi}{6} : \text{Sin}^2\frac{\pi}{4} : \text{Sin}^2\frac{\pi}{3} : \text{Sin}^2\frac{\pi}{2} = 1:2:3:4$

iii- Prove that $\frac{\text{Sin}\theta}{1+\text{Cos}\theta} + \text{Cot}\theta = \text{Cosec}\theta$

iv- Without using table, find the value of $\tan(-135^\circ)$

v- Prove that $\text{Cos}(\alpha+45^\circ)=\frac{1}{\sqrt{2}}(\text{Cos}\alpha-\text{Sin}\alpha)$

vi- Prove that $\frac{1-\text{Cos}\alpha}{\text{Sin}\alpha}=\tan\frac{\alpha}{2}$

vii- Find the period of $\text{Cot}\,8x$

viii- When the angle between the ground and the sun in 30°, flag pole casts a shadow of 40 m long. Find the height of the top of the flag.

ix- Find the smallest angle of the triangle ABC when $a=37.34$, $b=3.24$, $c=35.06$

x- Find the area of the triangle ABC when $a=200$, $b=120$, $\gamma=150^\circ$

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

xii- Find the solution set of $\text{Sin}x.\text{Cos}x=\frac{\sqrt{3}}{4}$

xiii- Find the solution of $\text{Sin}x=\frac{1}{2}$ in $[0\,,\,2\pi]$

SECTION-II

Note: Attempt any three (3) questions.

5- (a) Use matrices to solve the system of equations 5

$$2x_1+x_2+3x_3=3$$
$$x_1+x_2-2x_3=0$$
$$-3x_1-x_2+2x_3=-4$$

(b) Solve the equation $\left(x-\frac{1}{x}\right)^2+3\left(x+\frac{1}{x}\right)=0$ 5

6- (a) Resolve $\frac{x^2+1}{x^3+1}$ into partial fraction. 5

(b) A die is thrown. Find the probability that the dots on the top are prime numbers or odd numbers. 5

7- (a) For what value of n , $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is the positive geometric mean between a and b ? 5

(b) If $y=\frac{2}{5}+\frac{1\cdot3}{2!}\left(\frac{2}{5}\right)^2+\frac{1\cdot3\cdot5}{3!}\left(\frac{2}{5}\right)^3+\ldots\ldots$ then prove that $y^2+2y-4=0$ 5

8- (a) Prove that $\sqrt{\frac{1-\text{Sin}\theta}{1+\text{Sin}\theta}}=\text{Sec}\theta-\tan\theta$, where θ is not an odd multiple of $\frac{\pi}{2}$ 5

(b) If $\alpha+\beta+\gamma=180^\circ$, show that $\cot\alpha\cot\beta+\cot\beta\cot\gamma+\cot\gamma\cot\alpha=1$ 5

9- (a) Using law of tangents , solve the ΔABC in which $a=36.21$, $b=42.09$ and $\gamma=44^\circ29'$ 5

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

Roll No. _____

MATHEMATICS **Intermediate Part-I , Class 11th (1stA 323- I)** **PAPER: I** **GROUP: II**

Time: 30 Minutes **OBJECTIVE** **Marks: 20**

Code: 6192

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- Every real number is a complex number with its imaginary part equal to

(A) real part (B) i (C) 0 (D) 1

2- If A and B are disjoint sets, then $A - B =$

(A) $B - A$ (B) A (C) B (D) ϕ

3- If order of a matrix A is 2×3 and that of matrix B is 3×2, then order of $(AB)^t$ is

(A) 3×3 (B) 2×2 (C) 3×2 (D) 2×3

4- A square matrix $A=[a_{ij}]$ is lower triangular if

(A) $a_{ij} \neq 0$ for all $i < j$ (B) $a_{ij} \neq 0$ for all $i > j$

(C) $a_{ij} = 0$ for all $i > j$ (D) $a_{ij} = 0$ for all $i < j$

5- Four 4^{th} roots of 625 are

(A) $\pm 25i, \pm 25$ (B) $\pm 16i, \pm 16$ (C) $\pm 5i, \pm 5$ (D) $\pm 4i, \pm 4$

6- If α, β are roots of the equation $3x^2 - 2x + 4 = 0$, then value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ is

(A) $\frac{3}{4}$ (B) $-\frac{4}{3}$ (C) $\frac{5}{3}$ (D) $-\frac{5}{3}$

7- Partial fractions of $\frac{1}{x^2+1}$ are

(A) $\frac{A}{x+1} - \frac{B}{x-1}$ (B) $\frac{A}{x+1} + \frac{B}{x-1}$ (C) $\frac{Ax+B}{x^2+1}$ (D) not possible

8- 5^{th} term of the sequence whose general term is $a_n = n + (-1)^n$, is

(A) 4 (B) 5 (C) 0 (D) -5

9- Which one is true

(A) G, H, A are in G.P. (B) A, G, H are in G.P.

(C) A,G,H are in H.P. (D) A,G,H are in A.P.

10- The complementary combination ${}^nC_r = {}^nC_{n-r}$ is useful when

(A) $n = r$ (B) $n < r$ (C) $r < \frac{n}{2}$ (D) $r > \frac{n}{2}$

11- Two dice are thrown simultaneously, then the probability of getting a total of "7" number of dots is

(A) $\frac{1}{6}$ (B) $\frac{1}{18}$ (C) $\frac{4}{9}$ (D) $\frac{1}{9}$

12- $3 + 5 + 7 + \ldots\ldots + (2n+5) = (n+2)(n+4)$ for integral values of n

(A) $n \geq -4$ (B) $n \geq -3$ (C) $n \geq -2$ (D) $n \geq -1$

13- $\binom{n}{1} + \binom{n}{3} + \binom{n}{5} + \ldots\ldots + \binom{n}{n-1} =$

(A) 2^{n+2} (B) 2^{n-2} (C) 2^{n-1} (D) 2^{n+1}

14- $\cot^2\theta - \operatorname{cosec}^2\theta =$

(A) 1 (B) -1 (C) $\cos^2\theta$ (D) $\tan^2\theta$

15- $\tan 3\theta =$

(A) $\frac{3\tan\theta - \tan^3\theta}{1 - 3\tan^2\theta}$ (B) $\frac{3\tan^2\theta - \tan\theta}{1 - 3\tan^3\theta}$ (C) $3\tan\theta$ (D) $\tan^3\theta$

16- Range of $y = \sin x$ is

(A) $[-1,1]$ (B) $\left[-\frac{1}{2}, \frac{1}{2}\right]$ (C) $[-2,2]$ (D) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

