LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **APRIL 2016**

EC 1809 - MATHS & STATISTICS FOR ECONOMISTS

Date: 03-05-2016 Dept. No. Max. : 100 Marks
Time: 01:00-04:00

PART A

Answer any FIVE of the following questions:- **[5x4=20 marks]**

1. Find the inverse of following matrices:
   a. $A = \begin{bmatrix} 2 & 8 \\ 4 & 10 \end{bmatrix}$ b. $A = \begin{bmatrix} 5 & 3 \\ 2 & 3 \end{bmatrix}$
2. Define determinant of a Matrix. Write any four properties of determinants.
3. Define the Lagrangian Multiplier Process.
4. Two judges in a beauty competition rank the 12 entries as follows:-

X:-	1	2	3	4	5	6	7	8	9	10	11	12
Y:-	12	9	6	10	3	5	4	7	8	2	11	1

   Calculate rank correlation coefficient between X and Y.
5. The following zero order correlation coefficients are given:
   $r_{12}=0.5$ $r_{13}=0.6$ and $r_{23}=0.7$. Calculate the multiple coefficients of correlation $R_{1.23}$, $R_{2.31}$ and $R_{3.12}$.
6. A certain type of wooden beam has a mean breaking strength of 1500 kgs and a standard deviation of 100 kgs . Find the relative frequency of all such beams whose breaking strengths lie between 1450 and 1600 kgs.
7. Write the necessary and sufficient conditions for Maxima, Minima and Saddle point.

PART B

Answer any FOUR of the following questions:- **[4X10=40 marks]**

8. Discuss the application of Partial Derivatives in Economics.
9. Solve the following equations using Cramer's rule:
   a) $2x_1 + 3x_2 - x_3 = 15$.
   $4x_2 + 2x_3 = 16$.
   $3x_1 + 2x_2 = 18$.
10. A Monopolist has the following total revenue and total cost functions,
    $R = 30Q - Q^2$ and $C = Q^3 - 15Q^2 + 10Q + 100$.
    Find (a) profit maximizing output.
    (b) maximum profit.
    (c) equilibrium price.
11. Given below are the figures of production (in Lakh Kg) of a sugar factory:

Year	2005	2006	2007	2008	2009	2010	2011
Production	40	45	46	42	47	50	46

    Fit a Linear Trend line by the Least Square method and tabulate the trend values.
12. Find Maxima and Minima (if any) of the function $y = 5x_1x_2$ subject to $x_1 + 2x_2 = 8$.

13. Determine Karl Pearson's coefficient of correlation from the data given below:

Marks	Age in Years				
	16-23	23-30	30-37	37-44	44-51
18-25	9	3	-	-	-
25-32	-	20	10	4	-
32-39	-	-	12	5	3
39-46	-	-	8	7	3
46-53	-	-	-	10	4

14. Examine the concept of ANOVA using a suitable illustration.

PART C

Answer any TWO of the following question:- **[2X20=40 marks]**

15. A consumer has a Utility function given by $U = 5 \log X_1 + 2 \log X_2$. If the budget constraint is given by $4X_1 + 2X_2 = 28$, find out the optimum quantities of the two goods that the consumer should purchase in order to maximize utility, subject to the budget constraint.

16. Solve the following Input-Output model using Leontief inverse and find the gross output of the economy:

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

17. A. Examine the significance of Chi square distribution. **(10 marks)**

B. In an Industry, 200 workers, employed for a specific job, were classified according to their performance and training received / not received to test independence of a specific training and performance. The data is summarized as follows:

	PERFORMANCE		Total
	GOOD	NOT GOOD	
TRAINED	100	50	150
UNTRAINED	20	30	50
	120	80	200

Use χ^2 test of independence at 5% level of significance and write your conclusion.

(Table value of χ^2 at 1 d:f ; 5% = 3.84)

18. The heights of a sample of 10 fathers and their eldest sons are given below (to the nearest cm):

Height of Father: 170 167 162 163 167 166 169 171 164 165
(X)

Height of Son: 168 167 166 166 168 165 168 170 165 168
(Y)

a) Find the regression lines of 'Y on X' and of ' X on Y'.

b) Find the two regression coefficients.

c) Calculate the correlation coefficient.

[Hint: Let A=165 and B=165 be the assumed mean for the two series respectively]

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