LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Com./B.A. (ECO.) DEGREE EXAMINATION

THIRD SEMESTER – NOVEMBER 2007

MT 3203 / 3200 - BUSINESS MATHEMATICS

Date : 05/11/2007 Dept. No. Max. : 100 Marks
Time : 9:00 - 12:00

PART-A

Answer ALL questions **10 x 2 = 20**

1. Define a demand function with an example.
2. Find the equilibrium price by the method of demand given the functions $Q_d = 50 - \frac{8p}{7}$ and $Q_s = 10 + \frac{2p}{3}$.
3. If the total cost $C = \frac{2}{3}x + \frac{35}{2}$, find the marginal cost when the output in 3 units.
4. Differentiate $\frac{e^x}{1+x}$ with respect to x.
5. Evaluate: $\int (x^2 - 1)\, dx$
6. If the marginal revenue is 2p+4, find the demand function.
7. Find (AB)C if $A = \begin{pmatrix} 2 & 1 \\ -3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, $C = \begin{pmatrix} 0 & -1 \end{pmatrix}$.
8. Evaluate $\begin{vmatrix} 2 & 0 & 4 \\ 0 & 1 & 5 \\ 1 & 2 & 0 \end{vmatrix}$.
9. Resolve into partial fractions : $\frac{1}{(x-1)(x-2)}$.
10. Find the average fixed cost for the function $C(x) = 3x^2 - 4x + 6$.

PART-B

Answer any FIVE questions **5 x 8 = 40**

11. Find the elasticity of demand and supply at equilibrium price for the demand function $p = \sqrt{100 - x^2}$ and supply function x = 2p-10, where p is the price and x is the quantity.
12. Verify the relationship $MR = p\left(1 - \frac{1}{\eta_d}\right)$ for the demand function $p = (12-x)^{\frac{1}{2}}, 0 \le x \le 12$.
13. Differentiate $\frac{(x+1)(2x-1)}{(x-3)}$ with respect to x.
14. If $x^y = e^{x-y}$ then prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$.
15. Integrate $\frac{1}{3x^2 + 2x + 5}$ with respect to x.
16. Evaluate: a) $\int_0^1 x(1-x)^{10} dx$ b) $\int x^n \log x \, dx$

17. Resolve into partial functions : $\frac{1}{(x-2)(x^2-6x+8)}$

18. Find the rank of the matrix $\begin{pmatrix} -1 & 1 & 1 \\ 1 & -1 & 2 \\ -1 & 1 & 10 \end{pmatrix}$.

PART –C

Answer any TWO questions **2 x 20 = 40**

19 a) If AR and MR denote the average and marginal revenue at any output show that elasticity of demand is equal to $\frac{AR}{AR-MR}$ .Verify this law for the linear demand law p = a+bx. .

b) A manufacturer produces tubes and bulbs. It takes 1 hour of work on machine M and 3 hours of work on machine N to produce one package of bulbs while it takes 3 hours of work on machine M and 1 hour of work on machine N to produce a package of tubes. He earns a profit of Rs 12.50 per package of bulbs and Rs 5 per package of tubes. How many packages of each should he produced each day so as to maximize his profit if he operates the machine for at most 12 hours a day.

20 a) Find the maxima and minima for $\frac{2}{3}x^3+\frac{1}{2}x^2-6x+8$.

b) If $y=\left(x+\sqrt{1+x^2}\right)^m$, show that $(1+x^2)y_2+xy_1 = my^2$ .21 a) The marginal cost of a firm is given by $C'(q) = 5+0.13q$,Further marginal revenue $R'(q) = 18$ .Also it is given that $C(0)$ = Rs.120 . Compute the total profit.

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

22 a) Suppose the interrelationship between the production of two industries R and S in a given year is

	R	S	Demand	Total output
R	14	6	8	28
S	7	18	11	36

If the forecast demand in two years is D = $\begin{pmatrix} 20 \\ 30 \end{pmatrix}$. What should be total output X?

b) Find the inverse of $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{pmatrix}$.

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