Paper I	(Objective Type)	Ist – A – Exam – 2024	Session (2022 – 24) & (2023 – 25)
Time :	30 Minutes	Inter (Part - I)	Marks : 20

Note : Four choices A, B, C, D to each question are given. Which choice is correct fill that circle in front of that Question No. on the Objective Bubble Sheet. Use Marker or Pen to fill the circles. Cutting or filling two or more circles will result in Zero Mark in that Question.

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Q.No.1

(1) Modulus of 5 – 3i is :
(A) $\sqrt{4}$ (B) $\sqrt{16}$ (C) $\sqrt{25}$ (D) $\sqrt{34}$

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

(3) If $A \subseteq B$ and $A - B = \emptyset$, then n (A – B) = ... : (A) 0 (B) n(A) (C) n(B) (D) n(A) – n(B)

(4) The Property $\forall\ a \in R$, a = a is called :
(A) Symmetric (B) Transitive (C) Reflexive (D) Commutative

(5) Set containing elements of A or B is denoted by : (A) $A \cap B$ (B) $A \subseteq B$ (C) $A \cup B$ (D) $B \subseteq A$

(6) Roots of the equation $x^2 - 5x + 6 = 0$ are ...... : (A) 2, –3 (B) –2, –3 (C) 2, 3 (D) –2, 3

(7) If $A = \begin{bmatrix} 1 & 1 \\ 1 & x \end{bmatrix}$, and |A| = 4, then x = ... : (A) 2 (B) 3 (C) 4 (D) 5

(8) A matrix of order m x 1 is called :
(A) Row Matrix (B) Column Matrix (C) Diagonal Matrix (D) Null Matrix

(9) Degree of Constant Polynomial is : (A) n (B) 2 (C) 1 (D) 0

(10) $\sum_{K=1}^{n} K = ...$ (A) $\frac{n^2(n+1)^2}{4}$ (B) $\frac{n(n+1)}{2}$ (C) $\frac{n(n+1)(n+2)}{6}$ (D) $\frac{n(n-1)}{2}$

(11) The Arithmetic Mean between $\sqrt{2}$ and $3\sqrt{2}$ is : (A) $2\sqrt{2}$ (B) $3\sqrt{2}$ (C) $4\sqrt{2}$ (D) $\sqrt{2}$

(12) $\frac{x}{2x+3}$ is .... :
(A) Proper Fraction (B) Improper Fraction (C) Identity Fraction (D) Mixed Fraction

(13) Probability of an impossible event is ..... : (A) 1 (B) 0.5 (C) 0.25 (D) 0

(14) Tan (α – 90°) = ... : (A) Cot α (B) – Cot α (C) Tan α (D) – Tan α

(15) Solution of Cot θ = $\frac{1}{\sqrt{3}}$ in quad III is ..... : (A) $\frac{5\pi}{3}$ (B) $\frac{7\pi}{6}$ (C) $\frac{4\pi}{3}$ (D) $\frac{7\pi}{3}$

(16) Numbers of terms in the expansion of $(a + x)^{2n+1}$ are : (A) 2n + 2 (B) 2n + 1 (C) 2n (D) n + 1

(17) Period of Cot 3x is ..... : (A) π (B) $\frac{2\pi}{3}$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{3}$

(18) If Sinx = $\frac{\sqrt{3}}{2}$ and $x \in [0, 2\pi]$, then x is :
(A) $\frac{5\pi}{3}, \frac{4\pi}{3}$ (B) $\frac{\pi}{4}, \frac{3\pi}{4}$ (C) $\frac{\pi}{3}, \frac{2\pi}{3}$ (D) $\frac{\pi}{6}, \frac{5\pi}{6}$

(19) The Value of $\sin^{-1}(\cos\frac{\pi}{6})$ is equal to : (A) π/2 (B) 3π/2 (C) π/6 (D) π/3

(20) $\sec\left(\frac{\alpha}{2}\right)$ = ... : (A) $\sqrt{\frac{s(s-a)}{bc}}$ (B) $\sqrt{\frac{bc}{s(s-a)}}$ (C) $\frac{s}{\Delta}$ (D) $\frac{\Delta}{s-b}$

Mathematics (Subjective)	Ist – A – Exam – 2024	Time 2 : 30 Hours Marks : 80

Note: It is compulsory to attempt any (8 – 8) Parts each from Q.No. 2 and Q.No.3 while attempt any (9) Parts from Q.No.4. Attempt any (3) Questions from Part – II .Write same Question No. and its Part No. as given in the Question Paper.

