LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.A. DEGREE EXAMINATION - ECONOMICS

FIRST SEMESTER – APRIL 2013

EC 1809 - MATHS & STATISTICS FOR ECONOMISTS

Date : 06/05/2013   Dept. No.   Max. : 100 Marks
Time : 9:00 - 12:00

PART A

Answer any FIVE questions.   (5x4=20 marks)

1. Define the following:
   a. Idempotent Matrix.

   b. Orthogonal Matrix.

   c. Partitioned Matrix.

2. Define "Eigen values". Find the Eigen values for the following matrix A = $\begin{bmatrix} 2 & 1 \\ 0 & 1 \end{bmatrix}$.

3. State the condition for optimization for a function with more than one independent variable.

4. Point out the difference between Correlation and Regression analysis.

5. State the Pdf of Binomial distribution. What are its properties?

6. Write a note on "Analysis of Time Series".

7. Differentiate between Type I and Type II error.

PART B

Answer any FOUR questions.   (4x10=40 marks)

8. Briefly explain the application of derivatives in various economic problems.

9. Solve the following Input- Output model using Cramers' rule:

   A = $\begin{bmatrix} 0.3 & 0.2 & 0.3 \\ 0.1 & 0.3 & 0.4 \\ 0.2 & 0.3 & 0 \end{bmatrix}$ F= $\begin{bmatrix} 500 \\ 700 \\ 600 \end{bmatrix}$

10. Maximize the function $Y = 5x_1 x_2$ subject to $x_1 + 2x_2 = 8$.

11. Ten students got the following percentage of marks in Economics and Statistics:

Economics	8	36	98	25	75	82	92	62	65	35
Statistics	84	51	91	60	68	62	86	58	35	49

Find the coefficient of rank correlation.

12. Fit a straight line trend to the following data:

Year	2005	2006	2007	2008	2009	2010	2011
Sales (Rs crores)	672	824	968	1205	1464	1758	2058

Calculate the trend values taking 2008 as the origin.

13. A certain drug is claimed to be effective in curing cold. In an experiment on 164 people with cold, half of them were given the drug and the rest half were given sugar pills. The patients' reaction to the treatment is recorded in the following table. Test the hypothesis that the drug is not better than sugar pills.

	Helped	Harmed	No effect
Drug:	52	10	20
Sugar pills:	44	12	26

[Hint: Table valve of $\chi^2_{\alpha,\ 0.05} = 5.991$.]

14. State the Pdf of Normal Distribution by highlighting its various properties.

PART C

Answer any TWO questions. (2x20=40 marks)

15. In a three sector economy model, the economies being denoted by 1, 2 & 3 respectively:

$Y_1 = C_1(X_1 - M_1) + 1000$	$Y_2 = C_2 + (X_2 - M_2) + 1200$	$Y_3 = C_3 + (X_3 - M_3) + 900$
$C_1 = 0.8\,Y_1$	$C_2 = 0.7\,Y_2$	$C_3 = 0.75\,Y_3$
$M_1 = 0.2\,Y_1$	$M_2 = 0.18\,Y_2$	$M_3 = 0.25\,Y_3$
$X_1 = 0.15\,Y_2 + 0.1Y_3$	$X_2 = 0.12\,Y_1 + 0.15Y_3$	$X_3 = 0.2\,Y_1 + 0.25Y_2$

Where Y, C, M and X represent National Income, Consumption, Import and Export respectively.

Find the equilibrium Income using matrix inversion.

16. A monopolist produces his output in two plants and his total output is $Q = Q_1 + Q_2$. His Total Cost function in each of the plants are:

$$TC_1 = 10 - 2\,Q_1 + Q_1^2$$

$$TC_2 = 15 - 6\,Q_2 + Q_2^2$$

If the Average Revenue function is given by AR = 50 – 2Q, find:

a. His profit maximizing output to be produced in plants 1 and 2 ;

b. His maximum profit.

17. Following are the distribution of students according to their heights and weights:

HEIGHT (Inches)	WEIGHT (lbs)			
	90 – 100	100 – 110	110 – 120	120 - 130

50 – 55	4	7	5	2
55 – 60	6	10	7	4
60 – 65	6	12	10	7
65 - 70	3	8	6	3

Calculate:

a.   The two coefficients of regression.

b.   The two regression equations.

c.   The correlation coefficient.

18.   a. Explain the steps involved in ANOVA one – way classification using direct method.

b.   The three samples given below are obtained from normal population with equal variance. Test the hypothesis at 5 % level of significance to see whether the population means are equal.

8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

[Hint: Table value of $F_{\alpha,\,0.05}$ for $v_1 = 2$ and $v_2 = 12$ d:f is 3.88]