☆☆☆☆ Roll No _____

HSSC-(P-I)-A/2024
(For All Sessions)

Paper Code	6	1	9	7

Group-I

Time: 30 Minutes **Marks : 20**

Mathematics (Objective)

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 Four 4^{th} roots of 625 are:
(A) $\pm 4, \pm 4i$ (B) ● $\pm 5, \pm 5i$ (C) $\pm 16, \pm 16i$ (D) $\pm 25, \pm 25i$

2. Partial fractions of $\frac{x^2+1}{(x+1)(x-1)}$ are of the form:
(A) ● $\frac{A}{x+1}+\frac{B}{x-1}$ (B) $\frac{Ax}{x+1}+\frac{B}{x-1}$ (C) $1+\frac{A}{x+1}+\frac{B}{x-1}$ (D) $\frac{Ax+B}{x+1}+\frac{Cx+D}{x-1}$

3. $A.M$ between $x-3$ and $x+5$ is:
(A) ● $x+1$ (B) $x-1$ (C) $x-3$ (D) $x+5$

4. No term of a $G.P$ can be:
(A) ● 0 (B) 1 (C) -1 (D) i

5. $8.7.6 =$
(A) $\frac{8!}{8}$ (B) $\frac{8!}{7!}$ (C) $\frac{8!}{6!}$ (D) ● $\frac{8!}{5!}$

6. $4^n > 3^n + 4$ is true for integers:
(A) ● $n \geq 2$ (B) $n \geq 3$ (C) $n \geq 4$ (D) $n \geq 5$

7. If $sin\theta < 0$ and $cos\theta > 0$, then terminal arm of θ lies in quadrant:
(A) I (B) II (C) III (D) ● IV

8. $\frac{1-cos\theta}{2} =$
(A) $sin\theta$ (B) ● $sin^2\frac{\theta}{2}$ (C) $cos\,\theta$ (D) $cos^2\frac{\theta}{2}$

9. Range of $y = tanx$ is:
(A) $\frac{-\pi}{2} \leq y \leq \frac{\pi}{2}$ (B) ● $-\infty < y < \infty$ (C) $\frac{-\pi}{2} \leq x \leq \frac{\pi}{2}$ (D) $-\infty < x < \infty$

10. $2\mathcal{R}\,sin \propto =$
(A) r (B) S (C) Δ (D) ● a

11. $Sin\left(cos^{-1}\frac{\sqrt{3}}{2}\right) =$
(A) ● $\frac{1}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{1}{\sqrt{3}}$ (D) 1

12. Reference Angle for $1 - 2\,sinx = 0$ is:
(A) ● $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

13. $\forall z \in C$, which one is true:
(A) $z = -z$ (B) $\bar{z} = -z$ (C) ● $\bar{\bar{z}} = z$ (D) $\bar{\bar{z}} = -z$

14. A prime number can be factor of a square only if it occurs in it at least.
(A) Once (B) ● Twice (C) Thrice (D) Four times

15. If A and B are disjoint sets, then $A - B =$
(A) B (B) ● A (C) $B - A$ (D) ϕ

16. The converse of $\sim p \rightarrow q$ is:
(A) ● $q \rightarrow \sim p$ (B) $p \rightarrow q$ (C) $q \rightarrow p$ (D) $p \rightarrow \sim q$

17. $p \wedge q$ is called:
(A) ● Conjunction (B) Disjunction (C) Conditional (D) Equivalence

18. $(AB)^t =$
(A) A^tB^t (B) A^tB (C) AB (D) ● B^tA^t

19. A square matrix A is anti-symmetric if:
(A) ● $A^t = -A$ (B) $A^t = A$ (C) $\bar{A} = A$ (D) $\bar{A} = -A$

20. $1 + \omega + \omega^2 =$
(A) 1 (B) ω (C) ω^2 (D) ● 0

Roll No _____

HSSC-(P-I)-A/2024
(For All Sessions)

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Marks

Time: 2:30 hours

Mathematics (Subjective)

(GROUP-I)

SECTION-I

(8x2=16)

2. Write short answers of any eight parts from the following:

i. Define a complex number. Is 0 a complex number?

ii. Whether the set $\{0, -1\}$ is closed or not $w.r.t$ addition and multiplication.

iii. Factorize: $3x^2 + 3y^2$

iv. Find multiplicative inverse of $-3 - 5i$

v. Construct truth table of $\sim(p \to q) \to p$

vi. Define monoid.

vii. Find the matrix X if: $X\begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 12 & 3 \end{bmatrix}$

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

ix. If $A = \begin{bmatrix} 1 \\ 1+i \\ i \end{bmatrix}$, find $A(\bar{A})^t$

x. Find four fourth roots of 81

xi. Use the remainder theorem to find the remainder when $x^3 - 2x^2 + 3x +$ _ vided by $x - 3$

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

(8x2=16)

3. Write short answers of any eight parts from the following:

i. Define conditional equation.

ii. Resolve $\frac{x^2+15}{(x^4+2x+5)(x-1)}$ into partial fraction without finding constants.

iii. Find the first four terms of the sequence $a_n = \frac{n}{2n+1}$

iv. Determine whether -19 is a term of $17, 13, 9, \ldots$

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

vi. Sum the series $\frac{3}{\sqrt{2}} + 2\sqrt{2} + \frac{5}{\sqrt{2}} + \cdots + a_{13}$

vii. Prove from the first principle that ${}^nP_r = n \cdot {}^{n-1}P_{r-1}$

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

ix. Determine the probability of getting dots less than 5 when a die is rolled.

x. Prove that $n! > 2^n - 1$ for $n = 4, 5$

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

xii. Expand $(1 + 2x)^{-1}$ up to 4 terms.

(9x2=18)

4. Write short answers of any nine parts from the following:

i. Write values of trigonometric functions for $\theta = \frac{-9}{2}\pi$.

ii. Prove that $tan^2\theta - cos^2\theta = cot^2\theta\, cos^2\theta$.

iii. Prove that $sin(\theta + 270) = -cos\theta$.

iv. Prove that $sin2\theta = 2sin\theta\ cos\theta$.

v. Express $sin12^\circ\ sin46^\circ$ as sum or difference.

vi. Write domain and range of $cos\ x$.

vii. Find period of $sin\frac{x}{3}$.

viii. Draw the graph of $tanx$ for $x \in (0, \pi)$

ix. Prove that $r = (s - b)tan\frac{\beta}{2}$.

x. Write any two half angle formulae.

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

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

xiii. Solve the equation $4\ cos^2x - 3 = 0$

SECTION-II

Note: **Attempt any three questions. Each question carries equal marks:** (10x3=30)

5.(a) If $\propto$ and β are the roots of $x^2 - 3x + 5 = 0$, form the equation whose roots are $\frac{1-\propto}{1+\propto}\ and\ \frac{1-\beta}{1+\beta}$.

(b) Find the rank of matrix $\begin{bmatrix} 1 & -1 & 2 & 1 \\ 2 & -6 & 5 & 1 \\ 3 & 5 & 4 & -3 \end{bmatrix}$

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

(b) Find six arithmetic means between 2 and 5.

7. (a) A die is thrown. Find the probability that the no. of dots on the top are prime numbers or odd numbers.