17- Number of elements of a triangle is

(A) 4 (B) 5 (C) 6 (D) infinite

18- $\cos\frac{\beta}{2} =$

(A) $\sqrt{\frac{s(s-b)}{ac}}$ (B) $\sqrt{\frac{(s-c)(s-a)}{ac}}$

(C) $\sqrt{\frac{s(s-a)}{bc}}$ (D) $\sqrt{\frac{(s-b)(s-c)}{bc}}$

19- $\sin(\tan^{-1}(-1)) =$

(A) 1 (B) -1 (C) $\frac{1}{\sqrt{2}}$ (D) $\frac{-1}{\sqrt{2}}$

20- Reference angle of $2\sin x - 1 = 0$ is

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{2}$

MATHEMATICS **Intermediate Part-I , Class 11th (1stA 323)** **PAPER: I** **GROUP: II**
Time: 2:30 hours **SUBJECTIVE** **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)**

i- State the DeMoiver's theorem.

ii- Factorize $9a^2+16b^2$

iii- Write down two proper subsets of $\{0, 1\}$

iv- Construct truth table $(p \to \sim p) \vee (p \to q)$

v- Define unary and binary operations.

vi- Find matrix X if $X\begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 12 & 3 \end{bmatrix}$

vii- Solve the following system of linear equations
$3x_1 - x_2 = 1$, $x_1 + x_2 = 3$

viii- If $A = \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix}$, verify that $(A^{-1})^t = (A^t)^{-1}$

ix- Solve the equation $x^{2/5} + 8 = 6x^{1/5}$

x- Find four fourth roots of 16

xi- Discuss the nature of the roots of a quadratic equation $x^2 + 2x + 3 = 0$

xii- When the polynomial $x^3 + 2x^2 + kx + 4$ is divided by $x - 2$, the remainder is 14. Find the value of k

3. Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Define rational fraction.

ii- Write down the first four terms of the sequence, if $a_n = n \cdot a_{n-1}$, $a_1 = 1$

iii- Find the 13th term of the sequence $x, 1, 2-x, 3-2x, \ldots\ldots$

iv- Find the nth term of geometric sequence , if $\frac{a_5}{a_3} = \frac{4}{9}$ and $a_2 = \frac{4}{9}$

v- Sum to n terms of the series $3 + 33 + 333 + \ldots\ldots$

vi- Find the 9th term of H.P. $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \ldots\ldots$

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

viii- What is the probability that a slip of numbers divisible by 4 is picked from the slips bearing numbers $1, 2, 3, \ldots\ldots, 10$?

ix- If sample space $S=\{1, 2, 3, \ldots\ldots, 9\}$, event $A=\{2, 4, 6, 8\}$ and event $B=\{1, 3, 5\}$. Find $P(A \cup B)$

x- Prove by mathematical induction $r + r^2 + r^3 + \ldots\ldots + r^n = \frac{r(1-r^n)}{1-r}$, $r \neq 1$

xi- Find the 6th term in the expansion of $\left(x^2 - \frac{3}{2x}\right)^{10}$

xii- Evaluate $\sqrt[3]{30}$ correct to three places of decimal.

4. Write short answers to any NINE questions: **(2 x 9 = 18)**

i- Write down any two fundamental trigonometric identities.

ii- In which quadrant the terminal arm of the angle lie when $\sin\theta < 0$ and $\cos\theta > 0$

iii- Verify $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ = \sin 30^\circ$

iv- Prove that $\sin 3\alpha = 3\sin\alpha - 4\sin^3\alpha$

v- Prove that $\cot\alpha - \tan\alpha = 2\cot 2\alpha$

vi- Express $\sin(x + 30^\circ) + \sin(x - 30^\circ)$ as product .

(Turn Over)

vii- Write domain and range of $\text{Sin}\theta$

viii- A ladder leaning against a vertical wall makes an angle of 24° with the wall. Its foot is 5m from the wall. Find its length.

ix- Find the area of the triangle ABC, if $a = 18$, $b = 24$, $c = 30$

x- Prove that $r_1 r_2 r_3 = rs^2$

xi- Show that $\text{Cos}^{-1}(-x) = \pi - \text{Cos}^{-1}x$

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

xiii- Prove the identity $\text{Sin}^{-1}x = \frac{\pi}{2} - \text{Cos}^{-1}x$

SECTION-II

Note: Attempt any three (3) questions.

5- (a) Reduce the matrix $\begin{bmatrix} 2 & 3 & -1 & 9 \\ 1 & -1 & 2 & -3 \\ 3 & 1 & 3 & 2 \end{bmatrix}$ into echelon form 5

(b) Solve the equation $(x+4)(x+1) = \sqrt{x^2+2x-15}+3x+31$ 5

6- (a) Resolve $\frac{(x-1)(x-3)(x-5)}{(x-2)(x-4)(x-6)}$ into partial fractions. 5

(b) Find the values of n and r, when ${}^nC_r = 35$ and ${}^nP_r = 210$ 5

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

(b) Use mathematical induction to prove the formula for every positive integer n 5

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

8- (a) If $\text{Cosec}\theta = \frac{m^2+1}{2m}$ and $m > 0$ $\left(0 < \theta < \frac{\pi}{2}\right)$, 5

Find values of remaining trigonometric ratios.

(b) Prove that $\text{Sin}10^\circ \text{Sin}30^\circ \text{Sin}50^\circ \text{Sin}70^\circ = \frac{1}{16}$ 5

9- (a) Prove that $\Delta = 4Rr \cdot \text{Cos}\frac{\alpha}{2} \cdot \text{Cos}\frac{\beta}{2} \cdot \text{Cos}\frac{\gamma}{2}$ 5

(b) Prove that $\text{Sin}^{-1}\frac{1}{\sqrt{5}} + \text{Cot}^{-1}3 = \frac{\pi}{4}$ 5

Roll No. _____ Gujranwala Board-2021

MATHEMATICS **(INTER PART-I) 321-(IV)** **PAPER: I** **GROUP: I**

Time: 30 Minutes **OBJECTIVE** **Marks: 20**

Code: 6197

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. Attempt as many questions as given in objective type question paper and leave others blank.

