S.N.B.P's International School
Academic Year 2025-26
PERIODIC TEST-I
SET-II

Class: - XII   **Day: - Friday**
Subject: - Mathematics   **Date: - 11/07/2025**
Marks: - 40   **Time: - 2 Hours**

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 10 MCQs carrying 1 mark each
3. Section B has 4 questions carrying 02 marks each.
4. Section C has 3 questions carrying 03 marks each.
5. Section D has 1 question carrying 05 marks.
6. Section E has 2 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 1 Question of 3 marks, 2 Questions of 2 marks and 1 Question of 5 marks has been provided. An internal choice has been provided in the 2 marks question of Section E.

	SECTION-A	
Q.NO	**Section A consists of 10 questions of 1 mark each.**	**10M**
1.	Let Z be the set of integers and R be a relation defined in Z such that aRb if $(a - b)$ is divisible by 5. Then number of equivalence classes are (a) 2 (b) 3 (c) 4 (d) 5	**1**
2.	Let R be a relation defined as R = {(x, x), (y, y), (z, z), (x, z)} in set A = {x, y, z} then relation R is (a) reflexive (b) symmetric (c) transitive (d) equivalence	**1**
3.	If R = {(x, y) : x + 2y = 8} is a relation on N, then range of R is (a) {3} (b) {1, 2, 3} (c) {1, 2, 3, ... 8} (d) {1, 2}	**1**
4.	If $3 \tan^{-1} x + \cot^{-1} x = \pi$, then x equals (a) 0 (b) 1 (c) –1 (d) 1/2	**1**
5.	If $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$, then the value of $\cos^{-1} x + \cos^{-1} y$ is (a) $\frac{\pi}{2}$ (b) 0 (c) π (d) $\frac{2\pi}{3}$	**1**
6.	If $3 \tan^{-1} x + \cot^{-1} x = \pi$, then x equals (a) 0 (b) 1 (c) –1 (d) 1/2	**1**

7.	If $A = \begin{bmatrix} 5 & x \\ y & 0 \end{bmatrix}$ and A = A' then (a) $x = 0, y = 5$ (b) $x = y$ (c) $x + y = 5$ (d) $x - y = 5$	1
8.	If $x \begin{bmatrix} 2 \\ 3 \end{bmatrix} + y \begin{bmatrix} -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \end{bmatrix}$, find the value of x. (a) 1 (b) 2 (c) 3 (d) 4	1
	In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	
9.	**Assertion (A):** Let A $= \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 4 & 7 \end{bmatrix}$ and B $= \begin{bmatrix} 4 & 3 & 6 \\ 7 & 8 & 9 \\ 5 & 1 & 2 \end{bmatrix}$, then the product of the matrices A and B is not defined. **Reason (R):** The number of rows in B is not equal to number of columns in A.	1
10.	**Assertion (A):** The matrix A $= \begin{bmatrix} 0 & -1 & -2 \\ 1 & 0 & -3 \\ 2 & 3 & 0 \end{bmatrix}$ is a skew symmetric matrix. **Reason (R):** For the given matrix A we have A' = A.	1
	SECTION-B	8M
	Section B consists of 4 questions of 2 marks each	
11.	a) Find the value of $sin^{-1}\left(\cos\left(\frac{33\pi}{5}\right)\right)$. OR b) Find the domain of $sin^{-1}(x^2 - 4)$.	2
12.	Let the function $f : R \rightarrow R$ be defined by $f(x) = \cos x \ \forall \ x \in R$. Show that f is neither one-one nor onto.	2
13.	a) Let $A = \{1, 2, 3\}$, $B = \{4, 5, 6, 7\}$ and let $f = \{(1, 4), (2, 5), (3, 6)\}$ be a function from A to B. Show that f is one-one. OR b) Show that the relation R in the set $\{1, 2, 3\}$ given by R $= \{(1,1), (2, 2), (3, 3), (1,2), (2, 3)\}$ is reflexive but neither symmetric nor transitive.	2
14.	Find X and Y, if X+Y $= \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and X $-$ Y $= \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$.	2

	SECTION-C	9M
	Section D consists of 3 questions of 3 marks each.	
15.	a) Show that $\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right) = \sin^{-1}\left(\frac{x}{a}\right) = \cos^{-1}(\frac{\sqrt{a^2-x^2}}{x})$. **OR** b) Express $tan^{-1}\left(\frac{cosx}{1-sinx}\right), -\frac{\pi}{2} < x < \frac{\pi}{2}$ in the simplest form.	**3**
16.	Let T be the set of all triangles in a plane with R a relation in T given by $R = \{(T1, T2) : T1 \cong T2\}$.Show that R is an equivalence relation.	**3**
17.	If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, Prove that $A^3 - 6A^2 + 7A + 2I = 0$.	**3**
	SECTION-D	**5M**
	Section D consists of 1 question of 5 marks.	
18.	a) Express the matrix B = $\begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix. **OR** b) If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}, B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A + B)^2 = A^2 + B^2$, then find the values of a and b.	**5**
	SECTION-E	
	Section E consist of 2 Case based questions of 4 marks each	**8M**
19.	Two men on either side of a temple of 30 metres high from the level of eye observe its top at the angles of elevation α and β respectively. (as shown in the below figure). The distance between the two men is 40√3 metres and the distance between the first person A and the temple is 30√3 metres. 	

	Based on the above information answer the following: i) Find the measure of $\angle CAB$ in terms of $\sin^{-1}$ ii) Find the measure of $\angle CAB$ in terms of $\cos^{-1}$. ii)a) Find the measure of $\angle ABC$. **OR** b) Find the measure of $\angle BAC$.	**1** **1** **2**
20.	Sherlin and Danju are playing Ludo at home during Covid-19. While rolling the dice, Sherlin's sister Raji observed and noted that possible outcomes of the throw every time belongs to set $\{1, 2, 3, 4, 5, 6\}$. Let A be the set of players while B be the set of all possible outcomes. $A = \{S, D\}, B = \{1, 2, 3, 4, 5, 6\}$ (*i*) Let $R : B \rightarrow B$ be defined by $R = \{(x, y) : y \text{ is divisible by } x\}$. Show that relation R is reflexive and transitive but not symmetric. (*ii*) Let R be a relation on B defined by $R = \{(1, 2), (2, 2), (1, 3), (3, 4), (3, 1), (4, 3), (5, 5)\}$. Then check whether R is an equivalence relation. (*iii*)a) Raji wants to know the number of functions from A to B. How many number of functions are possible? **OR** *b)* Raji wants to know the number of relations possible from A to B. How many numbers of relations are possible?	 **1** **1** **2**