



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.COM. B.B.A. & B.A. DEGREE EXAMINATION – COMMERCE, BUSI. ADMI. & ECO.

THIRD SEMESTER – APRIL 2016

MT 3204 / MT 3203 - BUSINESS MATHEMATICS

Date: 04-05-2016
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

SECTION A

Answer ALL the questions:

(10x2 = 20)

1. Find equilibrium price by the method of excess demand for the functions $Q_d = 50 - \frac{8p}{7}$ and $Q_s = 10 + \frac{2p}{3}$.
2. If the demand law is $p = \frac{10}{(x+1)^2}$ find the elasticity of demand in terms of x .
3. Find the differential coefficient of $\frac{(x+1)(2x-1)}{(x-3)}$ with respect to x .
4. Find the first order partial derivatives of $u = 5x^2 + 3xy + 2y^2$.
5. Evaluate $(4x + 5)^6 dx$.
6. Integrate $\int_2^4 (3x - 2)^2 dx$.
7. Find the determinant value of A , if $A = \begin{bmatrix} 1 & 0 & -4 \\ -2 & 2 & 5 \\ 3 & -1 & 2 \end{bmatrix}$.
8. If $A = \begin{pmatrix} 4 & 1 \\ 2 & 3 \end{pmatrix}$, find A^2 .
9. Resolve into partial fractions: $\frac{1}{(x+1)(x+2)}$.
10. Define a feasible solution of the linear programming problem.

SECTION B

Answer any FIVE questions:

(5x8 = 40)

11. The total cost C for output x is given by $C = \frac{2}{3}x + \frac{35}{2}$. Find (i) Cost when output is 4 units (ii) Average cost when output is 10 units (iii) Marginal cost when output is 3 units.
12. 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 for the linear demand law $p = a + bx$.
13. If $y = x^{x^{\infty}}$ then prove that $x \frac{dy}{dx} = \frac{y^2}{1 - y \log x}$.
14. Integrate $\frac{x^3}{(x^2+1)^3}$ with respect to x .
15. Determine consumer surplus and producer surplus for the demand curve $D(x) = 36 - x^2$ and the supply curve $(x) = 6 + \frac{x^2}{4}$, where p is the price and x is quantity.
16. If $A = \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{pmatrix}$ then show that $A^3 - 3A^2 - A + 9I = 0$.

17. Compute the inverse of the matrix $A = \begin{pmatrix} 1 & 0 & -4 \\ -2 & 2 & 5 \\ 3 & -1 & 2 \end{pmatrix}$.

18. Resolve into partial fractions: $\frac{x^2+1}{(x-3)(x-1)^2}$.

SECTION C

Answer any TWO questions:

(2x20 = 40)

19. (a) If the marginal revenue function is $Mk = \frac{ab}{(x-b)^2} - c$, show that $p = \frac{a}{(b-x)} - c$ is the demand law.

(b) Let the cost function of a firm is given by the following equation:

$C = 300x - 10x^2 + \frac{1}{3}x^3$, 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.

(12+8)

20. (a) If $y = (x + \sqrt{1+x^2})^m$, prove that $(1+x^2)y_2 + xy_1 = m^2y$.

(b) Find the elasticities of demand and supply at equilibrium price for demand function

$p = \sqrt{100 - x^2}$ and the supply function $x = 2p - 10$, where p is price and x is quantity.

(10+10)

21. (a) Find the maximum and minimum values of the function $f(x) = x^4 + 2x^3 - 3x^2 - 4x + 4$.

(b) Evaluate $\int \frac{(3x+7)}{2x^2+3x-2} dx$. **(10+10)**

22. (a) Solve the equations $5x - 6y + 4z = 15$; $7x + 4y - 3z = 19$; $2x + y + 6z = 46$ by inverse matrix method.

(b) Solve the following LPP by graphical method:

Maximize $Z = 25x_1 + 40x_2$

Subject to $4x_1 + 4x_2 \leq 48$

$2x_1 + 5x_2 \leq 50$

$5x_1 + 3x_2 \leq 60$

$x_1, x_2 \geq 0$.

(10+10)
