বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

B.Sc. Honours Examination 2021

(CBCS)

1st Semester

ECONOMICS

PAPER—C2T

MATHEMATICAL METHODS IN ECONOMICS-1

Full Marks : 60

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

THEORY : C2T

Answer any *four* questions.　　　　　4×12

1. State the first and second order conditions of maximisation of a function y = f(x). The revenue R(Q) and cost C(Q) functions of a firm are R(Q) = $1200Q - 2Q^2$ and C(Q) = $Q^3 - 16.25Q^2 + 1528.5Q + 2000$. Find the profit maximising output and the maximum profit of the firm.　　　　4+8

2. (a) State and prove the theorem of total probability for two events A and B.

(b) A bag contains 4 white, 5 red and 6 green balls. three balls are drawn at random. What is the chance that a red, a white and a green ball are drawn ? 8+4

3. (a) Evaluate $\int x \log x \, dx$.

(b) The marginal cost function of a company in given by MC = 75 + 20x + 3x^2. Find the total cost function when fixed cost is Rs. 1000.00. 6+6

4. (a) Find the limit : $\lim\limits_{x \to \infty} \dfrac{x^2 - 2x}{x^3 - 8}$.

(b) Define the point of inflexion. Find the point of inflexion for the following function : $Y = x^3 - 5x^2 + 3x + 9$. 4+(3+5)

5. (a) (i) Define continuous function.

(ii) Is the function defined by f(x) = |x|, a continuous function ?

(iii) Examine the curve : y = x^3 – 3x^2 – 9x + 6 for convexity. (3+3)+6

6. (a) Let Z = f(x, y) be a linearly homogeneous production function. Prove that the marginal product of x and marginal product of y are functions of the ratio of y and x.

(b) State and prove the Euler's theorem. 6+6

7. (a) Given the following demand and supply functions, find the equilibrium price and the time path of price. Check whether the equilibrium is stable or not.

$$D_t = 18 - 3P_t; \quad S_t = -3 + 3P_{t-1} \tag{2+6)+4}$$

8. Define probability density function. Is the following a probability density function ?

$$f = \begin{vmatrix} 2x & 0 < x \leq 1 \\ 4 - 2x & 1 < x \leq 2 \\ 0 & elsewhere \end{vmatrix} \tag{3+3)+6}$$

<div align="center">Answer any <i>six</i> questions.   6×2</div>

9. In how many way can the letters of the word 'ECONOMICS' be arranged ?

10. What are the aximos of probability theory ?

11. Let $y = \log x$ and $x = 2 + 3z + 5z^2$, find $\dfrac{dy}{dz}$.

12. What do you mean by first order difference equation ?

13. Show that the function $f(x) = \dfrac{x^2 - 9}{x + 3} \, at \, x = -3$ is continuous.

14. If S = {1, 2, 3, 4, 5, 6}, A = {2, 3} and B = {4, 5, 6}, find $A'B', A'UB'$.

15. If X and Y are two sets such that X has 40 elements, XUY has 60 elements, and $X \cap Y$ has 10 elements, how many elements does Y have ?

16. For the demand function q = 30-4p-p^2, find the elasticity of demand when p = 3.

17. Find the derivative of $\dfrac{6x}{x+5}$.

18. A coin is tossed three times. What is probability of occurrence of head in all the three times ?

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