SGD-II-2-23

1123 **Warning:- Please write your Roll No. in the space provided and sign. Roll No----------**

(Inter Part – I) **(Session 2019-21 to 2022-24)** **Sig. of Student ----------**

Mathematics (Objective) **(Group-II)** **Paper (I)**

Time Allowed:- 30 minutes **PAPER CODE 2194** **Maximum Marks:- 20**

Note:- You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper, on** the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) If $\frac{1}{k}, \frac{1}{2k+1}, \frac{1}{4k-1}$ are in H.P, then k equals.

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

2) The real part of $\frac{1+3i}{2i}$ equals

(A) $^2/_3$ (B) $^3/_2$ (C) 1 (D) 2

3) The conjunction of two logical statements p *and* q is denoted by:

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

4) Let A= $[a_{ij}]_{3\times4}$, then number of elements in A are.

(A) 3 (B) 4 (C) 7 (D) 12

5) If 'A' is a symmetric matrix, then A^2 will also be

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

6) '$x-1$' is a factor of polynomial.

(A) x^2+4x+3 (B) x^2+4x-3 (C) x^2+4x+5 (D) x^2+4x-5

7) If the roots of equation $ax^2+bx+c=0$ are real and equal, then b^2-4ac will be

(A) 0 (B) a (C) b (D) c

8) The proper rational fraction is

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

9) If $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is A.Ms between a and b, then n will be equal to.

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

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10) Solution of $\cot\theta = \frac{1}{\sqrt{3}}$ in Ist quadrant will be.

(A) $\pi/3$ (B) $\pi/2$ (C) $\pi/4$ (D) $\pi/6$

11) If A and B are two independent events, then $P(A \cap B)$ will be.

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

12) If ${}^{n}C_{12} = {}^{n}C_{8}$, then n equals.

(A) 8 (B) 12 (C) 16 (D) 20

13) The sum of odd co-efficients in the expansion of $(1+x)^n$ is equal to.

(A) 2 (B) 2^{n-1} (C) 3^n (D) 4^n

14) 2^{nd} term in the expansion of $(4-3x)^{1/2}$ is

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

15) $Sin^2\pi/6 + Sin^2\pi/3 + tan^2\pi/4$ is equal to.

(A) 2 (B) 0 (C) 3 (D) 4

16) $\frac{2tan\theta}{1+tan^2\theta}$ will be equal to.

(A) $sin\theta$ (B) $Cos\theta$ (C) $Cos2\theta$ (D) $sin2\theta$

17) Period of Cot $x/2$ is

(A) $\pi/2$ (B) 2π (C) 4π (D) π

18) $\frac{a}{sin\alpha} = \frac{b}{sin\beta} = \frac{c}{sin\gamma}$ is called

(A) Cosines law (B) Sines law (C) Tangents law (D) Half angle law

19) In equilateral triangle having side 3, 'R' will be euqal to

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

20) The value of Sin $(Cos^{-1}x)$ equals

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

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Mathematics (Subjective) (Session 2019-21 to 2022-24) Paper (I)

Time Allowed: 2.30 hours (Inter Part - I) (Group-II) Maximum Marks: 80

Section ---------- I

2. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Define additive identity and additive inverse properties of real numbers.

(ii) Prove $\sqrt{3}$ is an irrational number. **(iii)** Define Aristotlian Logic.

(iv) Write converse and inverse of $\sim p \rightarrow q$.

(v) Give the table for addition of elements of the set of residue classes modulo 4.

(vi) Define rectangular matrix with example. **(vii)** If $A=\begin{bmatrix} 5 & 3 \\ 1 & 1 \end{bmatrix}$, find its multiplicative inverse.

(viii) If $B=\begin{bmatrix} 5 & -2 & 5 \\ 3 & -1 & 4 \\ -2 & 1 & -2 \end{bmatrix}$ find B_{22} and B_{23}

(ix) Find two consecutive numbers whose product is 132.

(x) If α, β are the roots of $x^2 - px - p - c = 0$ Prove that $(1+\alpha)(1+\beta) = 1 - c$.

(xi) Define Remainder theorem. **(xii)** Find Four fourth roots of 625.

3. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Resolve $\frac{1}{x^2-1}$ into partial fractions. **(ii)** If $S_n = n(2n-1)$, then find the Arithmetic series.

(iii) How many terms of the series -7+(-5)+(-3)+…. amount to 65?

(iv) Insert two G.Ms between 2 and 16.

(v) Find A,G,H if a=-2, b=-8, G<0 and verify that A<G<H.

(vi) Find the sum of the infinite geometric series $\frac{1}{5} + \frac{1}{25} + \frac{1}{125} + \cdots$

(vii) How many ways can 4 keys be arranged on a circular key ring.

(viii) Find the value of 'n' if ${}^{n}C_8 = {}^{n}C_{12}$ **(ix)** Define Sample Space and Events.

(x) Show that $\frac{n^3+2n}{3}$ represents an integer for n=1,2.

(xi) Find the term independent of 'x' in the expansion of $\left(x - \frac{2}{x}\right)^{10}$.

(xii) Expand $(1-x)^{-3}$ upto 4 terms.

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4. Answer briefly any Nine parts from the followings:- **9 × 2 = 18**

(i) Convert the angle $\theta = 21.256^\circ$ *to* $D^\circ M' S''$ form. **(ii)** Define angle in standard position with figure.

(iii) Verify $cos2\theta = 2cos^2\theta - 1$. *when* $\theta = 30^\circ, 45^\circ$.

(iv) Show that $\frac{tan\alpha + tan\beta}{tan\alpha - tan\beta} = \frac{Sin(\alpha+\beta)}{Sin(\alpha-\beta)}$

(v) Express cos *(x+y)* sin *(x-y)* as sum or difference.

(vi) By using fundamental Law of trigonometry, show that $(\sin \frac{\pi}{2} + \alpha) = cos\alpha$.

(vii) Find the period of $\sin \frac{x}{5}$. **(viii)** Solve the triangle ABC in which $\gamma = 90^\circ$ $a = 3.28$ $b = 5.74$.

(ix) The area of triangle is 2437, if a=79 , c=97 . Then find angle β.

(x) Find the area of the triangle ABC, b=37 c=45 $\alpha = 30^\circ 50'$

(xi) Evaluate without using calculator, $cos^{-1}(-\frac{1}{2})$ **(xii)** Solve $sin^2 x + cos\, x = 1$ *where* $x \in [0, 2\pi]$.

(xiii) Define Trigonometric equation.

Section ---------- II **(10 × 3 = 30)**

Note: Attempt any three questions.

5. (a) Find inverse of $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{bmatrix}$ and show that $A^{-1}A = I_3$

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

6. (a) Resolve $\frac{9x-7}{(x^2+1)(x+3)}$ into partial fractions.

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

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

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

8. (a) Show that the area of a sector of a circular region of radius r *is* $\frac{1}{2}r^2\theta$, where θ is the circular measure of the central angle of the sector.

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

9 (a) Prove that: $abc(sin\alpha + sin\beta + sin\gamma) = 4\Delta s$.

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

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