LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – MATHEMATICS

FOURTH SEMESTER – NOVEMBER 2012

# MT 4205 - BUSINESS MATHEMATICS

 Date : 05/11/2012 Dept. No. Max. : 100 Marks

 Time : 1:00 - 4:00

# PART A

# Answer ALL the questions: ( 10 X 2 = 20)

1. Find the equilibrium price and quantity for the functions $Q\_{d}=2-0.02P$ and $Q\_{s}=0.2+0.07P$

2. If the demand law is $p= \frac{10}{\left(x+1\right)^{2}}$ find the elasticity of demand in terms of x.

1. Find $\frac{dy}{dx}$ if $y=x^{2}+y^{2}-2x$.
2. Find the first order partial derivatives of $u=3x^{2}+2xy+4y^{2}$.
3. Evaluate
4. Prove that .
5. If $A=\left(\begin{matrix}1&2\\3&4\end{matrix}\right)$ and $B=\left(\begin{matrix}1&0\\2&-3\end{matrix}\right)$, find $A+B$.
6. If $A=\left(\begin{matrix}4&1\\2&3\end{matrix}\right)$, find $A^{2}$.
7. If  then find *A* and *B*
8. Define Linear Programming Problem.

**PART B**

**Answer any FIVE of the following: (5x 8=40)**

1. The total cost C for output x is given by . Find (i) Cost when output is 4 units (ii) Average cost of output of 10 units (iii) Marginal cost when output is 3 units.
2. If  then prove that .
3. Find the first and second order partial derivatives of .
4. Integrate  with respect to x.
5. Prove that (i) , if f(x) is an even function.

 (ii) , if f(x) is an odd function.

1. If  then show that .
2. Compute the inverse of the matrix .
3. Integrate  with respect to x.

**PART C**

**Answer any TWO questions: ( 2 X 20 = 40)**

1. (a) If AR and MR denote the average and marginal revenue at any output, show that elasticity of demand is equal to . Verify this for the linear demand law .

(b) If the marginal revenue function for output x is given by , find the total revenue by integration. Also deduce the demand function.

1. (a) Let the cost function of a firm be given by the following equation: where C stands for cost and x for output. Calculate (i) output, at which marginal cost is minimum (ii) output, at which average cost is minimum (iii) output, at which average cost is equal to marginal cost .

(b) Evaluate .

1. (a) Find the maximum and minimum values of the function .

(b) Solve the equations  by Crammer’s rule.

1. (a) The demand and supply function under perfect competition are  and respectively. Find the market price, consumer’s surplus and producer’s surplus.

(b) 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. Find the minimum cost of the product mix using graphical method.

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