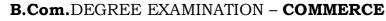
LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



FOURTHSEMESTER – APRIL 2018

MT 4205- BUSINESS MATHEMATICS

Date: 02-05-2018 Time: 09:00-12:00 Dept. No.

Max.: 100 Marks

SECTION – A

$$(10 \text{ x } 2 = 20)$$

1. Find the equilibrium price of excess demand given the function $Q_d = 50 - \frac{8p}{7}$.

2. Define profit function of a firm.

ANSWER ALL QUESTIONS:

- 3. Find the differential coefficient of $8x^3 4x^2 \frac{10}{x^2}$ with respect to x.
- 4. Find the n^{th} derivative of the function $y = e^{ax}$.
- 5. Evaluate $\int (8x^5 4x^3 4) dx$.
- 6. State any two properties of definite integral.

7. If
$$A = \begin{pmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{pmatrix}$$
. Find 2A

ANSWER ANY FIVE QUESTIONS:

- 8. Define rank of a matrix.
- 9. Solve $\frac{1}{(x-1)(2x+1)}$.
- 10. Write the Objective function of a linear programming problem.

SECTION – B

$(5 \times 8 = 40)$

11. The total cost C for output x is given by $C = \frac{2}{3}x + \frac{35}{2}$. Find the cost when output is 4 units and find the average cost of 10 units.

12. If $y = x^{x^x}$, find $\frac{dy}{dx}$

- 13. Differentiate xe^x with respect to x.
- 14. If $u = x^2 y^3 z^4$. Find $\frac{\partial u}{\partial x}, \frac{\partial u}{\partial y}, \frac{\partial u}{\partial z}$.
- 15. Integrate $\frac{1}{x^2 2x 35}$ with respect to *x*.
- 16. Evaluate $\int_{0}^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}}$. 17. Prove that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a b)(b c)(c a).$
- 18. Solve the equations 2x 3y = 3, 4x y = 11 using matrix method.

SECTION – C

ANSWER ANY TWO QUESTIONS:

 $(2 \times 20 = 40)$

19. (a) If AR and MR denote the average and marginal revenue at any output, show that the elasticity of demand is equal to $\frac{AR}{AR-MR}$. Verify this for the linear demand law p = a + bx. (b) If $y = \log(x + \sqrt{1 + x^2})$, then show that $(1 + x^2)y_2 + xy_1 = 0$. (10+10)

- 20. (a) Find maximum and minimum values of the function x⁴ + 2x³ 3x² 4x + 4.
 (b) Find the producer surplus and consumer surplus for the demand curve p(x) = 16 x² and supply curve S(x) = 4 + x. (12+8)
- 21. (a) Solve $\int \frac{3x+7}{2x^2+3x-2} dx$. (b) Solve the simultaneous linear equation using Cramer's rule: 2x - y = 5; 3x + 2y = -3 (12+8)
- 22. (a) Find the adjoint of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$.

(b) A company produces two articles X and Y. There are two departments through which the articles are processed. (Assembly and finishing). The potential capacity of the assembly department is 60 hours per week and that of the finishing department is 48 hours per week.Production of 1 unit X requires 4 hours in assembly and 2 hours in finishing. Each of the unit Y requires 2 hours in assembly and 4 hours finishing. If the profit is Rs. 8 for each unit of X and Rs. 6 for each unit of Y, find out the number of units of X and Y to be produced each week for maximum profit. Formulate the Linear Programming Problem. (12+8)

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