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

8. (a) Solve the triangle ABC, given that $\propto = 35^\circ\ 17'\ \beta = 45^\circ\ 13', b = 421$.

(b) Reduce $cos^4\theta$ to an expression involving only function of multiples of θ, raised to the first power.

9. (a) A circular wire of radius $6\ cm$ is cut straightened and then bent so as to lie along the circumference of a hoop of radius $24\ cm$. Find the measure of the angle which it subtends at the center of the hoop.

(b) Prove that: $tan^{-1}\frac{1}{4} + tan^{-1}\frac{1}{5} = tan^{-1}\frac{9}{19}$

Roll No _____

HSSC-(P-I)-A/2024
(For All Sessions)

Paper Code	6	1	9	2

Mathematics (Objective)

Group-II **Time: 30 Minutes** **Marks : 20**

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 A complex number $1 + i$ can also be expressed as:
(A) $2(cos45° + i\,sin45°)$ (B) $\sqrt{2}(cos45° - i\,sin45°)$ (C) ● $\sqrt{2}(cos45° + i\,sin45°)$ (D) $2(cos45° - i\,sin45°)$

2. If Z is a complex number and $Z = \overline{Z}$ then Z must be:
(A) ● Real (B) Imaginary (C) Rational (D) Irrational

3. The set $\{(a, b)\}$ is called:
(A) Infinite set (B) ● Singleton set (C) Empty set (D) Set with two elements

4. Drawing conclusion from premises believed to be true is called:
(A) Proposition (B) Contradiction (C) Induction (D) ● Deduction

5. If p is a logical statement $p \wedge \sim p$ is always:
(A) ● Absurdity (B) Contigency (C) Tautology (D) Conditional

6. If $A = [a \quad b \quad c]$, then order of A^t is:
(A) 1×3 (B) ● 3×1 (C) 3×3 (D) 1×1

7. If the matrix $\begin{bmatrix} \lambda & 1 \\ -2 & 1 \end{bmatrix}$ is singular then $\lambda =$
(A) 2 (B) 1 (C) -1 (D) ● -2

8. IF $4^{3x} = \frac{1}{2}$ then x is equal to:
(A) ● $-\frac{1}{6}$ (B) -6 (C) $\frac{1}{6}$ (D) 6

9. If ω is cube root of unity, then $\omega + \omega^2 =$
(A) 0 (B) ● -1 (C) 1 (D) $\frac{1}{\omega}$

10. From the identity $5x + 4 = A(x - 1) + B(x + 2)$, value of B is:
(A) -3 (B) ● 3 (C) -2 (D) 2

11. Which of the term cannot be a term of G.P:
(A) -1 (B) 1 (C) ● 0 (D) 5

12. $\sum_{k=1}^{n} K$ *is equal to:*
(A) $\frac{n+1}{2}$ (B) ● $\frac{n(n+1)}{2}$ (C) $\frac{n(n+1)(2n+1)}{6}$ (D) $\frac{n(n-1)}{2}$

13. $\frac{{}^{n}P_r}{r!}$ *is equal to:*
(A) ● ${}^{n}C_r$ (B) ${}^{n}C_{r-1}$ (C) ${}^{n+1}C_r$ (D) ${}^{n-1}C_r$

14. In expansion of $(a + b)^{16}$ middle term will be:
(A) $11th$ (B) $12th$ (C) $8th$ (D) ● $9th$

15. Which of the following is **NOT** Quadrantal angle?
(A) $\frac{9}{2}\pi$ (B) 13π (C) ● $\frac{4}{3}\pi$ (D) $\frac{\pi}{2}$

16. The angle $\frac{3\pi}{2} - \theta$ lies in quadrant:
(A) I (B) II (C) ● III (D) IV

17. The range of $sinx$ is:
(A) ● $[-1, 1]$ (B) $[-1, 0]$ (C) $[0, 2]$ (D) $[-2, 2]$

18. The radius of inscribed circle is:
(A) $\frac{abc}{4\Delta}$ (B) $\frac{S}{\Delta}$ (C) $\frac{\Delta}{S-a}$ (D) ● $\frac{\Delta}{S}$

19. $Cos\left(sin^{-1}\frac{1}{\sqrt{2}}\right)$ is equal to:
(A) $\frac{1}{2}$ (B) $\frac{\pi}{4}$ (C) ● $\frac{1}{\sqrt{2}}$ (D) $-\frac{\pi}{4}$

20. If $sinx = \frac{1}{2}$, then reference angle is:
(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $-\frac{\pi}{6}$ (D) ● $\frac{\pi}{6}$

Roll No _____ to be filled in by the candidate

HSSC-(P-I)-A/2024
(For All Sessions)
(GROUP-II)

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Marks : 80
Time: 2:30 hours

Mathematics (Subjective)

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. Does the set $\{1, -1)$ possess closure property $w.r.t$ multiplication? Construct the multiplication table.

ii. If $\frac{a}{b} = \frac{c}{d}$, prove that $ad = bc$

iii. Factorize $a^2 + 4b^2$

iv. Simplify by expressing in the form $a + bi$: $(2 + \sqrt{-3})(3 + \sqrt{-3})$

v. If $B = \{1, 2, 3\}$ then write down the power set of B

vi. Determine whether the statement $p \rightarrow (q \rightarrow p)$ is a tautology or not.

vii. Under what conditions, the determinant of a square matrix A is zero. Write any two conditions.

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

ix. Determine whether the matrix $A = \begin{bmatrix} 1 & 1+i \\ 1-i & 2 \end{bmatrix}$ is hermitian matrix or skew-hermitian matrix.

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

xi. Find four fourth roots of 16.

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

3. Write short answers of any eight parts from the following: (8x2=16)

i. Define an identity with example.

ii. Resolve into partial fraction $\frac{1}{x^2-1}$

iii. The $7th$ and $10th$ terms of an H.P are $\frac{1}{3}$ and $\frac{5}{21}$ respectively, find its $14th$ term.

iv. Find the sum of first 15 terms of geometric sequence $1, \frac{1}{3}, \frac{1}{9}, \ldots\ldots$

v. Insert two G.M's between 2 and 16.

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

vii. A card in drawn from a deck of 52 playing cards What is the probability that it is a diamond card or an ace?

viii. Find n, if ${}^nC_8 = {}^nC_{12}$

ix. How many different 4-digit numbers can be formed out of the digits 1, 2, 3, 4, 5, 6, when no digit is repeated?

x. Use mathematical induction to prove that $3 + 3.5 + 3.5^2 + \cdots + 3.5^n = \frac{3(5^{n+1}-1)}{4}$ for $n = 1,2$

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

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

4. Write short answers of any nine parts from the following: (9x2=18)

i. Find r, when $l = 56cm, \theta = 45°$

ii. Verify that $sin2\theta = 2sin\theta cos\theta$ for $\theta = 45°$

iii. Write the fundamental law of trigonometry.

iv. Show that $cos(\propto +\beta)\cos(\propto -\beta) = cos^2 \propto -sin^2\beta$.

v. Express $sin5x + sin7x$ as a product.

vi. Define the period of trigonometric function.

vii. Write down the domain and range of tangent function.

