



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.A. DEGREE EXAMINATION – ECONOMICS

FOURTH SEMESTER – NOVEMBER 2016

MT 4205 - BUSINESS MATHEMATICS

Date: 11-11-2016
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

PART A

Answer ALL the questions

(10x 2=20)

1. Find the equilibrium price for the function $Q_d \approx 2 - 0.02P$ and $Q_s = 0.2 + 0.07P$.
2. Define Cost function.
3. Find the differential coefficient of $3x^3 - 5x^2 + 8$ with respect to x .
4. If $u = x^3 - 3x^2y + 3xy^2 - y^3$, find $\frac{\partial u}{\partial y}$.
5. Evaluate $\int_{-1}^1 (2x^2 - x^3) dx$.
6. State any two properties of definite integrals.
7. Write down the formula for consumer's surplus and producer's surplus.
8. If $A = \begin{pmatrix} 1 & 2 & 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 1 \\ 2 \\ 3 \\ 4 \end{pmatrix}$, compute AB .
9. Define an objective function in a linear programming problem.
10. If $\frac{1}{x(x+1)} \approx \frac{A}{x} + \frac{B}{x+1}$, find A and B .

Part B

Answer any FIVE of the following

(5x 8=40)

11. The unit demand is $x = \frac{1}{3}(25 - 2p)$ where x is the number of units and p is the price. Let the average cost per unit be Rs. 40. Find the revenue function and profit function.
12. Differentiate $\frac{(x^2-1)^{4/5} (3x+5)^{2/7} e^{3x}}{(x-9)^{1/2} (2x-7)^4}$ with respect to x .
13. If $y = 2x + \frac{4}{x}$, prove that $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = 0$.
14. Evaluate $\int \frac{1}{x^2-2x-35} dx$.
15. Solve (i) $\int_0^{-2} \frac{\sqrt{x}}{\sqrt{x}+\sqrt{2-x}} dx$ (ii) $\int xe^x dx$.
16. Prove that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$.
17. Given the following transaction matrix, find the gross product to meet the final demand of 200 units of Agriculture and 800 units of Industry.

Producing Sector	Purchasing Sector		Final Demand
	Agriculture	Industry	
Agriculture	300	600	100
Industry	400	1200	400

18. Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 paise per gram. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and costs 20 paise per gram. The daily minimum requirements of vitamin A and vitamin B are 100 units and 120 units respectively. Formulate the problem mathematically.

Part C

Answer any TWO questions

(2x 20=40)

19 (a) Find the elasticity of demand with respect to price for the following demand functions (i) $p = \overline{a - bD}$, a & b being constants (ii) $D = \frac{8}{p^{\frac{2}{3}}}$ (iii) $D = \frac{20}{p+1}$.

(b) The total cost function of a firm is given by $C = 0.04q^3 - 0.9q^2 + 10q + 10$. Find (i) the average cost (ii) marginal cost (iii) the slope of marginal cost and (iv) the slope of average cost.

(10+10)

20 (a) Find the first and second order partial derivatives of $u = \log(x^2 + y^2)$.

(b) Find the maximum and minimum values of the function $y = 2x^3 + 3x^2 - 36x + 10$.

(10+10)

21 (a) Determine consumer surplus and producer surplus under perfect competition for the demand function $p = 36 - x^2$ and supply function $p = 6 + \frac{x^2}{4}$, where p is the price and x is quantity.

(b) Evaluate $\int \frac{x+5}{(x+1)(x+2)(x+3)} dx$. (12+8)

22 (a) Solve the system of equations:

$$2x - 3y + 5z = 11; 5x + 2y - 7z = -12; -4x + 3y + z = 5 \text{ using Cramer's rule.}$$

(b) Solve the following linear programming problem graphically:

$$\begin{aligned} \text{Max } Z &= 8x + 6y \\ \text{subject to } 4x + 2y &\leq 60 \\ 2x + 4y &\leq 48 \\ &\& x, y \geq 0 \end{aligned}$$

(10+10)