



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.A. DEGREE EXAMINATION – ECONOMICS

FIRST SEMESTER – APRIL 2017

EC 1809 - MATHS & STATISTICS FOR ECONOMISTS

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

Dept. No.

Max. : 100 Marks

PART A

Answer any **FIVE** of the following;

(5x4=20marks)

1. Given $Y = C + I_0$, where $C = C_0 + bY$. Use matrix inversion to find the equilibrium level of Y and C .
2. Show that Cobb-Douglas production function $Q = AK^\alpha L^\beta$, satisfies Euler's theorem.
3. State the condition for an unconstrained optimization for the function $Z = f(x, y)$.
4. Given the short – run total cost function $C = 2Q^3 - 15Q^2 + 30Q + 16$,
 - a) Find out the level of output at which AVC is minimum (2 marks)
 - b) Show that $MC = AVC$ at that level of output. (2 marks)
5. a) Define the pdf of Poisson distribution and list down its properties. (2 marks)
b) Suppose a book of page 585 pages contains 43 typographical errors. If these errors are randomly distributed throughout the book, what is the probability that 10 pages, selected at random, will be free from errors?(Use $e^{-0.735} = 0.4795$). (2 marks)
6. Find the regression of X on Y for the following data:
 $\Sigma x = 24$ $\Sigma y = 44$ $\Sigma xy = 306$
 $\Sigma x^2 = 164$ $\Sigma y^2 = 574$ $N = 4$
7. For the following data, calculate the coefficient of rank Correlation:

X :	80	91	99	71	61	81	70	59
Y :	123	135	154	110	105	134	121	106

PART B

Answer any **FOUR** of the following;

(4x10=40marks)

8. Find the Eigen values to determine the sign definiteness for the following matrix

$$A = \begin{bmatrix} -5 & 1 & 2 \\ 0 & -2 & 0 \\ 4 & 2 & -3 \end{bmatrix}$$

9. A monopolist produces two products Q_1 and Q_2 jointly. His Total Cost function is given by: $TC = Q_1^2 + \frac{1}{2}Q_2^2 + Q_1Q_2 + 10$ and his AR function is given by
 $P_1 = 40 - 2Q_1$
 $P_2 = 34 - 3Q_2$
Find the profit maximizing output levels Q_1 and Q_2 and the maximum profit.

10. The Utility function of a consumer is given by $U = 5 \log X_1 + 2 \log X_2$. Find the combination of X_1 and X_2 which will maximize the utility function subject to the satisfaction of the budget constraint $4X_1 + 2X_2 = 28$.

11. Calculate Karl Pearson's correlation coefficient between the marks in economics and statistics obtained by 10 students:

Marks in Economics(X)	10	25	13	25	22	11	12	25	21	20
Marks in Statistics (Y)	12	22	16	15	18	18	17	23	24	17

(Assumed mean for the values of X and Y are 18 and 18 respectively)

12. Briefly explain the procedure for Testing of Hypothesis.

13. (a) State the Pdf of Normal Distribution. (2 marks)

(b) List down the various properties of Normal Distribution. (8 marks)

14. 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)

PART C

Answer any **TWO** of the following;

(2x20=40marks)

15. A producer has the possibility of discriminating between the domestic and foreign markets for a product where the demands, are:

$Q_1=21-0.1P_1$ and $Q_2=50-0.4P_2$ and the Total costs= $2000+10Q$, respectively, where $Q=Q_1+Q_2$. What price will the producer charge in order to maximize profits;

b) With discrimination between markets,

c) Without discrimination,

d) Compare the profit differential between discrimination and nondiscrimination.

16. An economy consists of three broad sectors A, B and C having the following Input-Output table.

Find out the Leontief inverse and hence find the changes in intermediary demand and the final output, if the final demand vector changes to 48, 72 and 24 for A, B and C respectively.

Buyers	Sellers				
	A	B	C	F	Total
A	80	100	100	40	320
B	80	200	60	60	400
C	100	80	100	20	300

Construct the new Input-Output table.

17. Fit a straight line trend using the method of Least squares to the following data taking 1996 as the origin.
- Assuming that the same rate of change continues, what would be the earnings for 2002?
 - Plot the original data as well as the trend line on a graph. Read from the graph the projected value for 2002.

Year:	1993	1994	1995	1996	1997	1998	1999	2000
Earnings (Rs. Lakhs):	38	40	65	72	69	60	87	95

18. a) Explain the procedure of ANOVA one-way classification. (10marks)
- b) The following table gives the Yield on 15 sample fields under three varieties of seeds (viz: A, B, C):

A	B	C
20	18	25
21	20	28
23	17	22
16	25	28
20	15	32

Test at 5% level of significance whether the average yields of land under different varieties of seeds show significant differences. (Table value of F at 5% level of $V_1=2$ and $V_2=12$ is 3.88)

[10marks]

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