viii. Find the period of $sin\frac{x}{3}$

ix. Solve the right triangle ABC, in which $\gamma = 90°, a = 3.28,\ b = 5.74$.

x. Define half angle formulas for tangent.

xi. Define Hero's formula.

xii. Find the value of $sin(tan^{-1}(-1))$

xiii. Solve the equation $sin2x = cosx$ where $x \in [0, 2\pi]$

SECTION-II

Note: **Attempt any three questions. Each question carries equal marks:** (10x3=30)

5.(a) Show that $\begin{vmatrix} x & 1 & 1 & 1 \\ 1 & x & 1 & 1 \\ 1 & 1 & x & 1 \\ 1 & 1 & 1 & x \end{vmatrix} = (x+3)(x-1)^3$

(b) Prove that $\frac{x^2}{a^2} + \frac{(mx+c)^2}{b^2} = 1$ will have equal roots if $c^2 = a^2m^2 + b^2;\ a \neq 0, b \neq 0$

6. (a) Resolve into partial fractions $\frac{6x^3+5x^2-7}{2x^2-x-1}$

(b) The $A.M$ between the two numbers is 5 and their positive $G.M.$ is 4 find the numbers.

7. (a) Prove that ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$

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

8. (a) Reduce $sin^4\theta$ to an expression involving only functions of multiples of θ raised to the first power.

(b) With usual notations, prove that $r = s.\tan{}^{\propto}/_2 . tan{}^{\beta}/_2 . tan{}^{\gamma}/_2$

9. (a) If $cot\theta = \frac{5}{2}$, and θ is in quadrant I find the value of $\frac{3sin\theta+4cos\theta}{cos\theta-sin\theta}$

(b) Prove that $cos^{-1}\frac{63}{65} + 2tan^{-1}\frac{1}{5} = sin^{-1}\frac{3}{5}$

☆☆ Roll No _____ to be filled in by the candidate | HSSC-(P-I)-A/2023 | Paper Code | 6 | 1 | 9 | 3 |

Mathematics(Objective) (For All Sessions) Group-I Time: 30 Minutes Marks : 20

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 $\frac{abc}{4\Delta} =$

(A) r_1 (B) r (C) R (D) Δ

2. In any ΔABC $\sqrt{\frac{S(S-c)}{ab}}$ is:

(A) $Cos\,\alpha/_2$ (B) $Cos\,\beta/_2$ (C) $Cos\,\gamma/_2$ (D) $Cos\,\alpha$

3. $Cos\,(Tan^{-1}0) =$ ____

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

4. Solution of $1 + Cosx = 0$ in $[0\ 2\pi]$ is:

(A) π (B) $\frac{\pi}{2}$ (C) $\frac{3\pi}{2}$ (D) $\frac{5\pi}{2}$

5. The set $\{1\}$ possess closure property under:

(A) Addition (B) Multiplication (C) Subtraction (D) Both A & B

6. A function $f: A \to B$ is called an nto function if:

(A) Range of $f = A$ (B) Range of $f \neq A$ (C) Range of $f = B$ (D) Range of $f \neq B$

7. If $A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & -2 & 0 \\ -2 & -2 & 1 \end{bmatrix}$ then $|A| =$ _____.

(A) 4 (B) 7 (C) 10 (D) 13

8. If order of a matrix "A" is $m \times n$ and order of matrix "B" is $n \times p$ then order of product of matrices AB is:

(A) $m \times p$ (B) $n \times p$ (C) $m \times n$ (D) $p \times n$

9. The roots of $x^2 - 7x + 10 = 0$ are:

(A) $-2, -5$ (B) $2, 5$ (C) $-2, 8$ (D) $2, -5$

10. If α, β are the roots of $3x^2 - 2x + 4 = 0$, then sum of roots is:

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

11. Partial fractions of $\frac{1}{(x-1)(x+1)}$ are:

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

12. Next two terms of sequence $7, 9, 12, 16, \ldots\ldots$ are:

(A) 18, 20 (B) 19, 21 (C) 20, 22 (D) 21, 27

13. If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in G.P then common ratio is:

(A) $\pm\sqrt{\frac{c}{a}}$ (B) $\pm\sqrt{\frac{a}{c}}$ (C) $\pm\sqrt{\frac{b}{c}}$ (D) $\pm\sqrt{\frac{c}{b}}$

14. $n_{P_2} = 30$, then n is:

(A) 6 (B) 5 (C) 4 (D) 3

15. In how many ways can 4-keys be arranged on a circular key ring:

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

16. $n! > n^2$ is true for $n \neq$:

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

17. The formula for $(r+1)th$ term of binomial expansion of $(a+x)^n$ is:

(A) $\binom{n}{r} a^{n-r} x^r$ (B) $\binom{n}{r} a^{n+r} x^r$ (C) $\binom{n}{r} a^n x^{n-r}$ (D) $\binom{n}{r} a^n x^{n+r}$

18. Which one is the quadrantal angle:

(A) 30^0 (B) 45^0 (C) 60^0 (D) 90^0

19. $Cos\ 2\alpha =$ _____.

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

20. Period of Cosec $\frac{x}{4}$ is:

(A) 2π (B) 4π (C) 6π (D) 8π

Roll No _____ to be filled in by the candidate

HSSC-(P-I)-A/2023

Marks : 80

Mathematics (Subjective) (For All Sessions) (GROUP-I) Time: 2:30 hours

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. Name the properties used in equations: (a): $100 + 0 = 100$ (b): $1000 \times 1 = 1000$

ii. Separate into real and imaginary parts, if $Z = \frac{i}{1+i}$

iii. Differentiate between Equal and Equivalent sets, with example.

iv. Write the set: $\{x | x \in N \wedge 4 < x < 12\}$, in descriptive and tabular forms:

v. Define semi-group.

vi. Find values of x if $\begin{vmatrix} 3 & 1 & x \\ -1 & 3 & 4 \\ x & 1 & 0 \end{vmatrix} = -30$

vii. If the matrices A and B are symmetric and $AB = BA$, show that AB is symmetric.

viii. If $A = \begin{bmatrix} i & 1+i \\ 1 & -i \end{bmatrix}$, find $A + (\bar{A})^t$

ix. Solve: $x(x+7)=(2x-1)(x+4)$ by factorization.

x. If ω is a cube root of unity, form an equation whose roots are $Z\omega$ and $Z\omega^2$

xi. Find two consecutive numbers, whose product is 132.

xii. Find the three cube roots of -8

3. Write short answers of any eight parts from the following: (8x2=16)

i. Without finding constants write $\frac{x^2-10+13}{(x-1)(x^2-5x+6)}$ into partial fractions.

ii. Find vulgar fraction equivalent to recurring decimal 0.7

iii. Find the nth term of sequence $\left(\frac{4}{3}\right)^2, \left(\frac{7}{3}\right)^2, \left(\frac{10}{3}\right)^2, \ldots$

iv. Calculate geometric means between 4 and 16.

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

vi. Find 12th term of H.P: $1/3, 2/9, 1/6, \ldots$

vii. Find the term involving x^{-2} in the expansion of $\left(x - \frac{2}{x^2}\right)^{13}$

viii. How many words can be formed from PLANE using all letters when no letter is to be repeated.

ix. Write formula for ${}^nP_r$ and ${}^nC_r$

x. A die is thrown. Find the probability that dots on top are prime numbers.

xi. Expand $(1-x)^{1/2}$ up to 4 terms by binomial theorem.

