

XIIth MATHS



Practice Test-01

Syllabus : Unit 1 (Relations and Functions)
as per NCERT Chapter 1 and 2 has covered

SUBJECT: MATHEMATICS

Code : 041

MAX. MARKS : 30

DURATION : 60 min

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

Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated

SECTION – A

Questions 1 to 6 carry 1 mark each.

1. The range of the function $f(x) = \sec^{-1} x + \operatorname{cosec}^{-1} x$ is
 (a) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (b) $[0, \pi]$ (c) $(0, \pi)$ (d) $\left\{\frac{\pi}{2}\right\}$
2. The value of the expression $\operatorname{cosec}^{-1}(2) + \cos^{-1}\left(\frac{1}{2}\right) + \tan^{-1}(-1)$ is
 (a) $\frac{\pi}{4}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{2}$
3. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined as $f(x) = 3x + 2023$, then
 (a) f is one- one onto (b) f is many – one onto
 (c) f is one – one but not onto (d) f is neither one - one nor onto
4. If the function $f: \mathbb{R} \rightarrow A$ defined by $f(x) = 3\sin x + 4 \cos x$ is Surjective Find A.
 (a) $[-7, 7]$ (b) $[-1, 1]$ (c) $[1, 7]$ (d) $[-5, 5]$
5. Maximum number of equivalence relations on the set $A = \{1, 2, 3\}$ is
 (a) 3 (b) 5 (c) 8 (d) 9
6. If A be the set of the letters of the name of our country the 'BHARAT', Then the number of reflexive relations on $A \times A$ is
 (a) 2^6 (b) 2^{36} (c) 2^{20} (d) 2^{25}

SECTION – B

Questions 7 to 8 carry 2 mark each.

7. Express $\sin^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right)$; where $-\frac{\pi}{4} < x < \frac{\pi}{4}$, in the simplest form .

Or

Draw the graph of $\cos^{-1} x$, where $x \in [-1, 0]$. Also write its range.

8. Find the principal value of $\sin^{-1} \left(\sin \frac{3\pi}{5} \right)$

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

9. Find the domain of $\sin^{-1} (x^2 - 4)$.
10. Prove that the function f is surjective, where $f : \mathbb{N} \rightarrow \mathbb{N}$ such that

$$f(n) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd} \\ \frac{n}{2}, & \text{if } n \text{ is even} \end{cases}$$

Is the function injective? justify your answer.

Or

A relation R in the set of real numbers $\mathbb{R}$ is given by $R = \{ (a, b) : a > b, \text{ such that } a, b \in \mathbb{R} \}$. Check whether Relation R is Reflexive, Symmetric or Transitive. Also justify the answer

SECTION – D
Questions 11 carry 4 mark

11. In a school there are two sections of class XII, section A and section B. For a competition three students from each section were selected. Set $A = \{a, b, c\}$ and set $B = \{d, e, f\}$ represent students of section A and B respectively. On the basis of this information answer the following Questions
- (i) The number of relations that can be defined from set A to set B is
(a) 16 (b) 32 (c) 64 (d) 512
- (ii) How many functions can be defined from set A to set B
(a) 8 (b) 27 (c) 45 (d) 56
- (iii) How many bijective functions can be defined from set A to set B
(a) 4 (b) 6 (c) 8 (d) 12
- (iv) The number of reflexive relations from set A to set B is
(a) 128 (b) 90 (c) 64 (d) 16

Or

The number of Equivalence relations on set B is

- (a) 5 (b) 6 (c) 7 (d) 8

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

12. Let $\mathbb{N}$ be the set of all natural numbers and R be a relation on $\mathbb{N} \times \mathbb{N}$ defined by $(a, b) R (c, d) \Leftrightarrow ad = bc$ for all $(a, b), (c, d) \in \mathbb{N} \times \mathbb{N}$. Show that R is an equivalence relation on $\mathbb{N} \times \mathbb{N}$. Also, find the equivalence class of $(2, 6)$ i.e. $[(2, 6)]$.
13. Let R be the relation defined in the set $A = \{1, 2, 3, 4, 5, 6, 7\}$ by $R = \{(a, b) : \text{both } a \text{ and } b \text{ are either odd or even}\}$. Show that R is an equivalence relation. Hence find the elements of equivalence class.

OR

A function $f : [-4, 4] \rightarrow [0, 4]$ is given by $f(x) = \sqrt{16 - x^2}$. Show that f is an onto function but not one – one function. Further, find all possible values of “ a ” for which $f(a) = 7$.

End

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