

2016

(5th Semester)

ECONOMICS

(Honours)

Paper No. : ECO-503 (b)

(**Mathematical Economics**)

Full Marks : 70
Pass Marks : 45%

Time : 3 hours

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

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. Explain the meaning of the following : 7+7=14
- (a) Constrained optimisation and unconstrained optimisation
 - (b) Difference equation and the order of the difference equation
2. (a) Differentiate between differential conditions and derivative conditions. 7
- (b) Find all the second partial derivatives of
 $Z = X^Z e^{-Y}$ 7

UNIT—II

3. What restrictions must be placed upon a , b and h in $q = au^2 + 2huv + bv^2$, while u and v are allowed to take any value in order to ensure definite sign for q ? 14
4. Explain the following with suitable examples : 4+5+5=14
- (a) A differential equation
- (b) Order of differential equation
- (c) Degree of a differential equation

UNIT—III

5. (a) Suppose that a consumer has ₹ 90 to be divided between two commodities X and Y and suppose the unit price of Y is fixed at ₹ 0.20. What will be his demand equation for X , if his utility function is

$$U = \log Q_x + 2 \log Q_y$$

where Q_x and Q_y are the amounts of X and Y consumed by him? 6

- (b) Given the demand curve as $P = 76 - 73D$. Find the elasticity of demand for $D = 0.75$, where D is demand for specific commodity. 5
- (c) What will be the change in total utility u if both q_1 and q_2 change simultaneously? 3

6. (a) If consumer's demand function is given by $x = f(P) = 200 - 10P$, find the consumer's surplus where market price $P = 10$. 7
- (b) Write the elasticity form of the Slutsky equation. 7

UNIT—IV

7. (a) What do you mean by production function? Differentiate between homogeneous and non-homogeneous production functions. 3
- (b) A firm's production function is

$$q = 12 - \frac{1}{LK}(L + K)$$

The prices of labour, capital and output are ₹ 1, ₹ 4 and ₹ 9. Find the maximum profit combination of labour, capital and output. 7

- (c) Total cost C of output x is given by

$$C = \frac{2}{3}x + \frac{35}{2}$$

Find the—

- (i) cost when output is 4 units;
- (ii) average cost output of 10 units;
- (iii) marginal cost when output is 3 units. 4

8. For the linear homogeneous production function

$$x = \frac{2Hab - Aa^2 - Bb^2}{Ca + Db}$$

show that average and marginal products of the factors depend only on the ratio of the factors and verify that product is always a times the marginal product of A and b times the marginal product of B .

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UNIT—V

9. A radio manufacturer produces x sets per week at total cost of ₹ $\left(\frac{x^2}{25} + 3x + 100\right)$. He is

a monopolist and the demand for his product is $x = 75 - 3p$, where p is the price in rupees per set. Show that the maximum net revenue is obtained when about 30 sets are produced per week. What is the monopoly price?

10+4=14

10. (a) State the conditions of equilibrium, if in the cobweb model the supply curve is assumed to have negative slope.

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- (b) If the demand law is $P = 12 - 5Q$ and total cost is $C = Q^3 + 3Q^2$, determine the change in the price due to imposition of sales tax of 20%. Find the corresponding profit. Determine the price if Government grants subsidy (instead of imposing tax) of 1% per unit of output. What will be the profit if a sales tax of 10% is imposed?

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