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

HSSC-(P-I)-A/2023

Paper Code	6	1	9	8

(For All Sessions) Group-II 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.

Rwp-11-2023

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) $\sin\frac{\propto}{2}$ (B) $\sin\frac{\beta}{2}$ (C) $\cos\frac{\propto}{2}$ (D) $\cos\frac{\beta}{2}$

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

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

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) $3n$

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HSSC-(P-I)-A/2023

(For All Sessions)

Marks : 80

Mathematics (Subjective)

GROUP-II

Time: 2:30 hours

SECTION-I

Rwp-11-2-23

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

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

ii. Prove that $\bar{\bar{z}} = z$ 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 $\{a_n\} = \left\{\frac{1}{2^n}\right\}$

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

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

v. Which term of the sequence: $x^2 - y^2, (x+y), \frac{(x+y)}{(x-y)}$, ... 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 $G.P.\ 2, \sqrt{2}, 1, ...$

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 $\sin\theta > 0$ 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 $r_1 = 4R \sin\frac{\alpha}{2} . \cos\frac{\beta}{2} . \cos\frac{\gamma}{2}$

(b) Prove that $\tan^{-1}\frac{120}{119} = 2\cos^{-1}\frac{12}{13}$