1- 1- Period of $\tan 4x$ is

(A) $\pi/2$ (B) π (C) $\pi/4$ (D) 4π

2- Radius of the earth is

(A) 6000 Km (B) 6800 Km (C) 6400 Km (D) 8400 Km

3- If $a=-2$, $b=-6$ then A.M between a and b is =

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

4- Multiplicative inverse of $(a, 0)$ if $a \neq 0$ is

(A) $\left(\frac{1}{a}, 0\right)$ (B) $\frac{1}{(a, 0)}$ (C) $(-a, 0)$ (D) $\left(0, \frac{1}{a}\right)$

5- Transpose of a matrix $A=[a_{ij}]_{m\times n}$ is $A^t=$

(A) $[a_{ij}]_{m\times m}$ (B) $[a_{ji}]_{m\times n}$ (C) $[a_{ji}]_{n\times m}$ (D) $[a_{ij}]_{n\times m}$

6- If $n \in Z$, then general solution of equation $\sin x = 0$ is

(A) $\left\{n\frac{\pi}{2}\right\}$ (B) $\left\{n\frac{\pi}{3}\right\}$ (C) $\left\{n\frac{\pi}{4}\right\}$ (D) $\{n\pi\}$

7- $(S-a)(S-b)(S-c) =$

(A) $\frac{\Delta}{S}$ (B) $\frac{\Delta^2}{S}$ (C) $\frac{\Delta}{S^2}$ (D) $\frac{S}{\Delta}$

8- $\sin 540^\circ =$

(A) 1 (B) 0 (C) $1/2$ (D) $1/\sqrt{2}$

9- $(n+2)(n+1)(n) =$

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

10- $S_n = \frac{a(r^n-1)}{r-1}$ holds if

(A) $r \leq 1$ (B) $r = 1$ (C) $r > 1$ (D) $r \geq 1$

11- If $|A| = 0$ then A is

(A) singular (B) diagonal (C) rectangular (D) symmetric

(Turn over)

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12- $\cos 2\theta =$

(A) $1-\sin^2\theta$ (B) $1-2\sin^2\theta$ (C) $1-2\sin\theta$ (D) $2\sin^2\theta-1$

13- Product of the roots of $5x^2-x-2=0$ is =

(A) $1/5$ (B) $-1/5$ (C) $2/5$ (D) $-2/5$

14- If $S_n=n(2n-1)$, then $a_1 =$

(A) 2 (B) -2 (C) 1 (D) -1

15- The property which makes a group Abelian is

(A) associative (B) commutative (C) identity (D) closure

16- $\tan(\cos^{-1}\frac{\sqrt{3}}{2}) =$

(A) $\sqrt{3}$ (B) $1/\sqrt{3}$ (C) $1/\sqrt{2}$ (D) $\sqrt{2}$

17- To find T_8 in the binomial expansion we put r =

(A) 8 (B) 9 (C) 10 (D) 7

18- The product of 4, 4^{th} roots of unity is =

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

19- $\frac{x^3+x+1}{Q(x)}$ will be proper if the degree of Q(x) is =

(A) 1 (B) 2 (C) 3 (D) 4

20- $2R =$

(A) $\frac{a}{\sin\alpha}$ (B) $\frac{b}{\sin\beta}$ (C) $\frac{c}{\sin\gamma}$ (D) all of these

MATHEMATICS **(INTER PART-I) 321** **PAPER: I** **GROUP: I**
Time: 2:30 hours **SUBJECTIVE** **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)**

i- Prove $\frac{a}{c}+\frac{b}{c}=\frac{a+b}{c}$ by rules of addition.

ii- Factorize: a^2+4b^2

iii- Simplify $(2+\sqrt{-3})(3+\sqrt{-3})$

iv- If $U=\{1,2,3,.....20\}$ and $A=\{1,3,5,.....,19\}$ verify $A\cup A'=U$

v- Write inverse and contrapositive of the conditional $\sim p \rightarrow q$

vi- For $A=\{1,2,3,4\}$, find the relation $\{(x,y)\,|\,x+y>5\}$ in A

vii- Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix}=\begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$

viii- Without expansion show that $\begin{vmatrix} 2 & 3 & -1 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{vmatrix}=0$

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

x- Write second property of cube roots of unity without proof.

xi- Find the remainder by using remainder theorem when first polynomial is divided by second polynomial $x^2+3x+7,\ x+1$

xii- Show that the roots of the equation $(p+q)x^2-px-q=0$ will be rational.

3. Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Write $\frac{x^2+x-1}{(x+2)^3}$ in form of partial fractions without finding the constants.

ii- Write $\frac{1}{(x+1)^2(x^2-1)}$ in form of partial fractions without finding the constants.

iii- Write Ist four terms of the sequence $a_n=(-1)^n(2n-3)$

iv- Find G.M. between –2 and 8

v- Find the sum of infinite geometric series $2,\ \sqrt{2},\ 1,.....$

vi- Find the 9^{th} term of harmonic sequence $\frac{1}{3},\ \frac{1}{5},\ \frac{1}{7},.....$

vii- There are 5 green and 3 red balls in a box, one ball is taken out. Find the probability that the ball is green.

viii- Write in factorial form $(n+2)(n+1)n$

ix- How many signals can be given by 5 flags of different colours using 3 flags at a time.

x- Calculate $(0.97)^3$ by means of binomial theorem.

xi- Expand $(4-3x)^{1/2}$ upto three terms taking value of x such that (s.t) the expansion is valid.

xii- Determine the middle term in the expansion of $\left(\frac{1}{x}-\frac{x^2}{2}\right)^{12}$

(Turn over)

4. Write short answers to any NINE questions: (2 x 9 = 18)

i- If $\sin\theta = -\frac{1}{\sqrt{2}}$ and the terminal arm is not in quadrant III, find the value of $\cos\theta$

ii- Verify that $\sin^2\frac{\pi}{6} : \sin^2\frac{\pi}{4} : \sin^2\frac{\pi}{3} : \sin^2\frac{\pi}{2} = 1:2:3:4$

iii- Prove that $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A \cdot \operatorname{cosec}^2 A$, where $A \neq \frac{n\pi}{2}$, $n \in Z$

iv- If α, β, γ are the angles of a triangle, then prove that $\sin(\alpha+\beta) = \sin\gamma$

v- Prove that $\cos(\alpha+45°) = \frac{1}{\sqrt{2}}(\cos\alpha - \sin\alpha)$

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

vii- Find the period of $\tan\frac{x}{7}$

viii- When the angle between the ground and the sun is 30°, flag pole casts a shadow of 40 m long. Find the height of the top of the flag.

ix- Find the measure of the greatest angle, if sides of the triangle are 16, 20, 33

x- Find the area of the triangle when $b = 25.4,\ \gamma = 36°41',\ \alpha = 45°17'$

xi- Prove that $\tan^{-1}\frac{5}{12} = \sin^{-1}\frac{5}{13}$

xii- Find the general solution of the trigonometric equation $\sec x = -2$

xiii- Solve the trigonometric equation and write the solution in the interval $[0, 2\pi]$ when $2\sin^2\theta - \sin\theta = 0$

