



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 $x = 2$

$$f(x) = \frac{x^2 - 4}{x^2 - x - 2} \text{ for } 0 \leq x < 2$$
$$= \frac{x^2 + 1}{x + 2} \text{ for } 2 \leq x \leq 4. \quad [3]$$

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 $5x + \log(\sin x)$ 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 $A = [a_{ij}]_{2 \times 3}$ 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 $y = \sin(x \cdot 5^x)$. [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]