

XIIth

MATHS



Practice Sheet -03

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

Unit 2 Algebra (NCERT Chapter 3-4)

Unit 2 Calculus (NCERT Chapter 5)

SUBJECT: MATHEMATICS

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. The value of $\cot^{-1}(-\cot(\frac{\pi}{8}))$ is

- (a) $\frac{7\pi}{8}$ (b) $\frac{-\pi}{8}$ (c) $\frac{9\pi}{8}$ (d) $\frac{-9\pi}{8}$

2. If A is 3 X 3 matrix such that $|A^{-1}| = 5$, then $|5A^2|$ will be

- (a) 1 (b) 25 (c) 5 (d) 125

3. Number of reflexive relations in a set A with 3 elements is

- (a) 2^9 (b) 2^7 (c) 2^8 (d) 2^6

4.If $\sin(x+y) = \log(x+y)$, $x+y > 0$, then $\frac{dy}{dx}$ is equal to

- (a) 2 (b) 1 (c) -1 (d) -2

5.If $\begin{bmatrix} 2x & 5 \\ 8 & x \end{bmatrix} = \begin{bmatrix} 6 & 5 \\ 8 & 3 \end{bmatrix}$, then x is equal to

- (a) 3 (b) -3 (c) ± 3 (d) 0

6.If $A = \begin{bmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix}$ and $A + A^T = I$, then value of α is

- (a) $\frac{\pi}{6}$ (b) π (c) $\frac{\pi}{3}$ (d) $\frac{3\pi}{2}$

7. The relation R in the set $\{1,2,3\}$ given by $R = \{(1,2), (2,1), (1,1)\}$ is

- (a) Symmetric and Transitive but not Reflexive
 (b) Reflexive and Symmetric but not Transitive
 (c) Symmetric but neither Reflexive nor Transitive
 (d) An Equivalence relation

8. Derivative of $\operatorname{cosec} x^\circ$ w.r.t x is

(a) $-\operatorname{cosec} x^\circ \cot x^\circ$

(b) $-1^\circ \operatorname{cosec} x^\circ \cot x^\circ$

(c) $\frac{\pi}{180} \operatorname{cosec} x^\circ \cot x^\circ$

(d) $\frac{180}{\pi} \operatorname{cosec} x^\circ \cot x^\circ$

SECTION – B

Questions 9 to 11 carry 2 mark each.

9. If $x = a (\cos t + \log \tan \frac{t}{2})$, $y = a \sin t$, then evaluate $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{3}$.

10. Write the simplest form of $\tan^{-1} \left[\frac{\sqrt{1+x^2}-1}{x} \right]$.

11. Prove that the determinant of a skew symmetric matrix odd order is always zero.

Or

Prove that diagonal entries of skew symmetric matrix are always zero.

SECTION – C

Questions 12 to 15 carry 3 mark each.

12. Let $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$. Show that $A^2 - 5A + 7I = \text{Zero Matrix}$. Hence find A^{-1} .

13. Define a relation A on set $\mathbf{R}$, set of reals as $A = \{(x, y) : x - y \text{ is rational}\}$. Is A an equivalence relation? Justify your answer.

14. Prove that the function $f(x) = x + |x|$ is not differentiable at $x=0$.

Or

Prove that every differentiable function is continuous but converse need not be true justify with example.

15. If $y = \sin^{-1} \left(\frac{\sqrt{1+x} - \sqrt{1-x}}{2} \right)$, Prove that $\frac{dy}{dx} = \frac{-1}{\sqrt{1-x^2}}$, $x \in (-1, 1)$.

SECTION – D

Questions 16 carry 4 mark each.

16. Let $f(x)$ be a real valued function. Then its

$$\text{Left Hand Derivative (L.H.D.) : } Lf'(a) = \lim_{h \rightarrow 0} \frac{f(a-h) - f(a)}{-h}$$

$$\text{Right Hand Derivative (R.H.D.) : } Rf'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

Also, a function $f(x)$ is said to be differentiable at $x=a$ if its L.H.D. and R.H.D. at $x=a$ exist and both are equal.

$$\text{Let } f(x) = \begin{cases} |x-3|, & x \geq 1 \\ \frac{x^2}{4} - \frac{3x}{2} + \frac{13}{4}, & x < 1 \end{cases}$$

Based on the given information, answer the following questions.

- (i) What is R.H.D. of $f(x)$ at $x=1$?
- (ii) What is L.H.D. of $f(x)$ at $x=1$?
- (iii) Check if the function $f(x)$ is differentiable at $x=3$

OR

Find $f'(2)$ and $f'(-1)$.

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

- 17.** If, $y = (\sin^{-1} x)^2$, $x > 0$ show that .

$$(1-x^2) \left(\frac{d^2y}{dx^2} \right) - x \left(\frac{dy}{dx} \right) - 2 = 0$$

OR

If, $y = \left(x + \frac{1}{x} \right)^x + (\log x)^x$ then find $\frac{dy}{dx}$

- 18.** The sum of three numbers is 6. If we multiply third number by 3 and add second number to it, we get 11. By adding first and third number, we get the double of second number. Represent the above equations algebraically and find the numbers using matrix method.

End

To get more sample papers, practice papers, study material (Only for Maths CBSE XI-XII)Join my whatsapp group at

<https://chat.whatsapp.com/E72LRTSsNjb6LPEGW2fVlt>