SECTION II

5- (a) Show 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) Show that the roots of $x^2 + (mx+c)^2 = a^2$ will be equal, if $c^2 = a^2(1+m^2)$ 5

6- (a) Resolve $\frac{x^2+1}{x^3+1}$ into partial fractions. 5

(b) If $y = \frac{x}{2} + \frac{1}{4}x^2 + \frac{1}{8}x^3 + \ldots\ldots$ and $0 < x < 2$, then prove that $x = \frac{2y}{1+y}$ 5

7- (a) Two dice are thrown. What is the probability that the sum of the number of dots appearing on them is 4 or 6? 5

(b) If x is so small that its square and higher powers can be neglected then show that $\frac{\sqrt{1+2x}}{\sqrt{1-x}} \approx 1+\frac{3x}{2}$ 5

8- (a) Prove that $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$ where 'θ' is not an odd multiple of $\frac{\pi}{2}$ 5

(b) Prove without using tables/calculator that $\sin 19° \cos 11° + \sin 71° \sin 11° = \frac{1}{2}$ 5

9- (a) P and Q are two points in line with a tree. If the distance between P and Q be 30 m and the angles of elevation of the top of the tree at P and Q be 12° and 15° respectively, find the height of the tree. 5

(b) Show that $2\tan^{-1}\frac{2}{3} = \sin^{-1}\frac{12}{13}$ 5

Roll No. _____ Gujranwala Board-2021

MATHEMATICS **(INTER PART-I) 321-(I)** **PAPER: I** **GROUP: II**

Time: 30 Minutes **OBJECTIVE** **Marks: 20**

Code: 6192

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. Attempt as many questions as given in objective type question paper and leave others blank.

1- The property used in $\forall\ a, b \in R \quad a = b \wedge b = c \Rightarrow a = c$

(A) reflexive (B) symmetric (C) transitive (D) trichotomy

2- The converse of $p \rightarrow q$ is

(A) $\sim p \rightarrow \sim q$ (B) $\sim q \rightarrow \sim p$ (C) $q \rightarrow p$ (D) $\sim p \rightarrow q$

3- If A is a square matrix of order 3 then $|kA| =$

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

4- A square matrix is skew symmetric matrix, if $A^t =$

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

5- If ω is complex cube roots of unity, then conjugate of ω is

(A) ω^2 (B) $-\omega^2$ (C) $-\omega$ (D) $-i$

6- The product of roots of equation $4x^2 + 7x - 3 = 0$ is

(A) $\frac{7}{4}$ (B) $-\frac{7}{4}$ (C) $\frac{3}{4}$ (D) $-\frac{3}{4}$

7- In $\frac{P(x)}{Q(x)}$, if degree of $P(x) \geq$ degree of $Q(x)$ then fraction is

(A) proper (B) improper (C) irrational (D) identity

8- Next term of sequence 1, 3, 7, 15, 31, ... is

(A) 39 (B) 47 (C) 55 (D) 63

9- Sum of infinite geometric series is valid, if

(A) $r < 1$ (B) $|r| < 1$ (C) $|r| = 1$ (D) $|r| > 1$

10- The sequence $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots\ldots$ is

(A) H . P (B) A . P (C) G. P (D) arithmetic series

11- $(n-1)(n-2)(n-3) \ldots\ldots\ldots\ldots (n-r+1) =$

(A) $\frac{(n-1)!}{(n-r)!}$ (B) $\frac{n!}{(n-r)!}$ (C) $\frac{(n-1)!}{(n-r+2)!}$ (D) $\frac{n!}{(n-r+1)!}$

12- The number of terms in the expansion of $(1+x)^{1/2}$ are

(A) $\frac{3}{2}$ (B) 7 (C) 6 (D) infinite

13- If $\tan\theta = \frac{8}{15}$, $\pi < \theta < 3\frac{\pi}{2}$, then $\cos\theta =$

(A) $\frac{-17}{15}$ (B) $\frac{17}{15}$ (C) $\frac{15}{17}$ (D) $\frac{-15}{17}$

14- Which of the following is not quadrantal angle

(A) $\frac{\pi}{2}$ (B) $4\frac{\pi}{3}$ (C) $9\frac{\pi}{2}$ (D) 13π

15- $\cot\left(3\frac{\pi}{2} - \theta\right) =$

(A) $\tan\theta$ (B) $-\tan\theta$ (C) $\cot\theta$ (D) $-\cot\theta$

16- Range of $y = \cos x$ is

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

17- Area of triangle ABC is

(A) $\frac{1}{2}ab\sin\beta$ (B) $\frac{1}{2}bc\sin\alpha$ (C) $\frac{1}{2}ac\sin\gamma$ (D) $\frac{1}{2}ab\sin\alpha$

18- With usual notation $2s - b =$

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

19- $\cos^{-1}(-x) =$

(A) $-\cos^{-1}x$ (B) $\cos^{-1}x$ (C) $\pi - \cos^{-1}x$ (D) $\frac{\pi}{2} - \cos^{-1}x$

20- If $n \in Z$, then general solution of equation $\sin x = 0$ is

(A) $\left\{n\frac{\pi}{2}\right\}$ (B) $\left\{n\frac{\pi}{3}\right\}$ (C) $\left\{n\frac{\pi}{4}\right\}$ (D) $\{n\pi\}$

MATHEMATICS **(INTER PART-I) 321** **PAPER: I** **GROUP: II**

Time: 2.30 hours **SUBJECTIVE** **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)**

i- Does the set $\{1, -1\}$ possess closure property with respect to addition and multiplication?

ii- Find the multiplicative inverse of $(\sqrt{2}, -\sqrt{5})$

iii- Show that $\forall\ Z \in C \quad Z^2 + Z^{-2}$ is a real number.

iv- Write the descriptive and tabular form of $\{x : x \in Q \wedge x^2 = 2\}$

v- Write the converse and inverse of $\sim p \rightarrow q$

vi- Solve the equation $ax = b$, where a, b are the elements of a group G.

vii- If A and B are square matrices of the same order, explain why in general $(A + B)(A - B) \neq A^2 - B^2$

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

ix- Find the inverse of the matrix $\begin{bmatrix} -2 & 3 \\ -4 & 5 \end{bmatrix}$

x- Solve the equation by factorization method $9x^2 - 12x - 5 = 0$

xi- Evaluate: $(1 + \omega - \omega^2)(1 - \omega + \omega^2)$

xii- Discuss the nature of the roots of the equation: $2x^2 + 5x - 1 = 0$

Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Resolve into partial fractions, without finding the constants $\dfrac{x-1}{(x-2)(x+1)^3}$

ii- Write $\dfrac{1}{(x+1)^2(x^2-1)}$ in form of partial fractions without finding the constants.

iii- Which term of the arithmetic sequence OR arithmetic progression $5, 2, -1, \ldots\ldots$ is -85 ?

iv- Find the vulgar fraction equivalent to the recurring decimals $0.\overline{7}$

v- Find 9^{th} term of the harmonic sequence $\dfrac{1}{3}, \dfrac{1}{5}, \dfrac{1}{7}, \ldots\ldots$

vi- If A, G, H are the arithmetic, geometric and harmonic means between a & b respectively, Show that $G^2 = A.H$

vii- In how many ways can 4 keys be arranged on a circular key ring?

