LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc., B.COM. & B.A. DEGREE EXAMINATION – **STATS, COMMERCE, ECONOMICS**

FOURTH SEMESTER – APRIL 2017

MT 4205 / MT 3204 / MT 3203 - BUSINESS MATHEMATICS

Date: 29-04-2017   Dept. No.   Max. : 100 Marks
09:00-12:00

SECTION A

Answer **ALL** the questions: **(10x2 = 20)**

1. Find the equilibrium price and quantity for the functions $Q_d = 2 - 0.02P$ and $Q_s = 0.2 + 0.07P$.

2. Define Profit function of a firm.

3. Find the differential coefficient of $9x^4 - 7x^3 + 8x^2 - \dfrac{8}{x} + \dfrac{10}{x^2}$ with respect to x.

4. Find the nth derivative for the function $y = e^{ax}$.

5. Evaluate $\int (5x^3 + 6x^2 - 7)\, dx$.

6. State any two properties of definite integral.

7. If $A = (1 \quad 2 \quad 3 \quad 4)$ and $B = \begin{pmatrix} 1 \\ 2 \\ 3 \\ 4 \end{pmatrix}$. Find AB.

8. Compute the determinant of $\begin{pmatrix} 2x & 4y \\ x & 3y \end{pmatrix}$.

9. Solve the partial fractions $\dfrac{1}{(x-1)(2x+1)}$.

10. Define Optimum solution.

SECTION B

Answer any **FIVE** questions: **(5x8 = 40)**

11. The total cost C for output x is given by $C = \dfrac{2}{3}x + \dfrac{35}{2}$. Find   (i) Cost when output is 4 units

    (ii) Average cost of output of 10 units   (iii) Marginal cost when output is 3 units.

12. If $y = \left(x + \sqrt{1+x^2}\right)^m$ then show that $(1 + x^2)y_2 + xy_1 = m^2 y$.

13. If $y = x^{x^{x^{\cdots \infty}}}$ then prove that $x\dfrac{dy}{dx} = \dfrac{y^2}{1 - y\log x}$.

14. Integrate $\dfrac{1}{x^2 - 2x - 35}$ with respect to x.

15. Evaluate $\int_0^{\pi/2} \dfrac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}}\, dx$.

16. Prove that $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$.

17. Find the adjoint of the matrix $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{pmatrix}$.

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

1

Answer any **TWO** questions: **(2x20 = 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 for the linear demand law $p = a + bx$.

(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)**

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

(b) 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. **(10+10)**

21. (a) Evaluate $\int \frac{(3x+7)}{2x^2 + 3x - 2} dx$.

(b) Solve by Cramer's rule $2x + y - z = 3; x + y + z = 1; x - 2y - 3z = 4$. **(10+10)**

22. (a) Solve the following equation by inverse matrix method:

$5x - 6y + 4z = 15; 7x + 4y - 3z = 19; 2x + y + 6z = 46$.

(b) Solve graphically:

Maximize $Z = 8X + 6Y$

Subject to the constraints: $4X + 2Y \leq 60; 2X + 4Y \leq 48$

and $X, Y \geq 0$. **(10+10)**

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