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

4. Write short answers of any nine parts from the following: (9x2=18)

i. Define the word "Trigonometry"

ii. Find $tan\theta$ and $cot\theta$ for $\theta = \frac{19\pi}{3}$

iii. Show that $sin^2\left(\frac{\pi}{6}\right) + sin^2\left(\frac{\pi}{3}\right) + tan^2\left(\frac{\pi}{4}\right) = 2$

iv. Find the value of $cos\left(\frac{\pi}{12}\right)$

v. Prove that $Sin(180^0 + \propto)\, Sin(90^0 - \propto) = -Sin \propto Cos \propto$.

vi. Define the principal tangent function.

vii. Prove that $Sin(\propto + \beta)Sin(\propto - \beta) = cos^2\beta - cos^2 \propto$.

viii. Define the period of a Trigonometry function

ix. Solve the right triangle ABC in which: $r = 90^0$, $b = 68.4$, $c = 96.2$

x. Solve the triangle ABC if $\beta = 60^0$, $r = 15^0$, $b = \sqrt{6}$

xi. Find the area of triangle ABC for $b = 21.6$, $c = 30.2$, $\propto = 52^0 40'$

xii. Define the trigonometric equation.

xiii. Find the solution of Cosec $\theta = 2$ which lie in the interval $[0, 2\pi]$

SECTION-II

Note Attempt any three questions. Each question carries equal marks: (10x3=30)

5. (a) Find the matrix A if: $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix} A = \begin{bmatrix} 0 & -3 & 8 \\ 3 & 3 & -7 \end{bmatrix}$

(b) For what values of "m" the roots of the equation $x^2 - 2(1+3m)x + 7(3+2m) = 0$ be equal?

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

(b) Find the values of n and r when ${}^{n-1}C_{r-1} : {}^nC_r : {}^{n+1}C_{r+1} = 3 : 6 : 11$

7. (a) Sum the series up to n terms $2 + (2+5) + (2+5+8) + \cdots$

(b) Use binomial theorem to show that: $1 + \frac{1}{4} + \frac{1.3}{4.8} + \frac{1.3.5}{4.8.12} + \cdots = \sqrt{2}$

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

(b) Prove that $cos20^0 + cos100^0 + cos140^0 = 0$

9. (a) The measures of sides of a triangular plot are 413,214 and 375 meters. Find the measure of corner angles of the plot.

☆☆☆☆ Roll No to be filled in by the candidate | HSSC-(P-I)-A/2023 | Paper Code 6 1 9 8

Mathematics (Objective)

(For All Sessions) (Group-II) Time: 30 Minutes Marks : 20

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 The sum of infinite geometric series with common ratio $|r| < 1$ is:

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

2. A die is rolled. The probability that the dot on the top is greater than 4 is:

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

3. The value of $^{12}C_{10} =$

(A) 11 (B) 66 (C) 22 (D) 2

4. The sum of exponents of a and b in every term in the expansion of $(a+b)^n$ is:

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

5. The inequality $n! > 2^n - 1$ is valid if n is:

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

6. $\frac{2\pi}{3} radians =$

(A) 120^0 (B) 60^0 (C) 90^0 (D) 30^0

7. $Sin(2\pi - \theta) =$

(A) $Sin\theta$ (B) $-Sin\theta$ (C) $Cos\theta$ (D) $-Cos\theta$

8. The period of $Sin\, 2x =$

(A) 2π (B) -2π (C) π (D) $-\pi$

9. $\sqrt{\frac{s(s-a)}{bc}} =$ (A) $\sin\frac{\alpha}{2}$ (B) $\sin\frac{\beta}{2}$ (C) $\cos\frac{\alpha}{2}$ (D) $\cos\frac{\beta}{2}$

10. Hero's formula for area of triangle is:

(A) $\sqrt{s(s-a)(s-b)(s-c)}$ (B) $\frac{1}{2}bc\sin\alpha$ (C) $\frac{C^2\sin\alpha\sin\beta}{2\sin\gamma}$ (D) $\frac{1}{2}ab\sin\gamma$

11. $Sin^{-1}\left(-\frac{1}{2}\right) =$ (A) $\frac{\pi}{3}$ (B) $-\frac{\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $-\frac{\pi}{6}$

12. If $sinx = cosx$ then $x =$ (A) 0^0 (B) 30^0 (C) 45^0 (D) 60^0

13. The equation $x^2 + 1 = 0$ has solution in:

(A) $\mathbb{R}$ (B) $\mathbb{C}$ (C) $\mathbb{Q}$ (D) $\mathbb{Q}$

14. Let $p \rightarrow q$ be a given conditional then $\sim q \rightarrow \sim p$ is:

(A) Converse (B) Inverse (C) Contra positive (D) Positive

15. If A and B are non singular matrices, then $(AB)^{-1}$ is equal to:

(A) $\frac{1}{AB}$ (B) $A^{-1}B^{-1}$ (C) BA (D) $B^{-1}A^{-1}$

16. $AX = 0$ is homogeneous system with $|A| \neq 0$ then system has:

(A) No solution (B) Trivial solution (C) Non-trivial solution (D) Infinite solution

17. If $4^{-x} = \frac{1}{2}$ then $x =$:

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

18. An equation which remains unchanged when x is replaced by $\frac{1}{x}$ is:

(A) Exponential (B) Reciprocal (C) Radical (D) Reducible

19. Partial fractions of $\frac{1}{x^2-1}$ will be of the form:

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

20. General term of the sequence 1,3,5 ... is:

(A) $2n+2$ (B) $2n$ (C) $2n-1$ (D) $3n$

Roll No _____ to be filled in by the candidate

HSSC-(P-I)-A/2023

(For All Sessions) Rawalpindi Board-2023

GROUP-II

Time: 2:30 hours

Mathematics (Subjective)

SECTION-I

2. **Write short answers of any eight parts from the following:** (8x2=16)

i. Find the multiplicative inverse of $(-4, 7)$

ii. Prove that $\bar{Z} = Z$ if Z is a real number.

iii. Write down the power set of $\{9, 11\}$.

iv. Construct the truth table for $(P \wedge \sim P) \rightarrow q$

v. Define a group.

vi. If $A = \begin{bmatrix} 1 & 2 \\ a & b \end{bmatrix}$ and $A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ find the value of a and b.

vii. Find x if $\begin{vmatrix} 1 & x-1 & 3 \\ -1 & x+1 & 2 \\ 2 & -2 & x \end{vmatrix} = 0$

viii. Show that AA^t is symmetric for any matrix of order $3x3$.

ix. Solve the equation: $(a+b)x^2 + (a+2b+c)x + b + c = 0$

x. Find the condition that one root of $x^2 + px + q = 0$ is double the other.