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

ix- Find the value of n when, ${}^nC_{10} = \dfrac{12 \times 11}{2!}$

x- Expand by using the binomial theorem $(a + 2b)^5$

xi- Expand $(1+x)^{-1/3}$ up to 3 terms by using binomial expansion.

xii- If x is so small that its square and higher powers can be neglected then show that $\dfrac{1-x}{\sqrt{1+x}} \approx 1 - \dfrac{3}{2}x$

(Turn over)

4. Write short answers to any NINE questions: **(2 x 9 = 18)**

i- If $\text{cosec}\,\theta = \frac{m^2+1}{2m}$ $0 < \theta < \frac{\pi}{2}$. Find the value of $\sec\theta$

ii- Evaluate: $\frac{1-\tan^2\frac{\pi}{3}}{1+\tan^2\frac{\pi}{3}}$

iii- Verify that $(\sec\theta - \tan\theta)^2 = \frac{1-\sin\theta}{1+\sin\theta}$

iv- Without using calculator find the value of $\tan(1110^\circ)$

v- Prove that $\sin\left(\theta+\frac{\pi}{6}\right) + \cos\left(\theta+\frac{\pi}{3}\right) = \cos\theta$

vi- Prove that $\cot\alpha - \tan\alpha = 2\cot 2\alpha$

vii- Find the period of $\tan\frac{x}{7}$

viii- Prove that $R = \frac{abc}{4\Delta}$ using $R = \frac{a}{2\sin\alpha}$

ix- Find the measure of the greatest angle, if sides of the triangle are 16, 20, 33

x- Prove that $abc(\sin\alpha + \sin\beta + \sin\gamma) = 4\Delta s$

xi- Find the value of $\sec[\sin^{-1}(-\frac{1}{2})]$

xii- Find the general solution of the trigonometric equation $\sec x = -2$

xiii- Solve the trigonometric equation and write the solution in the interval $[0, 2\pi]$ when $2\sin^2\theta - \sin\theta = 0$

SECTION II

5- (a) Show 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) Prove that $\frac{x^2}{a^2} + \frac{(mx+c)^2}{b^2} = 1$ will have equal roots if $c^2 = a^2m^2 + b^2$ **5**

Where $a \neq 0$, $b \neq 0$

6- (a) Resolve $\frac{2x+1}{(x+3)(x-1)(x+2)^2}$ into partial fractions. **5**

(b) The sum of three numbers in an A.P is 24 and their product is 440. Find the numbers. **5**

7- (a) Find the values of n and r when ${}^nC_r = 35$ and ${}^nP_r = 210$ **5**

(b) If $y = \frac{2}{5} + \frac{1.3}{2!}\left(\frac{2}{5}\right)^2 + \frac{1.3.5}{3!}\left(\frac{2}{5}\right)^3 + \ldots\ldots$, then prove that $y^2 + 2y - 4 = 0$ **5**

8- (a) Prove the identity $\sin^6\theta - \cos^6\theta = (\sin^2\theta - \cos^2\theta)(1 - \sin^2\theta\cos^2\theta)$ **5**

(b) Prove that $\frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ} = \tan 37^\circ$ **5**

9- (a) Solve the triangle ABC if $b = 61$; $a = 32$ and $\alpha = 59^\circ 30'$ using first law of tangents and then law of sines **5**

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

atics
) Minutes

(INTER PART-I) 319-(I)
Code: 6191
OBJECTIVE

GROUP: I

PAPER: I
Marks: 20

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. Attempt as many questions as given in objective type question paper and leave others blank.

The imaginary part of a complex number $\overline{a + ib}$ is

(A) $-b$ (B) b (C) a (D) $-a$

The converse of $p \rightarrow q$ is

(A) $\sim p \rightarrow q$ (B) $p \rightarrow \sim q$ (C) $q \rightarrow p$ (D) $\sim p \rightarrow \sim q$

A square matrix A is said to be Hermitian if $(\overline{A})^t$

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

The trivial solution of the homogeneous linear equation is

(A) (0, 0, 0) (B) (1, 0, 0) (C) (0, 1, 0) (D) (0, 0, 1)

5- Roots of $x^2 - x - 2 = 0$ are

(A) $2, -1$ (B) $-2, 1$ (C) $-2, -1$ (D) $2, 1$

6- If one solution of the equation $x^2 + ax + 2 = 0$ is $x = 1$, then $a =$

(A) -7 (B) 7 (C) -3 (D) 0

7- A fraction in which the degree of the numerator is less than the degree of the denominator is called

(A) a proper fraction (B) partial fraction (C) combined fraction (D) irrational fraction

8- The sequence 3, 6, 12, ... is

(A) A. P (B) G. P (C) H. P (D) Arithmetic Series

9- $\sum_{k=1}^{n} k^2 =$

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

10- The factorial of a positive integer 'n' is

(A) $n! = n(n-1)!(n-2)!$ (B) $n! = n(n+2)!$

(C) $n! = n(n-1)!$ (D) $n! = n(n-2)!$

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

(A) $P(A) + P(B)$ (B) $P(A) + P(B) - P(A \cup B)$

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

12- If 'n' is positive integer, then $n^3 + n$ is divided by

(A) 2 (B) 3 (C) 4 (D) 5

13- The number of terms in the expansion $(x-3)^{10}$ is

(A) 10 (B) 11 (C) 12 (D) 13

14- If $\cos\theta = \frac{1}{\sqrt{2}}$, then θ is equal to

(A) 30° (B) 45° (C) 60° (D) 90°

15- $\tan\frac{\alpha}{2} =$

(A) $\pm\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}}$ (B) $\pm\sqrt{\frac{1+\cos\alpha}{1-\cos\alpha}}$ (C) $\pm\sqrt{\frac{1-\cos\alpha}{2}}$ (D) $\pm\sqrt{\frac{1+\cos\alpha}{2}}$

16- The period of $3\sin\frac{x}{3}$ is

(A) π (B) 2π (C) 3π (D) 6π

17- $\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$ is called the law of

