

XIIth MATHS



Practice Test 02

Syllabus : Unit 1 Relations and Functions(NCERT Chapter 1-2)
Unit 2 Algebra (NCERT Chapter 3-4)

SUBJECT: MATHEMATICS

SUBJECT Code : 041

MAX. MARKS : 40

DURATION : 90 min

1. This Question Paper has 5 Sections A-E.
 2. **Section A** has 8 MCQs carrying 1 mark each.
 3. **Section B** has 3 questions carrying 02 marks each.
 4. **Section C** has 4 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 8 carry 1 mark each.

1. A relation R is defined from $\{2, 3, 4, 5\}$ to $\{3, 6, 7, 10\}$ by $x R y \Leftrightarrow x$ is relatively prime to y . Then the domain of R is given by :

- (a) $\{2, 3, 5\}$ (b) $\{3, 5\}$ (c) $\{2, 3, 4\}$ (d) $\{2, 3, 4, 5\}$

2. If the function $f: [2, \infty) \rightarrow B$ defined by $f(x) = x^2 - 4x + 5$ is bijection , then B is :

- (a) R (b) $[1, \infty)$ (c) $[4, \infty)$ (d) $[5, \infty)$

3. The domain of the function $\cos^{-1}(2x - 1)$ is

- (a) $[0, 1]$ (b) $[1, -1]$ (c) $[-2, 1]$ (d) $[0, \pi]$

4. The value of $\sin^{-1}\left[\cos \frac{33\pi}{5}\right]$ is

- (a) $\frac{3\pi}{5}$ (b) $\frac{-7\pi}{5}$ (c) $\frac{\pi}{10}$ (d) $\frac{-\pi}{10}$

5. If A is a skew symmetric matrix , then A^2 is

- (a) symmetric (b) skew symmetric (c) O (d) diagonal matrix

6. If A (3 , 4) , B (- 7 , 2) & C (x , y) are collinear , then :

- (a) $x - 5y + 17 = 0$
(b) $x + 5y + 17 = 0$
(c) $x + 5y + 13 = 0$
(d) $x - 5y + 13 = 0$

7. Let $A = \begin{bmatrix} 1 & 1 \\ -5 & 1 \end{bmatrix}$, and $A^{-1} = xA + Yi$, then value of x & and y respectively are:

- (a) $\frac{-1}{11}, \frac{2}{11}$ (b) $\frac{1}{11}, \frac{2}{11}$ (c) $\frac{-1}{11}, \frac{-2}{11}$ (d) $\frac{1}{11}, \frac{-2}{11}$

8. If A is a square matrix such that $A^2 = I$, then $(A - I)^3 + (A + I)^3 - 7A$ is equal to

- (a) A (b) $I - A$ (c) $I + A$ (d) 3A

SECTION – B

Questions 9 to 11 carry 2 mark each.

9. Find the value of $\sin \left(\sin^{-1} \frac{1}{2} + \cos^{-1} \frac{3}{5} \right)$
10. Show that the relation R on R defined as $R = \{ (a, b) : a \leq b \}$ is reflexive and transitive but not symmetric.
- Or
- Show that the relation R on the set R of real numbers defined as $R = \{ (a, b) : a \leq b^2 \}$ is neither reflexive nor symmetric nor transitive.
11. If A is a square matrix of order 3 such that $A^2 = 2A$, then find the value of |A|.

SECTION – C

Questions 12 to 15 carry 3 mark each.

12. If $A = \begin{bmatrix} 3 & -5 \\ -4 & 2 \end{bmatrix}$, show that $A^2 - 5A - 14I = 0$. Hence or otherwise find a matrix B such that $BA = I$.

13. Show that the relation R on set $A = \{ x \in \mathbb{Z} ; 0 \leq x \leq 12 \}$, given by $R = \{ (a, b) : a = b \}$, is an equivalence relation.

14. If $A = \begin{pmatrix} \cos \alpha & -\sin \alpha & 0 \\ \sin \alpha & \cos \alpha & 0 \\ 0 & 0 & 1 \end{pmatrix}$ find adj A and verify that

$$A(\text{adj } A) = (\text{adj } A)A = |A| I_3$$

Or

Find the value of x, y, z if $A = \begin{pmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{pmatrix}$ satisfies $A' = A^{-1}$

15. Show that function is bijective given by $f: N \rightarrow S, S$ is range of $f(x) = 9x^2 + 6x - 5$.

SECTION – D

Questions 16 carry 4 mark each.

16. Fertilizer, natural or artificial substance containing the chemical elements that improved growth and productiveness of plants. Fertilizer enhances the natural fertility of the soil or replace chemical elements taken from the soil by the previous crops.

The following matrix gives the proportionate mix of constituents used for three fertilizers:



A	B	C	D	Constituents
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$$\begin{array}{l} \text{Fertilizers} \\ \text{I} \begin{bmatrix} 0.5 & 0 & 0.5 & 0 \end{bmatrix} \\ \text{II} \begin{bmatrix} 0.2 & 0.3 & 0 & 0.5 \end{bmatrix} \\ \text{III} \begin{bmatrix} 0.2 & 0.2 & 0.1 & 0.5 \end{bmatrix} \end{array}$$

- (i) If sales are 1000 tins (of one kilogram) per week 20% being fertilizer I, 30% fertilizer II and 50% being fertilizer III, how much of each constitute is used. (1 Mark)
- (ii) If the cost of each constituents is Rs 5, Rs 6, Rs 7.5 and Rs 10 per 100 grams, respectively how much does a one kilogram tin of each fertilizer cost? (2 Mark)
- (iii) What is the total cost per week? (1 Mark)

SECTION – E
Questions 17 to 18 carry 5 mark each.

17. Find the product AB , Where $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ and use it to solve the equations

$$x - y = 3, 2x + 3y + 4z = 17, y + 2z = 7.$$

18. Show that the relation R in the set $N \times N$, defined by $(a, b) R (c, d)$ if $a^2 + d^2 = b^2 + c^2 \forall a, b, c, d \in N$, is an equivalence relation .

Or

Show that the function $f : R \rightarrow \{x \in R : -1 < x < 1\}$ defined by $f(x) = \frac{x}{1+|x|}$, $x \in R$ is one one and onto function .

End

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