LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.A. DEGREE EXAMINATION – **ECONOMICS**

FIRST SEMESTER – NOVEMBER 2017

17PEC1MC04 - MATHEMATICS AND STATISTICS FOR ECONOMICS

Date: 10-11-2017 Dept. No. Max. : 100 Marks
Time: 01:00-04:00

PART–A

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

1. What is a zero sum game? Give example.
2. State the Kuhn-Tucker sufficiency condition for optimization.
3. How does the Martin's rule of matrix algebra withhold its consistency?
4. Compare the application of a Hessian determinant and a Bordered Hessian.
5. What are partitioned matrices?
6. 12 coins are tossed at the same time. What is the probability of getting 9 or more heads in a single toss?
7. State the PDF of Poisson distribution. What are its properties?

PART–B

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

8. Solve the following set of linear equations using Martin's rule

   $6x + 8y + z = 8$

   $4x + 7y – 5z = 5$

   $10x + 6y – 9z = 14$

9. Find A^2 where $A = \begin{matrix} 1 & 4 \\ 1 & 1 \end{matrix}$ and check that λ_i^2 is the characteristic root of A^2.

10. Two salesmen A and B are working in a certain district. From a sample survey conducted by the head office, the following results are obtained. State whether there is significant difference in the average sales between the two salesmen.

	A	B
No. of Sales	10	18
Average sales (Rs.)	170	205
Standard Deviation (Rs.)	20	25

($\nu = 26$, $t_{0.05} = 2.056$)

11. If the consumer's utility function is $U = q_1^2 q_2$, $p_1 = 4$, $p_2 = 5$ and consumer's income is 120, determine the quantities of q_1 and q_2 which he should purchase in order to maximize his derived utility.
12. Derive the Domar's macro model using differential equations.
13.
    a) If $Z = x^3 + x^2y - y^3$, find dZ
    b) If $Z = 2x^2 - 2y^2 - 3x - 4xy^2$, show that —— = ——
14. Verify that $y = 2Cx^2 + C^2$ is a solution of — + $8x^3$ — = $16x^2y$ and find the particular solution when y = -1 and x = 1.

PART–C

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

15. A test was given to 5 students chosen at random from M.Com class of each of the three universities in Bihar.

University	Scores				
A	90	70	60	50	80
B	70	40	50	40	50
C	60	50	60	70	60

    Perform ANOVA and show if there is any significant difference between the scores of students in the three universities. (Given F 5% = 3.44).
16. Find solution using linear programming

    Maximize $Z = 45x_1 + 55x_2$

    Subject to $6x_1 + 4x_2 \leq 120$

    $3x_1 + 10x_2 \leq 180$

    $x_1, x_2 \geq 0$
17. Determine the values of x_1, x_2 and x_3 that maximize or minimize the function $f(x_1, x_2, x_3) = x_1x_2 + 10x_1 - x_1^2 - x_2^2 - x_3^2$.
18. 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.

    $\bar{y} = 25 - 8x + x^2$