(A) tangents (B) cosine (C) sines (D) cotangents

18- If Δ is the area of a triangle ABC then $\Delta =$

(A) $\frac{1}{2}bc\sin\beta$ (B) $\frac{1}{2}ab\sin\alpha$ (C) $\frac{1}{2}bc\sin\alpha$ (D) $ab\sin\alpha$

19- $\sec\left(\cos^{-1}\frac{1}{2}\right) =$

(A) $\frac{1}{2}$ (B) 2 (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{6}$

20- $\cos x = \frac{1}{2}$ has a solution

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

thematics **(INTER PART-I) 319** **GROUP: I** **PAPER: I**
ıe: 2:30 hours **SUBJECTIVE** **Marks: 80**

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

SECTION I

Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Find modulus of $1 - i\sqrt{3}$

ii- Prove that sum as well as the product of any two conjugate complex numbers is a real number.

iii- Does the set $\{1, -1\}$ posses closure properties with respect to addition and multiplication?

iv- Define a binary relation from a set A to a set B.

v- Let $A = \{1, 2, 3\}$. Determine the relation r such that $x r y$ iff $x < y$.

vi- What is proposition?

vii- Define row and column matrices.

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

ix- If $A = \begin{vmatrix} 2 & -1 \\ 3 & 1 \end{vmatrix}$, verify that $(A^{-1})^t = (A^t)^{-1}$

x- Prove that $(-1+\sqrt{-3})^4 + (-1-\sqrt{-3})^4 = -16$

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

xii- Show that $x - 2$ is a factor of $x^3 - 13x^2 + 36$

Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Define improper rational fraction.

ii- If $\frac{x}{(x-a)(x-b)(x-c)} = \frac{A}{x-a} + \frac{B}{x-b} + \frac{C}{x-c}$ then find value of A.

iii- Write partial fraction form $\frac{2x^4 - 3x^3 - 4x}{(x^2+2)^2(x+1)^2}$

iv- Define a sequence.

v- Which term of the A.P (with usual notation) $-2, 4, 10, \ldots\ldots$ is 148 ?

vi- Sum the series $(-3) + (-1) - 1 + 3 + 5 + \ldots\ldots\ldots a_{16}$

vii- Insert three G. Ms between 2 and 32

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

ix- If ${}^nC_8 = {}^nC_{12}$ find n.

x- Find the fifth term of $\left(\frac{3x}{2} - \frac{1}{3x}\right)^{11}$

xi- Use binomial theorem to calculate $(21)^5$ upto three decimal places.

xii- Prove that the result $3^n < n!$ is true for $n = 7, 8$

(Turn over)

4. Write short answers to any NINE questions: **(2 x 9 = 18)**

i- Convert $154^\circ 20''$ to radian measure.

ii- Verify that $\sin^2\frac{\pi}{6} + \sin^2\frac{\pi}{3} + \tan^2\frac{\pi}{4} = 2$

iii- Prove the identity $\frac{\cot^2\theta - 1}{1+\cot^2\theta} = 2\cos^2\theta - 1$

iv- Express $\sin 319^\circ$ as a trigonometric function of an angle of positive degree measure of less than 45°.

v- Show that $\frac{\tan\alpha + \tan\beta}{\tan\alpha - \tan\beta} = \frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$

vi- If $\cos\alpha = \frac{3}{5}$ then find the value of $\sin 2\alpha$ where $0 < \alpha < \frac{\pi}{2}$

vii- Find the period of $\tan x$.

viii- In the triangle ABC if $c = 16.1$, $\alpha = 42^\circ 45'$ and $\gamma = 74^\circ 32'$. Find a

ix- Define escribed circle.

x- Find the area of triangle ABC if $a = 18$, $b = 24$, $c = 30$

xi- Define inverse sine function.

xii- Solve the equation $\sin 2x = \cos x$ where $x \in [0, 2\pi]$

xiii- Solve $\sin x = -\frac{\sqrt{3}}{2}$ where $x \in [0, 2\pi]$

SECTION II

5- (a) Convert $A \cup (B \cup C) = A \cup (B \cup C)$ into logical form and prove by constructing the truth table. 5

(b) Show that the sum of 'n' A.Ms between 'a' and 'b' is equal to 'n' times their A.M. 5

6- (a) Solve the system of linear equations: 5

$$x + 2y + z = 2$$
$$2x + y + 2z = -1$$
$$2x + 3y - z = 9$$

(b) Find the number of 6 digit numbers that can be formed from the digits 2, 2, 3, 3, 4, 4. How many of them will lie between 400000 and 430000 ? 5

7- (a) Solve the system of equations: 5

$$x^2 - 5xy + 6y^2 = 0 \quad ;$$
$$x^2 + y^2 = 45$$

(b) Find the coefficient of x^5 in the expansion of $\left(x^2 - \frac{3}{2x}\right)^{10}$ 5

Prove that $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \tan\theta + \sec\theta$ 5

$\frac{2\sin\theta \sin 2\theta}{\cos\theta + \cos 3\theta} = \tan\theta \tan 2\theta$ 5

. a triangle are $x^2 + x + 1$, $2x + 1$ and $x^2 - 1$. Prove that the greatest 5
.e triangle is 120°.

at $\sin^{-1}\frac{77}{85} - \sin^{-1}\frac{3}{5} = \cos^{-1}\frac{15}{17}$ 5

ıll No._____

athematics
me: 30 Minutes

(INTER PART-I) 319-(III)
Code: 6196
OBJECTIVE

GROUP: II

PAPER: I
Marks: 20

ıte: 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. Attempt as many questions as given in objective type question paper and leave others blank.

1- Expansion of $(1+x)^{\frac{-1}{4}}$ is valid only if

(A) $|x|>1$ (B) $|x|<1$ (C) $|x|<-1$ (D) $|x|>-1$

2- The 8^{th} term of sequence $1, -3, 5, -7$ is

(A) 15 (B) −15 (C) 14 (D) −14

3- A reciprocal equation remains unchanged when variable x is replaced by

(A) $-\frac{1}{x}$ (B) $\frac{1}{x}$ (C) $\frac{1}{x^2}$ (D) $-x$

4- The solutions of equation $1+\sin\theta = 0$ are in quadrant

(A) I and IV (B) I and III (C) II and IV (D) III and IV

5- With usual notations, radius r of inscribed circle is given by

(A) $\frac{\Delta}{s}$ (B) $\frac{s}{\Delta}$ (C) $\frac{\Delta}{s-c}$ (D) $\frac{4\Delta}{abc}$

6- If $\tan\theta = \frac{1}{\sqrt{3}}$ and θ is in III quadrant then $\cot\theta$ equals

