Pre Board MT -01

INFINITY THINK BEYOND.....
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Syllabus: Mock Test 01 : Ch – Relations and Function, Inverse Trigonometry, Matrices & Determinants

Time: 90 min **Maximum marks :40**

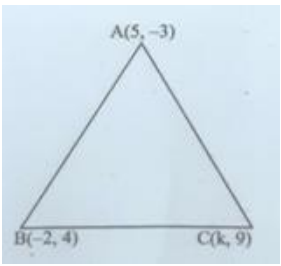
INSTRUCTIONS TO THE STUDENTS

1 . Read each question carefully .
2. Mark of each question is mention in front of question .
3. Attempt one question in internal choice based question .
4. Use of calculators is not allowed.
5. No negative marking .

SECTION A

(Questions 1 – 10 carry 1 marks)

1	The value of expression $\sec^{-1}(2) + \sin^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(-\sqrt{3}\right)$ is : (a) $\frac{5\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $\frac{-\pi}{3}$ (d) $\frac{\pi}{6}$	**1**
2	Given that A is a non- singular matrix of order 3 , such that $A^2 = 2A$, then value of $\lvert 2A \rvert$ is : (a) 4 (b) 8 (c) 64 (d) 16	**1**
3	The principal value of $\cos^{-1}\left(\cos\frac{13\pi}{6}\right)$ is (a) $\frac{13\pi}{6}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$	**1**
4	Let X = $\{x^2 : x \in N\}$ and the function f : N → X is defined by $f(x) = x^2$, $x \in N$. This function is : (a)injective only (b)not bijective (c)subjevtive (d)bijective	**1**
5	The number of onto mapping from the set A = { 1, 2, , ..., 100} to set B = {1,2} is (a) $2^{100} - 2$ (b) 2^{100} (c) $2^{99} - 2$ (d) 2^{99}	**1**
6	Given that A = [aij] is a square matrix of order 3×3 and $\lvert A \rvert = -7$ then the value of $\sum_{i=1}^{3} a_{i2} A_{I2}$, where Aij denotes the cofactor of elements aij is : (a) 7 (b) -7 (c) 0 (d) 49	**1**
7	If $\cos^{-1}\alpha + \cos^{-1}\beta + \cos^{-1}\gamma = 3\pi$, then the value of $\alpha + \beta + \gamma$ is : (a) 0 (b)3 (c) -3 (d)6	**1**
8	For any square matrix A, $(A - A^t)^t$ isalways : (a)An identity matrix (b)A null matrix (c)A skew symmetric matrix (d) A symmetric matrix	**1**
9	If $A.(\text{adj } A) = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$, then the value of $\lvert A \rvert . \lvert \text{adj } A \rvert$ is equal to : (a)12 (b) 9 (c)3 (d) 27	**1**
10	Two statements are given, one lablled Assertion (A) and the other labelled Reason(R) Select the correct answer from the options (A), (B), (C) and (D) as given below .	**1**

	(a)Both A and R are true and R is the correct explanation for A. (b) Both A and R are true and R is not the correct explanation for A. (c) A is true but R is false. (d) A is false but R is true **Assertion (A):**. Domain of f(x) = $\sin^{-1}x + \cos x$ is [-1,1]. **Reason (R):** Domain of a function is the set of all possible values for which function will be defined.	
	SECTION B **(Questions 11 – 13 carry 2 marks)**	
11	(a) Find the value of $\tan\left[\frac{\pi}{4} + \cos^{-1}\left(\frac{4}{5}\right)\right]$ **OR** (b)If $\tan^{-1} y + \tan^{-1} z = \frac{\pi}{4}$, then find the value of y+z+yz.	**2**
12	Find the values of x, y and z if the matrix $A^T = \begin{bmatrix} 0 & x & x \\ 2y & y & -y \\ z & -z & z \end{bmatrix}$ satisfy the equation $A^TA = I$.	**2**
13	Show that the function f: R→ R defined by $f(x) = \frac{x}{x^2+1}$ is neither one nor onto.	**2**
	SECTION C **(Questions 14 – 15 carry 3 marks)**	
14	(a) Find matrix A if A. $\begin{bmatrix} 1 & -2 & 5 \\ 4 & -3 & 9 \end{bmatrix} = [14 \quad -13 \quad 37]$ **Or** (b) Let $A = \begin{bmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{bmatrix}$, where $0 \le \theta \le 2\pi$ then find the range of Det (A)	**3**
15	Find the domain of the function $y = \sin^{-1}(x^2-2)$	**3**
	SECTION D **(Questions 16 – 17 carry 5 marks)**	
16	(a) If A ={x∈**Z** : 0≤x≤15}. Show that R= {(a,b): a,b∈A ,$\lvert a-b \rvert$is divisible by 5} is an equivalence relation. Find the set of all elements related to 1. OR (b) Let **N** denote the set of all natural numbers and R be the relation **on N×N** defined by (a,b)R(c,d) if ad(b+c)=bc(a+d). Show that R is an equivalence relation.	**5**
17	Evaluate the product AB, where $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$, Hence solve the system of linear equations: x – y = 3 , 2x + 3y + 4z =17 , y + 2z = 7	**5**
	SECTION E **(Questions 18 – 19 carry 4 marks)**	
18	Sushant is a farmer . He has a triangular field as shown in figure . The vertices of triangular field are A(5,-3) , B (-2, 4) and C (k,9) where k < -5.  Based on the above information answer the following question : (i)If area of the triangular field is 14 square units, then find the value of k using determinant. (ii)Using this value of k , find the value of a+b+c	**4**

	If $\begin{bmatrix} k+a & 0 & 0 \\ 0 & k+2b & 0 \\ 0 & 0 & k+3c \end{bmatrix}$ is identity matrix.	
19	An architect is designing a commercial complex and its working on the layout of a rectangular plot of land . When asked about the dimensions. He provides the following instructions : • If the length of the plot is decreased by 25m and the breadth is increased by 25 m, the area is increased by 625 m^2. • If the length of the plot is decreased by 20m and the breadth is increased by 10m, the area is decreased by 200m^2. Let the original length be x metres and the breadth be y meters. Based on the above information, answer the following : (i)Formulate the system of linear equation in x and y representing the given conditions. (ii)Solve the system of equations using matrix method to find the dimensions of the plot.	**4**