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

xii. Solve the equations simultaneously: $x + y = 5;\ x^2 + 2y^2 = 17$

3. **Write short answers of any eight parts from the following:** (8x2=16)

i. Resolve into $\frac{1}{x^2-1}$ partial fraction.

ii. Write the first three terms of $\left\{\frac{a}{n}\right\} = \left\{\frac{1}{2^n}\right\}$

iii. If nth term of the $A.F.$ is $3n - 1$, find the $A.P.$

iv. Evaluate: $4!.0!.1!$

v. Which term of the sequence: $x^2 - y^2, (x+y), \frac{(x+y)}{(x-y)}, \ldots$ is $\frac{x+y}{(x-y)^9}$?

vi. Define Harmonic Mean. Also derive formula.

vii. How many numbers greater than 1000,000 can be formed from the digits 0,2,2,2,3,4,4?

viii. Find the value of n when ${}^nC_{10} = \frac{12 \times 11}{2!}$

ix. Prove that: $n! > n^2$ for $n = 4, 5$.

x. Expand $(1+x)^{-2}$ upto 3 terms.

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

xii. Using binomial theorems: $(1.03)^{1/3}$, calculate the value upto three decimal places.

4. **Write short answers of any nine parts from the following:** (9x2=18)

i. Find θ when $l = 1.5\ cm$, $r = 2.5\ cm$

ii. Write domain and range of $\sin x$

iii. If $\tan\theta < 0$ and ; in which quadrant θ will lie.

iv. Prove than $\sin^2 \pi/6 + \sin^2 \pi/3 + \tan^2 \pi/4 = 2$

v. Prove that $R = \frac{abc}{4\Delta}$

vi. Find the distance between $A(3, 8)$ and $B(5, 6)$.

vii. State law of Sines.

viii. Prove that $\sin(45^0 + \propto) = \frac{1}{\sqrt{2}}(\sin \propto + \cos \propto)$

ix. Find the value of $\sin 2\propto$ when $\cos \propto = \frac{3}{5}$ and $0 < \propto < \pi/2$

x. For ΔABC if $\propto = 35°17';\ \beta = 45°13';\ b = 421$ find a and r.

xi. Find the value of $\cos(\sin^{-1}\frac{1}{\sqrt{2}})$

xii. Solve $\cos x = \frac{\sqrt{3}}{2}$ where $x \in [0, 2\pi]$

xiii. Define trigonometric equation. Give one example.

SECTION-II

Note **Attempt any three questions. Each question carries equal marks:** (10x3=30)

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

(b) For what value of m will the roots of following equation be equal?
$(1+m)x^2 - 2(1+3m)x + (1+8m) = 0$

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

(b) A card is drawn from a deck of 52 playing cards. What is the probability that it is a diamond card or an ace?

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

(b) If x is very near equal to 1. Then prove that $Px^p - qx^q \approx (p-q)x^{p+q}$

8. (a) A railway train is running on circular track of radius 500 meters at the rate of 30 km per hours. Through what angle it turn in 10 seconds.

(b) Show that $\cos 20° \cos 40° \cos 80° = \frac{1}{8}$

9.(a) Show that $r_1 = 4R \sin\frac{\alpha}{2} . \cos\frac{\beta}{2} . \cos\frac{\gamma}{2}$

Rawalpindi Board-2021

Inter. (Part-I)-A- 2021

Roll No._____ to be filled in by the candidate. (For all sessions) | Paper Code | 6 | 1 | 9 | 1 |

Mathematics (Objective Type)

Time: 30 Minutes **Marks: 20**

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & D to each question are given. Which answer you consider correct, fill the corresponding circle A,B,C or D given in front of each question with Marker or pen ink on the answer sheet provided.

1-1. Multiplicative identity of complex number is:

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

2. The contrapositive of $\sim p \rightarrow \sim q$ is:

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

3. If A and B are any two non singular matrices then $(AB)^{-1} =$

(A) $A^{-1}B^{-1}$ **(B) $B^{-1}A^{-1}$** (C) BA (D) AB

4. For a non-singular matrix A if X A=B then $X =$

(A) $A^{-1}B$ **(B) BA^{-1}** (C) $(AB)^{-1}$ (D) $(BA)^{-1}$

5. If $f(x) = 3x^4 + 4x^3 + x - 5$ is divided by $x+1$, then remainder is:

(A) -8 (B) 7 (C) 6 **(D) -7**

6. If w is cue root of unity, then $w^{18} =$ F. C

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

7. Partial fraction of $\frac{3x-11}{(x^2+1)(x+3)}$ will be of the form

(A) $\frac{Ax+B}{x^2+1} + \frac{C}{x+3}$ (B) $\frac{A}{x^2+1} + \frac{Bx+C}{x+3}$ (C) $\frac{Ax+B}{x+3} + \frac{C}{x^2+1}$ (D) $\frac{A}{x^2+1} + \frac{B}{x+3}$

8. If $a_n = (-1)^{n+1}$, then 28th term is:

(A) 1 **(B) -1** (C) 26 (D) -26

9. $(n+1)^{th}$ term of G.P is:

(A) $a_1 r^{n-1}$ (B) $a_1 r^{n+1}$ (C) $a_1 r^{n+2}$ **(D) $a_1 r^n$**

10. n^{th} term of A.P is: F. C

(A) $a_1(n-1)d$ (B) $a_1 + (n+1)d$ (C) $2a_1 + (n-1)d$ (D) $a_1 + (2n-1)d$

11. With usual notation $^nC_r + {}^nC_{r-1} =$

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

12. In the expansion of $(a+b)^7$, the second term is:

(A) a^7 **(B) $7a^6b$** (C) $7ab^6$ (D) 8

13. In one hour, the hour hand of a clock turns through an angle.

(A) $\frac{\pi}{8}$ (B) $\frac{\pi}{4}$ **(C) $\frac{\pi}{6}$** (D) $\frac{\pi}{2}$

14. $3\frac{\pi}{4}$ radian is equal to:

(A) 110^0 **(B) 135^0** (C) 150^0 (D) 130^0

15. $\sin(-300^0) =$

(A) $-\frac{\sqrt{3}}{2}$ **(B) $\frac{\sqrt{3}}{2}$** (C) $\frac{1}{2}$ (D) 0

16. Period of $\sin x$ is:

(A) π **(B) 2π** (C) 3π (D) $-\pi$

17. Radius of escribed circle opposite to vertex C is:

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

18. With usual notation $a+b-c =$

(A) $2S$ **(B) $2S-2C$** (C) $2S-2b$ (D) $2S-c$

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

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

20. Solution of $\cot\theta = \frac{1}{\sqrt{3}}$ in quadrant III is:

(A) $\frac{5\pi}{3}$ (B) $7\frac{\pi}{6}$ **(C) $\frac{4\pi}{3}$** (D) $\frac{7\pi}{3}$

Inter - (Part-I) -A-2021

Roll No._____ *to be filled in by the candidate.*

(For all sessions)

Mathematics (Essay Type)

Time: 2:30 Hours **Marks: 80**

Section -I

2. Write short answers of any eight parts from the following. **2x8=16**

i. Seperate into real and imaginary parts $\frac{2-7i}{4+5i}$.

ii. Factorize $3x^2+3y^2$.

iii. Simplify $(2,6)(3,7)$.

iv. Let $A=\{1,2,3,4\}$, Find the relation $\{(x,y)/x+y<5\}$ in A

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

vi. Find the value of x if $\begin{vmatrix} 3 & 1 & x \\ -1 & 3 & 4 \\ x & 1 & 0 \end{vmatrix} = -30$.

vii. Find the condition that one root of $x^2+px+q=0$ is multiplicative inverse of other.

viii. Evaluate $(1+w+w^2)(1-w+w^2)$.

