



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Com.DEGREE EXAMINATION – COMMERCE**

FOURTH SEMESTER – APRIL 2018

**MT 4205- BUSINESS MATHEMATICS**

Date: 02-05-2018  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

**SECTION – A**

**ANSWER ALL QUESTIONS:**

**(10 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.
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  $2A$ .
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**

**ANSWER ANY FIVE QUESTIONS:**

**(5 x 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  $u = x^2y^3z^4$ . 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 x 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  $x^4 + 2x^3 - 3x^2 - 4x + 4$ .  
 (b) Find the producer surplus and consumer surplus for the demand curve  $p(x) = 16 - x^2$  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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