2018 III 14 **1000** **Seat No. :** | | | | | |

Time : 2 Hours

MATHEMATICS (Vocational)
(New Pattern)

Subject Code

V	3	1	1

Total No. of Questions : 5 **(Printed Pages : 2)** **Maximum Marks : 50**

INSTRUCTIONS : *i) Answer **each** question on a fresh page.*
ii) Write the numbers of the question and sub-question clearly.
*iii) **All** questions are **compulsory**.*
*iv) Figures to the **right** indicate **full** marks.*
v) Use of logarithm table is allowed.
vi) Graph paper will be supplied on request.

1. A) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 8 \\ 9 & 6 \end{bmatrix}$ then, find transpose of A + B. **[1]**

B) Construct a forward difference table for the following data

x	0	5	10	15	20
y	–4	–6	–3	–1	4

hence identify $\Delta^2 y_5$, $\Delta^3 y_{15}$. **[2]**

C) Discuss the continuity of the function at x = 2

$$f(x) = \frac{x^2 - 4}{x^2 - x - 2} \text{ for } 0 \leq x < 2$$

$$= \frac{x^2 + 1}{x + 2} \text{ for } 2 \leq x \leq 4.$$ **[3]**

D) Solve the following linear programming problem using graphical method.

Maximise $z = x + 4y$
Subject to $x + 3y \geq 3$,
$2x + y \geq 2$,
$x \geq 0$ and $y \geq 0$. **[4]**

2. A) Differentiate 5x + log(sinx) with respect to x. **[1]**

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

C) Evaluate $\int \left[\frac{1}{x \log x} + \log x \right] dx$. **[3]**

D) If $x = \frac{2am}{1+m^2}$, $y = a\frac{(1-m^2)}{(1+m^2)}$ where m is parameter show that $\frac{dy}{dx} = \frac{2m}{m^2-1}$. **[4]**

3. A) Evaluate $\int 2\sin(3-2x)dx$. **[1]**

B) Two perfect cubic dice are thrown, find the probability that the sum of the numbers on their upper face is at least 8. **[2]**

C) Evaluate $\int_0^1 \frac{6}{\sqrt{x+1}-\sqrt{x}} dx$. **[3]**

D) Find the coefficient of correlation for the following data.

x	1	2	3	4	5
y	4	5	6	7	8

[4]

4. A) Find the matrix A if $A = [a_{ij}]_{2\times3}$ where $a_{ij} = 3(i + j)$ for $i = j$
$= i^2 - j^2$ for $i \neq j$. **[1]**

B) Evaluate $\int x \sec^2 x dx$. **[2]**

C) Evaluate $\int_0^6 (2x+1)dx$ using Simpson's rule where n = 6. **[3]**

D) Find the inverse of the matrix $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$. **[4]**

5. A) Evaluate $\int P^{2x-7} dx$. **[1]**

B) Find $\frac{dy}{dx}$ if $y = \sin(x.5^x)$. **[2]**

C) Solve the differential equation $(e^x + 1)\cos y\, dy + e^x \sin y\, dx = 0$. **[3]**

D) Given that f(0) = 4, f(2) = 6, f(4) = 8 using Lagrange's inverse interpolation formula find the value of x when f(x) = 7. **[4]**

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