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

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

xi. If $A=\begin{bmatrix} 1 & 2 \\ a & b \end{bmatrix}$ and $A^2=\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ then find the values of a and b.

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

3. Write short answers of any eight parts from the following. **2x8=16**

i. Which term of the A.P, -2,4,10,.....is 148?

ii. Insert three G.M's between 1 and 16.

iii. Write in factorial form $\frac{(n+1)(n)(n-1)}{3.2.1}$.

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

v. If 5 is the harmonic mean between 2 and b, find b.

vi. Find the number of diagonals of a 6-sided figure.

vii. Evaluate $\sqrt[3]{30}$ correct to two places of decimals.

viii. Expand by binomial theorem $\left(\sqrt{\frac{a}{x}}-\sqrt{\frac{x}{a}}\right)^3$.

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

x. Resolve into partial fractions without finding the constants $\frac{9x-7}{(x^2+1)(x+3)}$

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

xii. Check whether, $1+\frac{1}{2}+\frac{1}{4}+.....+\frac{1}{2^{n-1}}=2\left(1-\frac{1}{2^n}\right)$ is true for $n=1,2$

Rawalpindi Board-2021

4. Write short answers of any nine parts from the following. 2x9=18

i. Prove that $\sec^2\theta - \operatorname{cosec}^2\theta = \tan^2\theta - \cot^2\theta$.

ii. Find the values of $\cos 105^0$ taking $(105^0 = 45^0 + 60^0)$.

iii. Prove that $\dfrac{\sin 8x + \sin 2x}{\cos 8x + \cos 2x} = \tan(5x)$

iv. Find the period of $\tan(4x)$.

v. Show that $\gamma = (s-c)\tan\left(\dfrac{\gamma}{2}\right)$.

vi. In ΔABC a=3,b=6 and B=36^{0}20' Find "b".

vii. Find area of ΔABC if a=18, b=24 and c=30.

viii. Find the value of $\cos^{-1}\left(\dfrac{-1}{2}\right)$.

ix. Solve the equation $1+\cos x = 0$.

x. Find the soln of equation $\sec x = -2$ which lies in $[0, 2\pi]$.

xi. What is the circular measure of the angle between the hands of a watch at 4 'o' clock.

xii. Find the values of remaining trigonometric functions when $\cos\theta = \dfrac{9}{41}$ and the terminal arm of the angle is in quad Iv

xiii. If α, β and γ are angles of a triangle ABC then prove that $\tan(\alpha+\beta) + \tan\gamma = 0$.

Section -II

Note: Attempt any three questions from the following. 10x3=30

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

(b) Solve the system of equations $x + y = 5$; $\dfrac{2}{x} + \dfrac{3}{y} = 2$.

6. (a) Resolve $\dfrac{1}{(1-ax)(1-bx)(1-cx)}$ into partial fractions.

(b) For what value of n, $\dfrac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the positive Geometric Meam (G.M) between a and b.

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

(b) If x is so small that its cube and higher powers can be neglected then show that $\sqrt{\dfrac{1+x}{1-x}} \approx 1 + x + \dfrac{1}{2}x^2$.

8. (a) Two cities A and B lie on the equator such that their longitudes are 45^{0}E and 25^{0}W respectively. Find the distance between two cities, taking radius of earth as 6400 kms.

(b) Show that $\cos(\alpha+\beta)\cos(\alpha-\beta) = \cos^2\alpha - \sin^2\beta = \cos^2\beta - \sin^2\alpha$.

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 120^0.

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

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Inter. (Part-I)-A- 2019

Roll No._____to be filled in by the candidate. (For all sessions)

Paper Code	6	1	9	3

Mathematics (Objective Type)

Time: 30 Minutes Marks: 20

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & D to each question are given.Which answer you consider correct, fill the corresponding circle A,B,C or D given in front of each question with Marker or pen ink on the answer sheet provided.

1-1. In an oblique triangle , if $a = 200$; $b = 120$ and included angle $\gamma = 150^0$, then its area will be equal to:

(A) 6000 (B) 5000 (C) 2000 (D) 12000

2. If "R" is the circum-radius, then its value is:

(A) $\frac{ac}{4\Delta}$ (B) $\frac{ab}{4\Delta}$ (C) $\frac{abc}{4\Delta}$ (D) $\frac{abc}{\Delta}$

3. The value of $\sin\left(\cos^{-1}\frac{\sqrt{3}}{2}\right)$ is equal to:

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

4. The solution of $\cos ec\theta = 2$ in interval $[0, 2\pi]$ is equal to:

(A) $\frac{\pi}{6}, \frac{7\pi}{6}$ (B) $\frac{\pi}{6}, \frac{5\pi}{6}$ (C) $\frac{\pi}{3}, \frac{5\pi}{6}$ (D) $\frac{\pi}{3}, \frac{\pi}{6}$

5. If $z = \cos\theta + i\sin\theta$, then $|z|$ is equal to:

(A) 0 (B) 1 (C) 2 (D) 3

6 For any two subsets A and B of set $\cup$, then $(A \cup B)'$ is equal to:

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

7. If "A" is a square matrix and $(\overline{A})' = -A$, then "A" is called:

(A) Skew Symmetric (B) Symmetric (C) Skew Hermitian (D) Hermitian

8. If $A = \begin{bmatrix} 4 & x & 3 \\ 7 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$ is a singular matrix, then 'x' is equal to:

(A) 3 (B) 4 (C) 6 (D) 7

9. If α and β are roots of $ax^2 + bx + c = 0$, then $\alpha.\beta$ is equal to:

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

10. If "w" is a cube root of unity, then $(1+w-w^2)(1-w+w^2)$ will be equal to:

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

11. If $\frac{3}{(x-1)(x+2)} = \frac{1}{x-1} + \frac{A}{x+2}$, then "A" is equal to:

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

12. The n^{th} root of product of n Geometric Means between a and b is equal to:

(A) $(ab)^{1/n}$ (B) $a^n b^n$ (C) $n\sqrt{ab}$ (D) $\sqrt{ab}$

13. If in an A.P; $a_{n-1} = 2n-5$, then a_n will be equal to:

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

14. $\frac{n!}{(n-r)!r!}$ is equal to:

(A) ${}^{r}C_{n}$ (B) ${}^{r}P_{n}$ (C) ${}^{n}C_{n}$ (D) ${}^{n}P_{r}$

15. Number of signals given by 5 flags of different colours using 3 flags at a time equals.

(A) 30 (B) 40 (C) 50 (D) 60

16. Sum of even co-efficient in the expansion of $(1+x)^n$ equals.

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

17. Third term in the expansion of $(1-2x)^{1/3}$ is equal to:

(A) $-9x^2/4$ (B) $9x^2/4$ (C) $4x^2/9$ (D) $-4x^2/9$

18. The area of a sector of circular region of radius r and angle θ is equal to:

(A) $\frac{1}{2}r\theta^2$ (B) $\frac{1}{2}r^2\theta$ (C) $r\theta^2$ (D) $r^2\theta$

