

Topics : Inverse Trigonometric Function, Matrices, Fundamentals of Mathematics

Type of Questions	M.M., Min.
Single choice Objective (no negative marking) Q. 1, 2, 3, 4, 5, 6	(3 marks, 3 min.) [12, 12]
Subjective Questions (no negative marking) Q. 7	(4 marks, 5 min.) [8, 10]
Match the Following (no negative marking) Q.8	(8 marks, 8 min.) [8, 8]

- Value of $\cos^{-1}(\cos 12) - \sin^{-1}(\sin 12)$ is
 (A) 0 (B) π (C) $8\pi - 24$ (D) $8\pi - 32$
- Find the value of θ where $\theta = \sin^{-1} \sqrt{\frac{2-\sqrt{3}}{4}} + \cos^{-1} \frac{\sqrt{12}}{4} + \sec^{-1}(\sqrt{2})$
 (A) 0 (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{2}$
- If matrix $A = [a_{ij}]_{3 \times 3}$, matrix $B = [b_{ij}]_{3 \times 3}$ where $a_{ij} + a_{ji} = 0$ and $b_{ij} - b_{ji} = 0$, then $A^4 \cdot B^3$ is
 (A) skew-symmetric matrix (B) singular
 (C) symmetric (D) zero matrix
- If $A = [a_{ij}]_{3 \times 3}$, such that $a_{ij} = \begin{cases} 2, & i = j \\ 0, & i \neq j \end{cases}$, then $1 + \log_{1/2}(|A|^{\text{adj}A})$ is equal to
 (A) -191 (B) -23 (C) 0 (D) does not exist
- If $A = \begin{bmatrix} 1 & 2 & 0 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$, then $\det(\text{Adj}(\text{Adj} A)) =$
 (A) 13 (B) 13^2 (C) 13^4 (D) none of these
- The polynomial $P(x) = x^3 + ax^2 + bx + c$ has the property that the mean of its zeros, the product of its zeros, and the sum of its coefficients are all equal. If the y-intercept of the graph of $y = P(x)$ is 2, then the value of b is
 (A) -9 (B) 5 (C) -11 (D) 1
- We call 'a' a good number if the inequality $\frac{2x^2 + 2x + 3}{x^2 + x + 1} \leq a$ is satisfied for some real values of x.
 (a) Prove that 4 is a good number. (b) Find all good numbers.

8. Match the column

Column - I

Column - II

[.] and {.} represent the greatest integer and fractional part functions respectively.

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|--|-------|
| (a) Number of solutions of $[x] = \cos^{-1}x$ | (P) 3 |
| (b) Number of solutions of $\sin^{-1}x = \text{sgn}(x)$ | (Q) 2 |
| (c) Number of solutions of $\{x\} = e^{x^2}$ | (R) 1 |
| (d) Number of solutions of $\frac{\sin^{-1}x + \cos^{-1}x}{2} = \{x\}$ | (S) 0 |



Answers Key

1. (C) 2. (D) 3. (B) 4. (A)
5. (C) 6. (C) 7. (b) For all $a \in (2, \infty)$
8. (a) \rightarrow (S), (b) \rightarrow (P), (c) \rightarrow (S), (d) \rightarrow (Q)