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Part - I — 25 x 2 = 50

Q.No.2	(i)	Show that $\forall z \in C$, $z\bar{z} = \lvert z\rvert^2$		
	(ii)	Show that $\forall z_1, z_2 \in C$, $\overline{z_1 z_2} = \overline{z_1}\ \overline{z_2}$		
	(iii)	Define Polar form of a Complex Number .		
	(iv)	Prove that $\bar{z} = z$ iff z is real .		
	(v)	Write down the Power set of $\{a, \{b, c\}\}$		
	(vi)	Show that $(p \wedge q) \rightarrow p$ is a tautology .		
	(vii)	Solve the system of linear equations : $4x_1 + 3x_2 = 5$, $3x_1 - x_2 = 7$	(viii)	Write any two Properties of Determinant.
	(ix)	Define Hermitian Matrix .	(x)	Solve the equation by Completing Square $x^2 + 4x - 1085 = 0$
	(xi)	Solve the equation by using quadratic formula , $16x^2 + 8x + 1 = 0$	(xii)	Prove that : $(-1+\sqrt{-3})^4 + (-1-\sqrt{-3})^4 = -16$
Q.No.3	(i)	Define Conditional equation and give example .		
	(ii)	Resolve $\frac{1}{x^2-1}$ into Partial Fraction .		
	(iii)	If $a_{n-2} = 3n - 11$, find the nth term of the Sequence .		
	(iv)	Find A.M between $3\sqrt{5}$ and $5\sqrt{5}$		
	(v)	If $S_n = n(2n-1)$, then find the series .		
	(vi)	With usual notation , show that $G^2 = AH$		
	(vii)	Write $n(n-1)(n-2)\ldots(n-r+1)$ in the factorial form.	(viii)	What is the Fundamental Principle of Counting?
	(ix)	Two Coins are tossed twice each. Find the Probability that the head appears on the first toss and the same faces appear in the two tosses.	(x)	Calculate $(0.97)^3$ by means of Binomial Theorem.
	(xi)	Find the term involving x^4 in the expression of $(3-2x)^7$	(xii)	Expand upto 4 terms , taking the values of x such that the expansion in case is valid for $(1-x)^{\frac{1}{2}}$
Q.No.4	(i)	Convert $\frac{9\pi}{5}$ into the measure of Sexagesimal System .		
	(ii)	If $\tan\theta = \frac{8}{15}$ and $\theta \in$ III then find $\sin\theta$ and $\cos\theta$.		
	(iii)	If α, β, γ be the angles of a triangle , then prove $\tan(\alpha+\beta) + \tan\gamma = 0$		

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L.K.No. 1534

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	(iv)	Find the Value of tan (105°) .
	(v)	Write Triple angle identity for $\cos 3\alpha$.
	(vi)	Find the Period of $\tan\theta$.
	(vii)	Find the Period of $\sin\left(\frac{x}{3}\right)$.
	(viii)	Draw the graph of $y = 2\cos x$, $x \in [0, 2\pi]$
	(ix)	Solve the right triangle ABC in which $\gamma = 90^{\circ}$, $\alpha = 37^{\circ}\ 20'$, $a = 243$
	(x)	Define Angle of Depression .
	(xi)	By using Law of Cosine find the value of C if $a = \sqrt{3} - 1$, $b = \sqrt{3} + 1$, $\gamma = 60^{\circ}$
	(xii)	Find the value of $\cos\left(\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)\right)$
	(xiii)	Solve the equation $1 + \cos x = 0$

Part - II — $3 \times 10 = 30$

Q.No.5	(a)	Show that $\begin{vmatrix} a+l & a & a \\ a & a+l & a \\ a & a & a+l \end{vmatrix} = l^2(3a+l)$	(5)
	(b)	Solve the Equation : $\sqrt{5x^2 + 7x + 2} - \sqrt{4x^2 + 7x + 18} = x - 4$	(5)
Q.No.6	(a)	Resolve $\frac{x^2+1}{x^3+1}$ into Partial Fractions .	(5)
	(b)	If the numbers 1 , 4 and 3 are Subtracted from three Consecutive terms of an A.P , the resulting numbers are in G.P . Find the numbers if their Sum is 21 .	(5)
Q.No.7	(a)	Find the values of n and r When ${}^{n}C_{r} = 35$, and ${}^{n}P_{r} = 210$	(5)
	(b)	Use Binomial Theorem to show that $1 + \frac{1}{4} + \frac{1.3}{4.8} + \frac{1.3.5}{4.8.12} + \ldots\ldots = \sqrt{2}$	(5)
Q.No.8	(a)	Prove that $\sin^6\theta - \cos^6\theta = (\sin^2\theta - \cos^2\theta)(1 - 3\sin^2\theta\cos^2\theta)$	(5)
	(b)	Prove that : $\sin^{-1}\frac{1}{\sqrt{5}} + \cot^{-1}3 = \frac{\pi}{4}$	(5)
Q.No.9	(a)	Reduce $\sin^4\theta$ to an expression involving only function of multiples of θ , raised to the first power.	(5)
	(b)	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° .	(5)

09-05-2024