19. If $6\cos^2\theta + 2\sin^2\theta = 5$, then $\tan^2\theta$ will be equal to:

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

20. Period of $\sin\frac{x}{5}$ is equal to.

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

Rawalpindi Board-2019

Inter - (Part-I) - A-2019

Roll No._____ to be filled in by the candidate. **(For all sessions)**

Mathematics (Essay Type)

Time: 2:30 Hours **Marks: 80**

Section -I

2. Write short answers of any eight parts from the following. **2x8=16**

i. Find the modulus of complex number $3+4i$.

ii. Simplify by justifying each step $\dfrac{\frac{1}{4}+\frac{1}{5}}{\frac{1}{4}-\frac{1}{5}}$ by writing propertie

iii. Factorize the expression $9a^2+16b^2$.

iv. Define absurdity and give one example.

v. Solve the system of linear equations. $\begin{matrix}4x_1+3x_2=5\\3x_1-x_2=7\end{matrix}$

vi. Find the value of x if $\begin{vmatrix}1 & 2 & 1\\2 & x & 2\\3 & 6 & x\end{vmatrix}=0$

vii. Define Row Rank of a matrix.

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

ix. If $A=\{1,2,3,4\}, B=\{3,4,5,6,7,8\}, C=\{5,6,7,9,10\}$ verify distributivity of union over intersection.

x. Find the inverse of the relation $\{(1,3),(2,5),(3,7),(4,9),(5,11)\}$.

xi. Use remainder theorem to find the remainder when x^3-x^2+5x+4 is divided by $x-2$.

xii. Find the roots of the equation $16x^2+8x+1=0$ by using quadratic formula.

3. Write short answers of any eight parts from the following. **2x8=16**

i. Resolve $\dfrac{1}{x^2-1}$ into partial fraction.

ii. Find 5th term of Geometric progression G.P 2,6,12,.....

iii. Define Circular permutation.

iv. Expand $(4-3x)^{\frac{1}{2}}$ upto three terms.

v. If $\frac{1}{a},\frac{1}{b},\frac{1}{c}$ are in Arithmatic progression (A.P) show that common difference is $\dfrac{a-c}{2ac}$.

vi. If 5,6 are two Arithmatic Means (A.M) between "a" and "b". Find "a" and "b".

vii. If the numbers $\frac{1}{k},\frac{1}{2k+1},\frac{1}{4k-1}$ are in (H.P) Hormonic Progression, Find "K".

viii. How many words can be formed from the letters of PLAN" using all letters when no letters to be repeated?

ix. If ${}^{n}C_{5}={}^{n}C_{4}$, where C stands for combination then find value of n.

x. Verify the inequality $n>2^n-1$ for integral values of $n=4,5$.

xi. If x is so small that its square and higher power cab be neglected, show that $\dfrac{1-x}{\sqrt{1-x}}=1-\dfrac{3}{2}x$.

xii. Prove that Hormonic Mean (H.M) between two numbers "a" and "b" is $\dfrac{2ab}{a+b}$.

4. Write short answers of any nine parts from the following. **2x9=18**

i. Prove the fundamental identity $\cos^2\theta+\sin^2\theta=1$.

ii. Verify the result $\tan 2\theta=\dfrac{2\tan\theta}{1-\tan^2\theta}$ for $\theta=30^\circ$.

iii. Show that $\frac{\cos 11^0 + \sin 11^0}{\cos 11^0 - \sin 11^0} = \tan 56^0$.

iv. Prove that $\cos 330^0 \sin 600^0 + \cos 120^0 \sin 150^0 = -1$.

v. Find the period of $\cos ec(10x)$.

vi. Show that $\gamma = 4R \sin\frac{\alpha}{2} \sin\frac{\beta}{2} \sin\frac{\gamma}{2}$ with usual notation.

vii. Find the value of $\cos\left(\sin^{-1}\frac{1}{2}\right)$.

viii. Show that $\frac{\cot^2\theta - 1}{1 + \cot^2\theta} = 2\cos^2\theta - 1$.

ix. Expras the following difference as the product of trignometric functions $\cos 7\theta - \cos\theta$

x. In any triangle ΔABC, if $c = 16.1, \alpha = 42^0 45', \gamma = 74^0 32'$, then find "$\beta$" and "$\alpha$".

xi. Find the area of triangle ABC, given two sides and their included angle $a = 200, b = 120, \gamma = 150^0$.

xii. Find the solutions of the equation $\cot\theta = \frac{1}{\sqrt{3}}$ in the interval $[0, 2\pi]$.

xiii. Find the values of θ satisfying the equation $3\tan^2\theta + 2\sqrt{3}\tan\theta + 1 = 0$.

Section -II

Note: Attempt any three questions from the following. 10x3=30

5. (a) Verify De Morgan's Laws for the given sets: $U = \{1, 2, 3, \ldots\ldots 20\}, A = \{2, 4, 6, \ldots\ldots 20\}, B = \{1, 3, 5, \ldots\ldots 19\}$.

   (b) Find the value of λ if A is singular matrix, $A = \begin{bmatrix} 4 & \lambda & 3 \\ 9 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$.

6. (a) If the roots of $px^2 + qx + q = 0$ are α and β, then prove that $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} + \sqrt{\frac{q}{p}} = 0$.

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

7. (a) The sum of an infinite geometric series is 9 and sum of square of its terms is $\frac{81}{5}$. Find the series.

   (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 $y^2 + 2y - 4 = 0$.

8. (a) A railway train is running on a circular track of radius 500 meters at the rate of 30Km per hour. Through what angle will it turn in 10 sec?

   (b) If $\tan\alpha = \frac{-15}{8}$ and $\sin\beta = \frac{-7}{25}$ and neither the terminal side of the angle of measure α nor that of β is in IV quadrant. Find $\sin(\alpha + \beta)$ and $\cos(\alpha + \beta)$.

9. (a) One side of a triangular garden is 30m. If two corner angle are $22^0\frac{1}{2}$ and $112^0\frac{1}{2}$, find the cost of planting the grass at the rate of Rs.5 per square meter.

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

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Inter. (Part-I)-A- 2018

Roll No. _____ to be filled in by the candidate.	(For all sessions)	Paper Code	6	1	9	3

Mathematics (Objective Type)

Time: 30 Minutes **Marks: 20**

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & D to each question are given.Which answer you consider correct, fill the corresponding circle A,B,C or D given in front of each question with Marker or pen ink on the answer sheet provided.

