

Vidya Vikas Mandal's
Ramacrisna Madeva Salgaocar Higher Secondary School
Margao Goa

Std: XII VOC – CT First Term Exam, October, 2023
Date: 19/10/23 Subject : Mathematics (voc)

Duration: 2 hr.
Marks: 40

Instructions :

- i. All questions are compulsory
- ii. There are four sections in this question paper (A, B, C & D)
- iii. In section A there are 4 questions of 1 mark each.
- iv. Section B contains 7 questions of 2 marks each.
- v. Section C contains 2 questions of 3 marks each.
- vi. Section D contains 4 questions of 4 marks each.
- vii. Write the number of each question clearly on the answer book.

Section A

Question numbers from 1 to 4 carry 1 mark each.

1. If $A = \begin{bmatrix} 6 & 3 \\ 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 3 & -2 \end{bmatrix}$ find matrix $A - 2B$
2. Write the matrix $A = [a_{ij}]_{2 \times 2}$ where $a_{ij} = 2i + j$ for $i = j$
 $= i + 2j$ for $i \neq j$
3. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$, find $|A| \cdot |B|$
4. If $A = \begin{bmatrix} 2 & 4 \\ -1 & -2 \end{bmatrix}$, show that A^2 is a null matrix.

Section B

Question numbers from 5 to 11 carry 2 marks each.

5. Construct a backward difference table for the following data.

x	2	4	6	8	10
y	-2	-1	1	2	4

hence identify $\nabla^2 y_8$ $\nabla^3 y_7$

6. Construct a forward difference table for the following data.

x	5	10	15	20	25
y	13	20	15	10	8

Hence identify $\Delta^3 y_{15}$ $\Delta^4 y_5$

7. A card is drawn from a pack of 52 playing cards, find the probability of getting a king in black suit.
8. Two dice are thrown find the probability that the sum of the numbers on their upper faces is greater than 8.

9. Find x if $[4 \ x \ 1] \begin{bmatrix} 3 \\ -2 \\ x \end{bmatrix} = [8]$

10. If $A = \begin{bmatrix} -2 & 0 & 1 \\ 1 & 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 \\ 2 & 3 \\ 1 & -1 \end{bmatrix}$, find $|AB|$

11. Find the value of a and b from the matrix equation

$$\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix} \begin{bmatrix} a & 1 \\ 5 & b \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ 3 & 5 \end{bmatrix}$$

Section C

Question numbers from 12 to 13 carry 3 marks each.

12. Discuss the continuity of the function at $x=4$

$$f(x) = \frac{x^2 - 16}{x^2 + x - 20} \quad 0 \leq x < 4$$

$$= \frac{x^2 - 9}{x + 3} \quad 4 \leq x < 8$$

13. If a function

$$f(x) = \begin{cases} x^2 - x + a & \text{for } 0 \leq x < 1 \\ x & \text{for } 1 \leq x < 2 \\ 5x - b & \text{for } 2 \leq x < 4 \end{cases}$$

is continuous in $[0, 4]$, find the values of a and b

Section D

Question numbers from 14 to 17 carry 4 marks each.

14. Write down the following equations in matrix form and solve them by matrix method

$$x + y + z = 3, \quad 3x - 2y + 3z = 4, \quad 5x + 5y + z = 11$$

15. For the following table

X	1	2	4
Y	5	7	11

Using Lagrange's Inverse Interpolation formula, find the value of x when $f(x)=9$

16. Obtain the regression line of y on x for the following data

X	5	6	7	8
Y	4	3	2	1

Also find y when $x = 3$

17. Solve the following L.P.P. by graphical method

$$\text{Maximize } z = 10x + 5y$$

$$\text{Subject to } 2x + 3y \leq 6$$

$$3x + 2y \leq 12$$

$$x \leq 2$$

$$x \geq 0, y \geq 0$$