(A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{1}{2}$ (D) $-\frac{1}{2}$

7- ${}^{n-1}C_r + {}^{n-1}C_{r-1}$ equals

(A) ${}^{n+1}C_r$ (B) ${}^{n+1}C_{r+1}$ (C) ${}^{n}C_r$ (D) ${}^{n-1}C_r$

8- $\sin(\cos^{-1}\frac{1}{2})$ equals

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{2}$ (C) $\frac{-\sqrt{3}}{2}$ (D) $\frac{-1}{2}$

9- $(x-1)^2 = x^2-2x+1$ is called

(A) equation (B) inequality (C) identity (D) polynomial

10- For any two matrices A and B then $(AB)^t$ equals

(A) AB (B) A^tB^t (C) B^tA^t (D) BA

11- Additive inverse of $a \in \mathbb{R}$ is

(A) 2 (B) 1 (C) $\frac{1}{a}$ (D) $-a$

(Turn over)

12- With usual notations, the value of $a+b+c$ is

(A) s (B) 2s (C) 3s (D) $\frac{s}{2}$

13- cos 315° equals

(A) tan (–45°) (B) tan 45° (C) sin 45° (D) cosec 45°

14- If A and B are disjoint then $P(A \cup B)$ equals

(A) $P(A)-P(B)$ (B) $P(A)\,P(B)$ (C) $\frac{P(A)}{P(B)}$ (D) $P(A)+P(B)$

15- If $\begin{bmatrix} \lambda & 4 \\ 3 & 2 \end{bmatrix}$ is singular then λ is equal to

(A) 2 (B) 6 (C) 4 (D) 8

16- The middle term in expansion of $(a+x)^n$ when n is even is

(A) $\left(\frac{n}{2}+1\right)$th term (B) $\left(\frac{n}{2}-1\right)$th term (C) $\left(\frac{n}{2}\right)$th term (D) $\left(\frac{n+1}{2}\right)$th term

17- Period of cosec $10x$ is

(A) $\frac{\pi}{10}$ (B) $\frac{2\pi}{5}$ (C) $\frac{\pi}{5}$ (D) $\frac{4\pi}{5}$

18- The domain of relation $f = \{(a, 1), (b, 1), (c, 1)\}$ is

(A) {a, b, c} (B) {a} (C) {b} (D) {1}

19- If ω is complex cube root of unity then ω^{15} equals

(A) 1 (B) zero (C) ω (D) $-\omega$

20- The arithmetic mean between $\frac{1}{2}$ and $\frac{1}{4}$ is

(A) $\frac{3}{8}$ (B) $\frac{3}{4}$ (C) $\frac{1}{8}$ (D) $-\frac{1}{8}$

thematics (INTER PART-I) 319 GROUP: II PAPER: I
ıe: 2:30 hours SUBJECTIVE Marks: 80

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

SECTION I

Write short answers to any EIGHT questions: (2 x 8 = 16)

i- Separate into real and imaginary parts $\frac{i}{1+i}$

ii- Simplify $(i)^{101}$

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

iv- For the conditional $p \rightarrow q$. Write its inverse and converse.

v- Define disjunction of two statements p and q

vi- If a, b are elements of a group G, then show that $(ab)^{-1} = b^{-1}a^{-1}$

vii- Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$

viii- Find the value of λ if $A = \begin{bmatrix} 4 & \lambda \\ 7 & 3 \end{bmatrix}$ is singular.

ix- Define upper triangular matrix.

x- Reduce $x^{-2} - 10 = 3x^{-1}$ into quadratic form.

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- Show that roots of $(p + q)x^2 - px - q = 0$ are rational.

Write short answers to any EIGHT questions: (2 x 8 = 16)

i- Resolve $\frac{7x+25}{(x+3)(x+4)}$ into partial fractions.

ii- Define proper rational fraction.

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

iv- Write the first four terms of the sequence $a_n = \frac{n}{2n+1}$

v- How many terms are there in A.P., in which $a_1 = 11$, $a_n = 68$, $d = 3$

vi- Sum the series $\frac{1}{1+\sqrt{x}} + \frac{1}{1-x} + \frac{1}{1-\sqrt{x}} + \ldots\ldots\ldots$ to n terms.

vii- Find the 12^{th} term of the G.P $1+i$, $2i$, $2(1-i)$, ……..

viii- Find the sum of the following infinite geometric series $4 + 2\sqrt{2} + 2 + \sqrt{2} + 1 + \ldots\ldots$

ix- How many arrangements of the letters of the word 'MATHEMATICS', taken all together, can be made?

x- Prove the formula for $n = 1, 2$ $\quad 1 + 2 + 4 + \ldots\ldots + 2^{n-1} = 2^n - 1$

xi- Calculate $(2.02)^4$ by means of binomial theorem.

xii- Expand $(1+x)^{\frac{-1}{3}}$ upto 4-terms, taking the values of x such that the expansion is valid.

(Turn over)

4. Write short answers to any NINE questions: **(2 x 9 = 18)**

i- What is the length of the arc intercepted on a circle of radius 14 cm by the arms of a central angle of 45°?

ii- Evaluate: $\dfrac{1-\tan^2\frac{\pi}{3}}{1+\tan^2\frac{\pi}{3}}$

iii- Prove that: $\dfrac{1-\sin\theta}{\cos\theta} = \dfrac{\cos\theta}{1+\sin\theta}$

iv- Prove that: $\tan\left(\dfrac{\pi}{4}-\theta\right)+\tan\left(\dfrac{3\pi}{4}+\theta\right)=0$

v- Prove that: $\tan 2a = \dfrac{2\tan\alpha}{1-\tan^2\alpha}$

vi- Find the value of $\cos 2\alpha$ when $\sin\alpha = \dfrac{12}{13}$ where $0 < \alpha < \dfrac{\pi}{2}$

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

viii- State law of cosines.

ix- Find the area of the triangle ABC, given three sides $a = 524$, $b = 276$, $c = 315$

x- Show that: $r_1 = s\tan\dfrac{\alpha}{2}$

xi- Prove that: $\sin^{-1}x = \dfrac{\pi}{2} - \cos^{-1}x$

xii- Find the solution of equation: $\sin x = \dfrac{-\sqrt{3}}{2}$

xiii- Solve the equation: $\sin^2 x + \cos x = 1$

SECTION II

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

(b) For what value of n, $\dfrac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is the positive geometric mean between a and b? 5

