

**Ba/Eco-102 (N)**

**2 0 2 1**

( 1st Semester )

**ECONOMICS**

( Honours )

Paper No. : ECO-102

( New Course )

( **Quantitative Techniques—I** )

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

The figures in the margin indicate full marks  
for the questions

**UNIT—I**

Q.1. Given  $A = \{a, b\}$ ,  $B = \{4, 6\}$  and  
 $C = \{5, 6\}$ . Find—

(i)  $A \times (B \cap C)$ ;

(ii)  $(A \times B) \cap (A \times C)$ .

Verify whether

$$A \times (B \cap C) = (A \times B) \cap (A \times C) \quad 3 \times 3 = 6$$

Q.2. Q.

Time Over

( 2 )

(b) If

$U = \{j, k, l, m, n\}$ ,  $X = \{j, k, m\}$  and  $Y = \{k, m, n\}$

show that  $(X \cap Y)' = X' \cup Y'$ . 4

(c) If  $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ ,  $P = \{4, 5, 6\}$   
and  $Q = \{5, 6, 8\}$ , show that

$(P \cup Q)' = P' \cap Q'$  4

OR

2. (a) Each student in a class of 40 plays at least one indoor game chess, carom and scrabble. 18 play chess, 20 play scrabble and 27 play carom. 7 play chess and scrabble, 12 play scrabble and carom and 4 play chess, carom and scrabble. Find the number of students who play --

(i) chess and carom;

(ii) chess, carom but not scrabble. 8

(b) Discuss the types of functions and their applications in economics. 6

UNIT—II

3. Add  $3 + 3i$  and  $-4 + i$  and subtract  $3 + 3i$  from  $-1 + 4i$  graphically.  $3+3=6$

4. Discuss the axiomatic properties of real numbers. 8

(c) (Continued)

( 3 )

OR

4. (a) Find the equation of a straight line that has  $y$ -intercept 4 and is perpendicular to straight line joining (2, -3) and (4, 2). 4
- (b) Find the coordinates of the centre and radius of the circle whose equation is  
 $3x^2 + 3y^2 - 6x + 9y - 4 = 0$  5
- (c) Find the equation of a circle which passes through three points (0, 1), (5, 1) and (2, -3). 5

UNIT—III

5. (a) Find  $\frac{dy}{dx}$  of the following : 4+3+3=10
- (i)  $x^2 + y^2 + 2x + 2y - 2 = 0$
- (ii)  $\frac{x^2 + 5}{x^2 + x}$
- (iii)  $(x + 2)(3x + 2)$
- (b) Find the maximum and minimum values of the following function : 4
- $$Y = 3x^4 - 10x^3 + 6x^2 + 5$$

( 4 )

OR

6. (a) Find  $E_d$ , if the demand function is  $x = 25 - 4p + p^2$ , where  $x$  is the demand for commodity at price  $p$  and find out the point elasticity at price level  $p = 8$ ,  $p = 4$  and  $p = 5$ . 5

- (b) Discuss the relationship between average and marginal cost curves through differentiation. 4

- (c) A firm has the following total cost and demand functions :

$$C = \frac{1}{3}Q^3 - 7Q^2 + 111Q + 50 \text{ and } Q = 100 - p$$

Find the profit maximising level of output; also find profit at this level of output. 5

UNIT—IV

- 7 Integrate the following : 2+4+4+4=14

(a)  $\int (x^3 - 4x^2 + x) dx$

(b)  $\int \frac{x^4 - 8}{x} dx$

(c)  $\int 2x(x^2 + 1) dx$

(d)  $\int \left( \frac{1}{x^2} + \frac{4}{x\sqrt{x}} + 2 \right) dx$

( 5 )

OR

8. (a) If the demand function is  $p = 85 - 4x - x^2$ , what will be the consumer's surplus, if—

(i)  $x_0 = 5$ ;

(ii)  $p_0 = 64$ ?

8

(b) Find the producer's surplus when

$$P_d = 3x^2 - 20x + 5, \quad p_s = 15 + 9x$$

6

UNIT—V

9. (a) Solve the following equation through matrix inversion :

8

$$A = \begin{bmatrix} 3x - 2y + 3z = 8 \\ 2x + y - z = 1 \\ 4x - 3y + 2z = 4 \end{bmatrix}$$

(b) Discuss the properties of determinants.

6

OR

10. Compute (i)  $2A - 3B$  and (ii)  $ABC$  for the following matrices :

$2+2=4$

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \quad B = \begin{bmatrix} -1 & 2 \\ 2 & -1 \end{bmatrix} \quad C = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$$

11. (a)

( Turn Over )

( 6 )

b) Write short notes on (i) diagonal matrix  
and (ii) symmetric matrix with examples.

2+2=4

c) Solve the following set of equations by  
Cramer's rule method :

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$$2x - 3y + 4z = 8$$

$$3x + 4y - 5z = -4$$

$$4x - 5y + 6z = -12$$

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