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Time : 2 Hours

Mathematics (Vocational)

Subject Code

V	3	1	1
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Total No. of Questions : 5

(Printed Pages : 4)

Maximum Marks : 50

*INSTRUCTIONS* : (i) Answer each question on a fresh page.

(ii) Write the number of questions and sub-questions clearly.

(iii) All questions are compulsory.

(iv) Figures to the right indicate full marks.

(v) Use of logarithmic table is allowed.

(vi) Graph paper will be supplied on request.

1. (A) If

1

$$A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 \\ 3 \end{bmatrix},$$

find  $(AB)^T$ .

(B) Construct a backward difference table for the following data :

2

$x$	0	2	4	6	8	10
$f(x)$	10	14	17	21	27	35

Find  $\nabla^3 y_6$  and  $\nabla^2 y_8$ .

(C) Find 3

$$\lim_{x \rightarrow \frac{1}{2}} \left[ \frac{1}{2x^2 + 3x - 2} - \frac{1}{6x^2 - x - 1} \right].$$

(D) Solve the following L.P.P. by Graphical method : 4

Max. :  $Z = 5x + 7y$

Subject to :  $4x + 2y \leq 12$

$$3x + 6y \leq 18$$

with  $x \geq 0, y \geq 0$ .

2. (A) If  $y = (2x^2 + 8)^2$ , find  $\frac{dy}{dx}$ . 1

(B) If 2

$$A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix},$$

Show that  $A^2 - 4A + 3I = O$ .

(C) Evaluate : 3

$$\int x \cdot \sin 5x dx.$$

(D) If 4

$$y = (\tan x)^{\cot x} + (\cot x)^{\tan x},$$

find  $\frac{dy}{dx}$ .

3. (A) Evaluate : 1

$$\int 6^{(5x-2)} dx.$$

- (B) Three cards are drawn from a well shuffled pack of 52 playing cards. Find the probability of getting a picture card and two aces. 2

- (C) Evaluate : 3

$$\int_0^3 \frac{\sqrt{x}}{\sqrt{3-x} + \sqrt{x}} dx.$$

- (D) Find the regression line of  $x$  on  $y$  for the following data : 4

$x$	2	3	4	5	6
$y$	3	5	7	9	11

Also, find  $x$  when  $y = 4$ .

4. (A) If 1

$$\begin{bmatrix} 4 & 5 \\ 2 & k \end{bmatrix}$$

is a singular matrix, find  $k$ .

- (B) Evaluate : 2

$$\int \frac{x^2 + 1}{x^3 + 3x + 5} dx.$$

- (C) Evaluate : 3

$$\int_4^{10} (x^2 + 3) dx$$

by using trapezoidal rule when  $n = 6$ .

(D) Find the inverse of : 4

$$\begin{bmatrix} 1 & 2 & 1 \\ 1 & -1 & 1 \\ 1 & -4 & -1 \end{bmatrix}.$$

5. (A) Evaluate : 1

$$\int \tan^2 7x \, dx.$$

(B) Differentiate : 2

$$\left(3x^2 + 4x + 1\right)^5 + \frac{1}{(1 - 2x)^3}$$

with respect to  $x$ .

(C) Form a differential equations : 3

$$y = Ae^{4x} + Be^{-4x} + x^2.$$

(D) Given that  $f(2) = 1$ ,  $f(6) = 5$ ,  $f(8) = 9$  use Lagrange's interpolation formula to obtain  $f(4)$ . 4