LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.A. DEGREE EXAMINATION – ECONOMICS

FIRST SEMESTER – NOVEMBER 2018

16/17/18PEC1MC04 – MATHEMATICS AND STATISTICS FOR ECONOMICS

Date: 29-10-2018 Dept. No. Max. : 100 Marks
Time: 01:00-04:00

PART–A

Answer any FIVE questions in about 75 words each (5x4=20)

1. State any four examples where the Poisson probability can be applied.
2. Find the characteristic matrix of A = $\begin{bmatrix} 1 & 4 & 3 \\ 4 & 2 & 1 \\ 3 & 2 & 2 \end{bmatrix}$
3. Distinguish between a Hessian determinant and a Bordered Hessian with suitable examples.
4. What are partitioned matrices?
5. Write a short note on Prisoner's Dilemma.
6. Find the total differential of $U = 3x^2 + xy - 2y^3$.
7. What are the consequences of Type II error?

PART–B

Answer any FOUR questions in about 300 words each (4x10=40)

8. Students of a class were given an aptitude test. Their marks were found to be normally distributed with mean 60 and standard deviation 5. What percent of student scored:
   i. more than 60 marks?
   ii. between 45 and 65 marks?

9. Two companies A and B are competing for the same product. Their different strategies are given as follows:

	Company B			
		I	II	III
Company A	I	-2	14	-2
	II	-5	-6	-4
	III	-6	20	-8

   Determine the optimal strategies for both the companies.

10. Find the solution of the equation system using Martin's rule.

$$x_1 - x_2 + x_3 = 4$$
$$2x_1 + x_2 - 3x_3 = 0$$
$$x_1 + x_2 + x_3 = 2$$

11. Explain the closed input-output model.
12. Examine the function $Z = 8x^3 + 2xy - 3x^2 + y^2 + 1$ for maximum, minimum and saddle points (if any.)
13. Prove that $\frac{\delta^2 z}{\delta x \delta y} = \frac{\delta^2 z}{\delta y \delta x}$ for $Z = 8x^3 - 6x^3y^2 + 3xy^3 - 7y^2 + 10$.

14. For the following average cost function, find the minimum average cost and show that at minimum average cost, marginal cost and average cost are equal.

$\bar{y} = 4 - 2x + 6x^2$

PART–C

Answer any TWO questions in about 1200 words each **(2x20=40)**

15. Solve graphically

Minimize $C = 12x_1 + 42x_2$

Subject to $x_1 + 2x_2 \geq 3$

$x_1 + 4x_2 \geq 4$

$3x_1 + x_2 \geq 3$

and $x_1, x_2 \geq 0$

16. Given the input matrix and final demand vector, find the output matrix X.

$$A = \begin{bmatrix} 0 & \frac{1}{4} & \frac{1}{3} \\ \frac{1}{2} & 0 & \frac{1}{4} \\ \frac{1}{4} & \frac{1}{4} & 0 \end{bmatrix} \qquad D = \begin{bmatrix} 516 \\ 258 \\ 129 \end{bmatrix}$$

17. Derive the macro model of Harrod using differential equations.

18. Use the Lagrange-multiplier method to find the extreme value of $U = 4xy - y^2$ subject to $2x + y - 6 = 0$.