1-1. In any ΔABC $rr_1r_2r_3 =$ _____

(A) Δ^4 (B) Δ^3 (C) Δ^2 (D) Δ

2. With usual notation $\sqrt{\frac{(s-b)(s-c)}{bc}}$ is equal to:

(A) $\cos\frac{\alpha}{2}$ (B) $\sin\frac{\alpha}{2}$ (C) $\sin\frac{\beta}{2}$ (D) $\sin\frac{\gamma}{2}$

3. $\cos^{-1}(-x)$ is equal to:

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

4: Solution of the equation $\tan x+1=0$ is:

(A) $\left\{\frac{3\pi}{4}+n\pi\right\}$ (B) $\left\{\frac{\pi}{4}+n\pi\right\}$ (C) $\{\pi+n\pi\}$ (D) $\{2\pi+n\pi\}$, when $n\in z$

5. If $z=a+ib$, what is the value of $\cos\theta$?

(A) $\frac{a}{|z|}$ (B) $\frac{b}{|z|}$ (C) $\frac{a}{b}$ (D) $\frac{b}{a}$

6. A function $f:A\to B$ is surjective if:

(A) Range $f=A$ (B) Range $f=B$ (C) Range $f\neq B$ (D) Range $f\neq A$

7. Determinant of any unit matrix has value:

(A) Greater than 1 (B) less than 1 (C) 1 (D) zero

8. A square matrix A is skew -symmetric if A^t is equal to:

(A) A (B) -A (C) A^t (D) A^2

9. The discriminant of $ax^2+bx+c=0$, $a\neq 0$ is:

(A) b^2+4ac (B) $4ac-b^2$ (C) b^2-4ac (D) a^2-4ac

The degree of the equation $x^3+3x^2+4x+5=0$ is

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

11. $\frac{x^2+1}{Q(x)}$ will be improper fraction if

(A) Degree of $Q(x)=2$ (B) Degree of $Q(x)=3$

(C) Degree of $Q(x)=4$ (D) Degree of $Q(x)=5$

12. $\sum_{K=1}^{n} K$ is equal to:

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

13. The geometric mean between $-2i$ and $8i$ is:

(A) ± 1 (B) ± 2 (C) ± 3 (D) ± 4

14. If A and B are mutually exclusive events, then $P(A \cup B)$ is equal to:

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

15. If ${}^{n}C_{8}={}^{n}C_{12}$, then n is equal to:

(A) 8 (B) 12 (C) 20 (D) 0

16. In the expansion of $(x+y)^8$, middle term is:

(A) T_4 (B) T_6 (C) T_3 (D) T_5

17. If n is a positive even integer, then $\binom{n}{1}+\binom{n}{3}+\binom{n}{5}+.....+\binom{n}{n-1}$ is equal to:

(A) 2^n (B) 2^{n+1} (C) 2^{n-1} (D) 3^n

18. An angle in the standard position whose terminal side falls on $x-$axis or $y-$axis is:

(A) General angle (B) coterminal angle (C) Quadrantal angle (D) acute angle

19. $\cos(\pi+\theta)$ is equal to:

(A) $\sec\theta$ (B) $-\cos\theta$ (C) $\cos\theta$ (D) $-\sec\theta$

20. Range of Cosine function is:

(A) $(-1,1)$ (B) $[-1,1]$ (C) $[-1,1)$ (D) $(-1,1]$

Inter - (Part-I) -A-2018

Roll No._____ to be filled in by the candidate.

(For all sessions)

Mathematics (Essay Type)

Time: 2:30 Hours **Marks: 80**

Section -I

2. Write short answers of any eight parts from the following. **2x8=16**

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

ii. Simplify $\left(\frac{-1}{2}-\sqrt{3}/2\, i\right)^3$

iii. Write the converse and inverse of $q \to p$.

iv. Define the terms proper and improper subsets with example.

v. Find inverse of $\begin{bmatrix} -2 & 3 \\ -4 & 5 \end{bmatrix}$

vi. Differentiate between I_n to and on to function.

vii. For a square matrix A, $|A| = |A^t|$.

viii. What is Rank of matrix? Explain with example.

ix. Solve $15x^2 + 2ax - a^2 = 0$ by quadratic formula.

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

xi. Does the set $\{0, -1\}$ possess closure property w.r.t "Addition" and "multiplication"?

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

3. Write short answers of any eight parts from the following. **2x8=16**

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

ii. If $y = 1 + \frac{x}{2} + \frac{x^2}{4} + \ldots\ldots\infty$, show that $x = \frac{2(y-1)}{y}$.

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

iv. Find n, if ${}^{n}P_2 = 30$.

v. Find n, if ${}^{n}C_{10} = \frac{12 \times 11}{2!}$.

vi. Define the probability.

vii. If 5 and 8 are arithematic means between a and b find a and b.

viii. Find 12th term of Harmonic progression $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, \_\_\_\_\_$

ix. In how many ways 4 keys be arranged on a circular key ring?

x. Prove the formula $1+3+5+\ldots\ldots+(2n-1) = n^2$ for $n = 1, 2$.

xi. Find the term involving x^4 in the expansion of $(3-2x)^7$.

xii. Use binomial theorem, find the value to three decimal places $(1.03)^{\frac{1}{3}}$.

4. Write short answers of any nine parts from the following. **2x9=18**

i. Verify $2\sin 45^0 + \frac{1}{2}\operatorname{cosec} 45^0 = 3/\sqrt{2}$.

ii. Prove that: $\frac{2\tan\theta}{1+\tan^2\theta} = 2\sin\theta\cos\theta$.

iii. Prove that $\tan(45^0+A)\tan(45^0-A)=1$

iv. Prove that: $\frac{\sin 2\alpha}{1+\cos 2\alpha}=\tan\alpha$.

v. Define period of a trigonometric function.

vi. Prove that $\gamma=(s-a)\tan\frac{\alpha}{2}$.

vii. Prove that $\tan^{-1}\frac{1}{4}+\tan^{-1}\frac{1}{5}=\tan^{-1}\frac{9}{19}$.

viii. Solve $\sin x+\cos x=0$.

ix. Solve the trigonometric equation $\sec^2\theta=4/3$.

x. Find the radius of the circle in which the arm of the central angle of measure 1 radian cut off an arc of length 35cm.

xi. If α,β be the angle of a triangle ABC then prove that $\cos\left(\frac{\alpha+\beta}{2}\right)=\sin\gamma/2$.

xii. Find the smallest angle of ΔABC ,when $a=37.34$, $b=3.24$, $c=35.06$.

xiii. Find area of triangle ABC given three sides $a=18$, $b=24$, $c=30$.

Section -II

Note: Attempt any three questions from the following. **10x3=30**

5. (a) Convert into logical form and prove by truth table of $(A\cap B)'=A'\cup B'$.

(b) Find the value of λ if given system has non-trivial solution

$$x_1+4x_2+\lambda x_3=0, 2x_1+x_2-3x_3=0, 3x_1+\lambda x_2-4x_3=0$$

6. (a) If α,β are the roots of $x^2-px-p-c=0$, then prove that: $(1+\alpha)(1+\beta)=1-C$.

(b) Resolve into partial fraction $\frac{x^2+a^2}{(x^2+b^2)(x^2+c^2)(x^2+d^2)}$

7. (a) The sum of 9 terms of a A.P is 171 and its eighth term is 31. Find the series.

(b) If x is very nearly equal 1 then prove that: $px^p-qx^q\simeq(p-q)x^{p+q}$.

8. (a) Find the value of remaining trigonometric function of $\sin\theta=-\frac{1}{\sqrt{2}}$

and the terminal arm of the angle is not in quad III.

(b) Prove that: $\frac{\sin 3\theta}{\cos\theta}+\frac{\cos 3\theta}{\sin\theta}=2\cot 2\theta$.

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

(b) Prove that: $\sin^{-1}\frac{3}{5}+\sin^{-1}\frac{8}{17}=\sin^{-1}\frac{77}{85}$.