6- (a) Use Cramer's rule to solve the system: 5

$$3x_1 + x_2 - x_3 = -4$$
$$x_1 + x_2 - 2x_3 = -4$$
$$-x_1 + 2x_2 - x_3 = 1$$

(b) The members of a club are 12 boys and 8 girls. In how many ways can a committee of 3 boys and 5 girls be formed? 5

7- (a) Solve $4.2^{2x+1} - 9.2^x + 1 = 0$ 5

(b) Find the term involving a^4 in the expansion of $\left(\dfrac{2}{x}-a\right)^9$ 5

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

(b) Reduce $\sin^4\theta$ to an expression involving function of multiple of θ raised to the first power. 5

9- (a) The sides of a triangle are x^2+x+1, $2x+1$, x^2-1. Prove that the greatest angle of the triangle is 120°. 5

(b) Prove that: $\tan^{-1}\dfrac{3}{4} + \tan^{-1}\dfrac{3}{5} - \tan^{-1}\dfrac{8}{19} = \dfrac{\pi}{4}$ 5

Mathematics **(INTER PART-I) 318 (III)** **PAPER: I**

Time: 30 Minutes **Code: 6195** **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 circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank.

1- 1- If $a = 1$ then sum of even coefficients in expression of $(a + x)^n$ is equal to

(A) 2^{n-1} (B) 2^n (C) 2^{n+1} (D) 2^{2n}

2- The arithmetic mean (A.M) between $\frac{1}{a}$ and $\frac{1}{b}$ is equal to

(A) $\frac{a+b}{2}$ (B) $\frac{a+b}{2ab}$ (C) $\frac{1}{a+b}$ (D) $\frac{2ab}{a+b}$

3- Solution of equation $\cos x + 1 = 0$ is

(A) $\{\pi + n\pi\}$ (B) $\{\pi + 2n\pi\}$ (C) $\{\pi\}$ (D) $\left\{\frac{\pi}{2} + n\pi\right\}$

4- The radius of inscribed circle $r =$

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

5- The range of $\sin x =$

(A) $[-1, 1]$ (B) $[0, 1]$ (C) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (D) $[-1, 0]$

6- The angle formed by a line above horizontal line is called

(A) right angle (B) oblique angle (C) angle of depression (D) angle of elevation

7- If A is non-singular matrix then $A^{-1} =$

(A) $\frac{Adj(A)}{|A|}$ (B) $|A|\,Adj(A)$ (C) A^t (D) $\frac{|A|}{Adj(A)}$

8- The number $\sqrt{-1}$ is called

(A) real number (B) natural number (C) complex number (D) rational number

9- The fraction $\frac{x+1}{x^2+2}$ is

(A) proper fraction (B) improper fraction (C) identity (D) mixed

10- Show that $n! > n^2$ is true for integral values of

(A) $n = 3$ (B) $n < 4$ (C) $n \geq 4$ (D) $n \leq 4$

11- The value of $2\,Sin^2 \theta/2 =$

(A) $1 + \cos\theta$ (B) $1 - \cos\theta$ (C) $1 + \sin\theta$ (D) $1 - \sin\theta$

12- The roots of equation $ax^2 + bx + c = 0$ are rational if $b^2 - 4ac$ is

(A) positive (B) perfect square (C) negative (D) 0

(Turn over)

13- The converse of $P \rightarrow q$ is

(A) $\sim q \rightarrow p$ (B) $q \rightarrow p$ (C) $p \rightarrow \sim q$ (D) $\sim p \rightarrow \sim q$

14- The value of $\sin(\tan^{-1}(0)) =$

(A) 0 (B) 1 (C) -1 (D) ∞

15- In a triangle with usual notation $\cos\frac{\beta}{2} =$

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

16- If α, β are roots of equation $x^2 - x + 1 = 0$ then $\alpha + \beta =$

(A) -1 (B) 0 (C) 1 (D) 2

17- For two +ve real numbers, with usual notation

(A) $A > G$ (B) $A = G$ (C) $A \geq G$ (D) $A < G$

18- A die is rolled, the probability that dots on tops are greater than 4 is

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{1}{6}$

19- The value of permutation ${}^{20}P_3$ is

(A) 4050 (B) 5040 (C) 6840 (D) 4068

20- The matrix $\begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ is called

(A) identity (B) null (C) scalar (D) diagonal

Mathematics **(INTER PART-I) 318** **PAPER: I**

Time: 2:30 hours **SUBJECTIVE** **Marks: 80**

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

SECTION I

Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Find out real and imaginary parts for $(\sqrt{3}+i)^3$

ii- Simplify by justifying each step by using properties of real numbers $\dfrac{\frac{1}{4}+\frac{1}{5}}{\frac{1}{4}-\frac{1}{5}}$.

iii- Show that $(z-\bar{z})^2$ is a real number for all $z \in c$

iv- Write down the power set of $\{a, \{b, c\}\}$.

v- Write the converse and inverse of $\sim p \rightarrow \sim q$.

vi- Prepare a table of addition of the elements of the set of residue classes modulo 4.

vii- If $A=\begin{bmatrix}1 & -1\\ a & b\end{bmatrix}$ and $A^2=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, find the values of "a" and "b".

viii- If $A=[a_{ij}]_{3\times 4}$ then show that $AI_4 = A$

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

x- Solve the equation $x^{-2}-10=3x^{-1}$

xi- Evaluate $(1+\omega-\omega^2)^8$; ω is a complex cube root of unity.

xii- Whether factor theorem holds? When x^3+x^2-7x+1 is divided by $(x-2)$

Write short answers to any EIGHT questions: **(2 x 8 = 16)**

i- Resolve $\dfrac{3x-11}{(x^2+1)(x+3)}$ into partial fraction.

ii- Determine whether -19 is the term of A.P 17, 13, 9, ... or not.

iii- Find the 5th term of the G.P 3, 6, 12, ...

iv- Find the sum of the infinite G.P 2, $\sqrt{2}$, 1, ...

v- Show that $G^2 = A.H$ if $a=-2$, $b=-6$. (using usual notation)

vi- If $\frac{1}{a}, \frac{1}{b}$ and $\frac{1}{c}$ are in G.P, show that common ratio is $\pm\sqrt{\frac{a}{c}}$

vii- Find the value of n, when permutation ${}^{11}P_n = 11.10.9$

viii- How many arrangements of letters of word "PAKISTAN" can be made?

ix- Pakistan and India play a cricket match. Find the probability that Pakistan wins.

x- State Binomial theorem.

xi- Show that $\dfrac{n^3+2n}{3}$ is integer for $n = 1, 2, 3$.

xii- If x is so small that its square and higher powers can be neglected, then show that

$$\frac{\sqrt{1+2x}}{\sqrt{1-x}} = 1+\frac{3}{2}x$$