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XII – MATHEMATICS TERM 1- Practice Paper 01 (As Per Latest CBSE Guidelines) PAPER CODE:MC23-1201

INFINITY
THINK BEYOND............

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(SYLLABUS COVERED : Unit 1-Relations & Functions , Unit 2-Algebra ,Unit 5 LPP)

Maximum Marks : 40   **Time : 1.5 hrs.**

General Instruction:

1. This Question paper contains five sections - A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.

2. Section A has 9 MCQs and 01 Assertion-Reason (A-R) based questions of 1 mark each.
   Section B has 05 questions of 2 marks each.
   Section C has 03 questions of 2 marks each.
   Section D has 02 questions of 5 marks each.
   Section E has 01 Case-study / Source-based / Passage-based questions with sub-parts (4 marks each)

Section A(1 Mark each)

1. If $A = \begin{bmatrix} -a & b \\ c & a \end{bmatrix}$ and A² = I, then

    (a) $a^2 + bc - 1 = 0$ b) $1 - a^2 + bc = 0$ c) $a^2 + bc + 1 = 0$ d) $a^2 - bc + 1 = 0$

2. If A is a square matrix of order 3 such that IAI = - 5 , then value of $|-AA'|$ is
    (a) 125   (b) - 125   (c) 25   (d) - 254.

3. If $A = \begin{vmatrix} 1 & 1 & -2 \\ \lambda & 1 & -3 \\ 5 & 4 & -9 \end{vmatrix}$ then A⁻¹ exist if

    a) λ = 2   b) λ = 0   c) $\lambda \neq 2$ d) $\lambda \neq 0$

4. For any square matrix A, AAᵀ is a

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

5. If A is a 3 x 3 matrix and I A I = - 2 then value of I A(adj A)I is

    (a) -2   (b) 2   (c) -8   (d) 8

6. Corner points of the feasible region for an LPP are (0, 2), (3, 0), (6, 0), (6, 8) and (0, 5).Let F = 4x + 6y be the objective function. The Minimum value of F occurs at

    (a) (0, 2) only
    (b) (3, 0) only

(c) the mid point of the line sgment joining the points (0, 2) and (3, 0) only

(d) any point on the line segment joining the points (0, 2) and (3, 0).

7. The corner points of the feasible region determined by the following system of linear inequalities: $2x + y \leq 10$, $x + 3y \leq 15$, $x, y \geq 0$ are (0,0), (5,0), (3,4), (0,5). Let $Z = px + qy$, where $p,q > 0$. Condition on p and q so that the maximum of Z occurs at both (3,4) and (0,5) is

(a) p = q   b) p = 2q   c) p = 3q   d) q = 3p

8. If the set A contains 5 elements and the set B contains 6 elements, then the number of one-one and onto mappings from A to B is

(a) 720   (b) 120   (c) 0   (d) none of these

9. The value of cot(cos-1 (7/25)) is
(a) 25/24   (b) 24/25   (c) 7/24   (d) 25/7

10. Assertion (A) : The value of expression $\sec^{-1}\left(\dfrac{2}{\sqrt{3}}\right) + \tan^{-1}(1) + \sin^{-1}\left(\dfrac{1}{2}\right)$ is $\dfrac{\pi}{4}$

Reason (R): Principal value branch of of $\sin^{-1}(x)$ is $\left[-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right]$ and that of $\sec^{-1}(x)$ is $[0, \pi]$

(a) Both A and R are true and R is 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) Both A and R are false.

Section B(2 Mark each)

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

12. Find the range of $\sin^{-1} x + \cos^{-1} x + \tan^{-1} x$

13. Show that $f : N \to N$, given by $f(n) = \begin{cases} n + 1, & if\ n\ is\ odd \\ n - 1, & if\ n\ is\ even \end{cases}$ is a bijection

14. Find : $\dfrac{d}{dx}\left[\tan^{-1}\left(\sqrt{\dfrac{1+\sin x}{1-\sin x}}\right)\right]$, where $0 < x < \dfrac{\pi}{4}$

15. If A is a square matrix such that $A^2 = A$, show that $(I + A)3 = 7A + I$.

Section C(3 Mark each)

16. . Find the equation of the line joining A(1,3) and B(0,0) using determinants and find k if D(k,0) is a point such that area of triangle ABD is 3 sq units.

17. If f(x) = $\begin{cases} 3ax + b, x < 1 \\ 11, x = 1 \\ 5ax - 2b, x > 1 \end{cases}$ continuous at x = 1, find the values of a and b.

Section D(5 Mark each)

18. Find the product of the matrices A = $\begin{bmatrix} -5 & 1 & 3 \\ 7 & 1 & -5 \\ 1 & -1 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 1 & 2 \\ 3 & 2 & 1 \\ 2 & 1 & 3 \end{bmatrix}$ and use it to solve the

equations x + y + 2z = 1, 3 x + 2 y + z = 7 and 2 x + y +3z = 2.

19. For the Power set of all subsets of a non empty set , a relation A R B is defined if and only if A $\subset$ B. Is R an equivalence relation on the power set ?

Or

Show that the relation R in the set NxN 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

Section E(4 Mark each)

20. A manufacture produces three stationery products Pencil, Eraser and Sharpener which he sells in two markets. Annual sales are indicated below.

Market	Products (in numbers)		
	Pencil	Eraser	Sharpener
A	10,000	2000	18,000
B	6000	20,000	8,000

If the unit Sale price of Pencil, Eraser and Sharpener are Rs. 2.50, Rs. 1.50 and Rs. 1.00 respectively, and unit cost of the above three commodities are Rs. 2.00, Rs. 1.00 and Rs. 0.50 respectively, then, Based on the above information answer the following:

(i). Find the total revenue of market A.

(ii). Find the total revenue of market B.

(iii). What is the Cost incurred in market A.
     OR
     Find the Gross profit in both markets

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