AN EDUCATIONAL INSTITUTE

**SUBJECT:MATHS**
**DATE : 15/11/24**

**MAX. MARKS : 30**
**DURATION : 60 MIN**

**PBMT – 01**

## UNIT – 1 RELATIONS & FUNCTIONS
### Ch – 1 Relations & Functions
### Ch – 2 Inverse trigonometry

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**General Instruction:**

This Question Paper has 5 Sections A-E.

1. **Section A** has 6 MCQs carrying 1 mark each.
2. **Section B** has 2 questions carrying 02 marks each.
3. **Section C** has 2 questions carrying 03 marks each.
4. **Section D** has 1 questions carrying 04 marks each.
5. **Section E** has 2 questions carrying 05 marks each .

Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

**SECTION – A**
**Questions 1 to 6 carry 1 mark each.**

**1.** The maximum number of equivalence relations on the set A= {1, 2, 3} is
(a) 1 (b) 2 (c) 3 (d)5

**2.** The number of elements in Set A is 3. The number of possible reflexive relations that can be defined in A is
(a) 64 (b) 8 (c) 512 (d) 4

**3.** If f(x) = $x^2$ + 2, x ∈ R, then the range of f(x) is
(a) [2, ∞) (b) (-∞, 2] (c) (2, ∞) (d) (-∞, 2) U (2, ∞)

**4.** The range of f(x) =$\sqrt{(25 - x^2)}$ is
(a) (0, 5) (b) [0, 5] (c) (-5, 5) (d) [1, 5]

**5.** $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$ is equal to
(a) $\pi$ (b) $\frac{-\pi}{3}$ (c) $\frac{\pi}{3}$ (d) $\frac{2\pi}{3}$

**6. Assertion** (A) :A, B are two sets such that n(A)=m and n(B)=n. The number ofone-one functions from A onto B is $nPm$ if n ≥ m
**Reason(R)**: A function f is one –one if distinct elements of A have distinct images in B
(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

**SECTION – B**
**Questions 7 to 8 carry 2 mark each.**

**7.** Find the domain of $\cos^{-1}(2x-1)$.

OR

Compute the domain of $\sin^{-1}(x^2 - 4)$.

**8**. Draw the graph of f(x) =$Sin^{-1}$ x , x ∈ $\left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$ also write range of f(x).

**SECTION – C**
**Questions 9 to 10 carry 3 mark each.**

**9.** Show that the relation R in the set of real numbers, defined as R={(a,b):a≤ $b^2$ } is neither reflexive nor symmetric nor transitive.

OR

Show that the relation S in the set R of real numbers, defined as S = {(a,b) : a,b ∈ R and a≤b3 } is neither reflexive, nor symmetric, nor transitive.

**10.** Show that the greatest integer function f : R→R, given by f(x) = [x] is neither one-one nor onto.

**SECTION – D**
**Questions 11 carry 4 mark each.**

**11**. Priya(P) and Surya(S) are playing monopoly in their house during COVID. While rolling the dice their mother Chandrika noted the possible outcomes of the throw every time belongs to the set {1, 2, 3, 4, 5, 6}.

Let A denote the set of players and B be the set of all possible outcomes. Then $A$ = {$P$, $S$} $B$ = {1, 2, 3, 4, 5, 6}.

Then answer the below questions based on the given information:

(i) Let $R$: $B \rightarrow B$ be defined by $R$ = {$(a, b)$ $both\ a\ and\ b\ are\ either\ odd\ or\ even$}. Is R an equivalence relation? Justify.

(ii) Chandrika wants to know the number of functions for $A$ to $B$. How many numbers of functions are possible?

(iii) Let $R$ be a relation on $B$ defined by $R$ = {(1, 2), (2, 2), (1, 3), (3, 4), (3, 1), (4, 3), (5, 5)}. State if $R$ is reflexive symmetric or transitive?

OR

Chandrika wants to know the number of relations for $A$ to $B$. How many numbers of relations are possible?

**SECTION – E**
**Questions 12 to 13 carry 5 mark each**

**12**. Let N denote the set of all natural numbers and R be the relations on N×N defined by (a,b)R(c,d)⟺ad(b+c)= bc(a+d). Check whether R is an equivalence relation on N×N.

OR

Let N be the set of all natural number and let R be a relation on N×N defined by (a,b)R(c,d) ⟺ ad=bc for all (a,b),(c,d) ∈ N×N. Show that R is an equivalence relation on N×N

**13.** Show that f : N → N is given by f(x) = $\begin{cases} x+1 \text{ , if x is odd} \\ x-1 \quad \text{if x is even} \end{cases}$ is both one-one and onto.

**End**