

Ba/EC2.CC4

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(FYUGP)

(2nd Semester)

ECONOMICS

(MAJOR)

Paper : EC2.CC4



(Mathematical Methods for Economics—II)

Full Marks : 75

Pass Marks : 40%

Time : 3 hours

*The figures in the margin indicate full marks
for the questions.*

UNIT—I

1. (a) Explain the different types of matrices
with examples.

10

(b) If

$$A = \begin{bmatrix} 3 \\ 5 \\ 0 \\ 2 \end{bmatrix} \text{ and } B = [6 \ 4 \ 2 \ 0]$$

show that $AB \neq BA$.

5

(2)

Or

2. (a) Find the rank of

$$A = \begin{bmatrix} 2 & 4 & 1 \\ 3 & 6 & 2 \\ 4 & 8 & 3 \end{bmatrix}$$

5

(b) Solve the following using Cramer's rule : 10

$$x + 6y - z = 10$$

$$2x + 3y + 3z = 17$$

$$3x - 3y - 2z = -9$$

UNIT—II

3. Find the partial derivatives of the following :

5×3=15

(i) $y = (x_1^2 + 2x_2)(x_1x_2 - x_1^2 + x_2^2)$

(ii) $y = e^{(x_1 + 6x_1x_2 - x_2^2)}$

(iii) $y = \frac{(x_1 - 2x_2^2)}{(x_1^2 - 4x_2)}$

Or

4. Find the total differentials of the following :

5×3=15

(i) $x^2 - 2xy + y^2$

(ii) $xy^3 - yx^3$

(iii) $\frac{x^2 + y^2}{x - y}$

UNIT—III

5. (a) Explain the substitution method for solving the problem of constrained optimization. 5

- (b) Find the maximum value of

$$u = x^2 + 3xy - 5y^2$$

subject to $2x + 3y = 6$. 10

Or

6. Given the function

$$u = x^2 + y^2 + w^2$$

subject to a linear constraint of $x + y + w = 1$.

Find at what point it has a maximum or a minimum value. 15

UNIT—IV

7. Examine the following functions for their maxima and minima : $5 \times 3 = 15$

(i) $y = 3x - 12x^2$

(ii) $y = 3x^2 - 12x + 12$

(iii) $y = \frac{6x}{x^2 + 4}$

Or

8. (a) Find the extreme values of

$$y = x^3 - 9x^2 + 15x + 20$$

6

- (b) The demand function faced by a firm is $P = 500 - 4Q$ and its cost function is $C = 500 + 125Q$, where P is the price. Find—

- (i) the output at which profit of the firm is maximum;
- (ii) equilibrium price charged by the firm;
- (iii) maximum profit.

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UNIT—V

9. Solve the following differential equations : 15

(i) $(x + y) dx + (x + 4y) dy = 0$

(ii) $\frac{dy}{dx} = ay$

(iii) $\frac{dy}{dx} + 2y = 10$

Or

10. (a) What is difference equation? Solve the following difference equation using the iteration method :

$$2+5=7$$

$$\Delta y_t = -0.2y_t$$

- (b) Solve the difference equation

$$y_{t+1} + 5y_t = 9$$

when $y_0 = 12$.

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