



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.A.DEGREE EXAMINATION – ECONOMICS

FIRSTSEMESTER – APRIL 2017

16PEC1MC04- MATHEMATICS AND STATISTICS FOR ECONOMICS

Date: 04-05-2017
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

PART A

Answer any FIVE questions in about 75 words each

(5 x 4 = 20)

1. In a hospital 480 male and 520 female babies were born in a week. Do these figures confirm the hypothesis that males and females are born in equal number? (1.96 S.E at 5% level of significance)
2. Find the characteristic roots of $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$
3. What is a Sub Matrix? Give example.
4. Write a short note on constrained optimization.
5. What is a 'Saddle point'? What are the conditions for a saddle point?
6. Distinguish between Type I and Type II errors.
7. What is Prisoner's Dilemma?

PART B

Answer any FOUR questions in about 300 words each

(4 x 10 = 40)

8. Given $Z = x^2 - 2xy + y^2$, find the first and second order total differential.
9. Find the partial derivatives f_{xx} , f_{yy} , f_{xy} and f_{yx} given that $f(x,y) = 8x^3 - 6x^3y^2 + 3xy^3 - 7y^2 + 10$.
10. Prove that $|A| = 0$ is a necessary condition for the linear homogeneous equations to have a non-trivial solution.
11. Derive the 1st and 2nd order conditions for convexity and concavity of a function.
12. Find the characteristic vectors of $\begin{pmatrix} 0 & -1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 1 \end{pmatrix}$
13. For a certain type of computers, the length of time between charges of the battery is normally distributed with a mean of 50 hours and a standard deviation of 15 hours. John owns one of these computers and wants to know the probability that the length of time will be between 50 and 70 hours.
14. Explain the significance of Input-Output Analysis in Economics.

PART C

Answer any TWO questions in about 1200 words each

(2 x 20 = 40)

15. Derive the Domar's equation for warranted growth using differential equations.
16. Solve using Martin's rule
 $5x + 3y + z = 7$
 $2x - 2y + 3z = 14$
 $-x - y + z = 1$
17. Indicate whether the function $z = x_1^2 - 3x_1x_2 + 3x_2^2 + 4x_2x_3 + 6x_3^2$ has maximum or minimum value.

18. A workshop has three (3) types of machines A, B and C; it can manufacture two (2) products 1 and 2, and all products have to go to each machine and each one goes in the same order; First to the machine A, then to B and then to C. The following table shows the hours needed at each machine, per product unit, the total available hours for each machine, per week and the profit of each product per unit sold.

Type of Machine	Product 1	Product 2	Available hours per week
A	2	2	16
B	1	2	12
C	4	2	28
Profit per unit	1	1.50	

Solve using the graphical method a Linear Programming model that allows the workshop to obtain maximum gains.

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