LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRSTSEMESTER – NOVEMBER 2017

EC 1809- MATHS & STATISTICS FOR ECONOMISTS

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 (5 x 4 = 20)

1. Distinguish between Type I and Type II errors.
2. State the properties of a good estimator.
3. Using scatter diagrams represent perfect positive correlation and perfect negative correlation.
4. Find the characteristic roots of the matrix A = $\begin{bmatrix} 10 & 3 \\ 3 & 2 \end{bmatrix}$
5. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ for $Z = 12 - x^2 - y^2 + xy$
6. Find 2A – 3B
   A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ B = $\begin{bmatrix} -1 & 2 \\ 2 & -1 \end{bmatrix}$
7. Find $|A|$ given A = $\begin{bmatrix} 3 & 4 & 7 \\ 2 & 1 & 3 \\ 7 & 2 & 1 \end{bmatrix}$

PART – B

Answer any FOUR questions in about 300 words each (4 x 10 = 40)

8. Solve the following set of simultaneous linear equations using Cramer's rule
   $3x_1 + x_2 - x_3 = 2$
   $x_1 - 2x_2 + x_3 = -9$
   $4x_1 + 3x_2 + 2x_3 = 1$
9. Elucidate the procedure for testing hypothesis.
10. Two ladies were asked to rank 7 different types of lipsticks. The ranks given by them are as follows:

Lipsticks :	A	B	C	D	E	F	G
Neelu :	2	1	4	3	5	7	6
Meena :	1	3	2	4	5	6	7

    Calculate Spearman's rank correlation coefficient.
11. Examine the function $f(x,y) = x^2 + xy + y^2 - 3x + 2$ for maximum and minimum values.
12. Find the inverse of $\begin{bmatrix} 1 & 4 & 3 \\ 4 & 2 & 1 \\ 3 & 2 & 2 \end{bmatrix}$
13. Explain the practical uses of Poisson distribution.
14. Given $Z = x^2 - 2xy + y^2$, find the first and second order total differentials.

PART – C

Answer any TWO questions in about 1200 words each (2 x 20 = 40)

15. Solve the following input-output model using Leontief inverse and find the gross output of the economy

$$A = \begin{matrix} P \\ Q \\ R \end{matrix}\begin{bmatrix} 0.3 & 0.5 & 0.2 \\ 0.2 & 0 & 0.5 \\ 0.1 & 0.3 & 0.1 \end{bmatrix} \quad F = \begin{bmatrix} 100 \\ 40 \\ 50 \end{bmatrix}$$

16.
    a) Explain the uses of χ^2 estimates.
    b) From the data given below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment.

Treatment	No. of Patients		
	Favourable	Non-favourable	Total
New	140	30	170
Conventional	60	20	80
Total	200	50	250

(Given for degree of freedom = 1, χ^2 at 5% = 3.84)

17. Consider the following data:

Marks in Economics : 25 28 35 32 31 36 29 38 34 32
Marks in Statistics : 43 46 49 41 36 32 31 30 33 39

    a) Find the regression equations 'X on Y' and 'Y on X'.
    b) Find the correlation between marks in Economics and Statistics.
    c) The most likely marks in Statistics when the mark in Economics is 30.

18. Determine the maxima or minima of the function $f(x_1,x_2,x_3) = x_1^2 + 2x_2^2 + x_3^2 + x_1x_2 - 2x_3 - 7x_1 + 12$.

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