2024 III 07 0930 Seat No. | | | | | |

Time : 2 Hours

MATHEMATICS
(Vocational)

Subject Code

V	4	3	1	1

Total No. of Questions : 22 (Printed Pages : 4) **Maximum Marks : 50**

INSTRUCTIONS : (*i*) *All* questions are compulsory.

(*ii*) The question paper consists of **22** questions divided into **4** sections A, B, C and D.

(*iii*) **Section–A** contains **6** questions of 1 mark each.

Section–B contains **8** questions of 2 marks each.

Section–C contains **4** questions of 3 marks each.

Section–D contains **4** questions of 4 marks each.

(*iv*) Write the number of each question clearly on the answer book.

Section – A

1. If $\begin{bmatrix} a+ab & 10 \\ 15 & ab \end{bmatrix} = \begin{bmatrix} 1 & 10 \\ 15 & 0 \end{bmatrix}$, find the values of a and b.

2. Construct a 2×3 matrix $A = [a_{ij}]$, such that $a_{ij} = i + 2j$.

3. Differentiate $\sin^2(x^3)$ with respect to x.

4. Evaluate :

$$\int e^{2\cos x}\, dx$$

5. Evaluate :

$$\int a^{3x+2}\, dx$$

6. Evaluate :

$$\int_{-3}^{-1} 2x \, dx$$

Section - B

7. Construct a forward difference table for the following data :

X	Y
1	3
4	6
6	8
8	10
10	12

And write the values of $\Delta^3 y_4$ and $\Delta^4 y_{10}$.

8. Verify whether the given matrix is singular or not :

$$A = \begin{bmatrix} 2 & 4 & 1 \\ 1 & 1 & 2 \\ 2 & 6 & 2 \end{bmatrix}$$

9. The six faces of a die show the letters A, B, C, D, E, A. What is the probability of getting 'A' when the die is tossed ?

10. From a well shuffled pack of 52 playing cards, one card is drawn at random. Find the probability that the card drawn bears a number between 2 and 7.

11. If $y = x^a a^x, a > 0, a \in N$, find $\frac{dy}{dx}$.

12. If $y = \sqrt{\sin\sqrt{x}}$, find $\frac{dy}{dx}$.

13. Evaluate :

$$\int \frac{1}{\sqrt{2x+1}+\sqrt{2x+2}}\,dx$$

14. Evaluate $\int_0^4 (x^2+1)\,dx$, using Trapezoidal rule with 4 strips.

Section - C

15. If $f(x)$ is continuous on $[-2, 2]$, where

$f(x) = 6x^3 + 5, \quad -2 \le x < -1$

$= ax + 2b, \quad -1 \le x < 1$

$= 4x^2 + 9, \quad 1 \le x \le 2$, find the values of a and b.

16. Differentiate $5^x - x^{\sin x}$, with respect to x.

17. Integrate $x^2 e^{3x}$, with respect to x.

18. Evaluate $\int_4^{10} (2x+7)dx$, using Simpson's rule when $n = 6$.

Section - D

19. Given that $f(1) = 2$, $f(3) = 10$, and $f(4) = 17$, find the value of X, when $f(X) = 5$, using Lagranges Inverse Interpolation formula.

20. Find the regression line of Y on X for the following data :

X	Y
2	3
–1	2
4	–6
–5	1

21. Solve the following L.P.P. by graphical method :

Maximize $Z = x + y$,

such that $2x + y \leq 50$, $x + y \leq 40$, $x \geq 0$, $y \geq 0$.

22. Solve the following equations using inverse of a matrix :

$$2x + y + z = 8,$$

$$x + y + z = 6,$$

$$x - z = -4$$