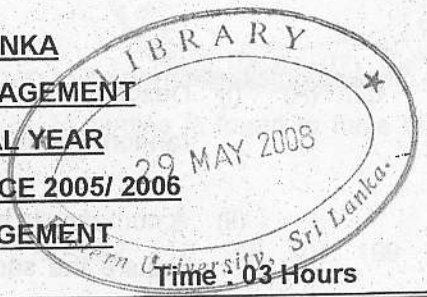


EASTERN UNIVERSITY, SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT
SPECIAL EXAMINATION FOR FINAL YEAR
BUSINESS ADMINISTRATION/ COMMERCE 2005/ 2006
COM 2023 STATISTICS FOR MANAGEMENT



Answer All Questions

01. (A) (i) Define the following terms.
- (a) Random variable (b) Probability distribution
- (ii) What are the conditions that must be satisfied by the probabilities in a discrete probability distribution?
- (iii) The numbers of defective parts produced per day by an automated machine follows a poisson probability distribution with a mean of 4.
- (a) What is the probability that on a given day at least 3 defective parts are produced?
- (b) What is the probability that on 2 consecutive days at most 4 defective parts are produced?
- (c) What is the expected number of defective parts produced by the machine on a half - day?
- (d) What is the standard deviation of the number of defective parts produced by the machine per day?
- (B) (i) What are the uses of a normal distribution?
- (ii) What are the parameters of a normal distribution?
- (iii) A company which produces electric items finds that the life time of the items obeys the Normal distribution. A random sample of the items has mean life time 2000 hours and standard deviation 100 hours. If an item is selected at random, find the probability that the item has a lifetime :
- (a) between 2000 and 2085 hours
- (b) over 2180 hours

(20 marks)

02. (A) (i) Describe how to compute the mean and the standard deviation of a discrete random variable.
- (ii) A company is trying to decide which of two product lines to select, both of which require the same rupees investment. The probabilities of market acceptance and the corresponding profits are shown in the following table.

Market Acceptance	Probability	Line 1 (Rs)	Line 2 (Rs)
Poor	0.05	3000	2250
Below Average	0.15	7500	3700
Average	0.60	24000	25500
Above average	0.15	40500	44250
Excellent	0.05	45000	48750

- (a) Compute the expected value and the variance of the profits for each line.
- (b) Which line has higher expected profit?
- (c) Which line has higher risk?
- (d) Which line would you select? Explain why?
- (B) (i) State the Central Limit theorem.
- (ii) The population distribution of gripping strengths of industrial works is known to have a mean of 110 and standard deviation of 10. A sample of 75 workers is selected randomly.
- (a) What is the distribution of the sample mean of gripping strength?
- (b) Compute the probability that the sample mean gripping strength will be between 109 and 112.

(20 marks)

03. (A) (i) How does an estimate differ from an estimator?
- (ii) Discuss the important properties of a good statistical estimator.
- (iii) Explain the difference between a point estimate and an interval estimate of a population parameter.
- (iv) Explain why it is important to calculate a confidence interval in addition to calculating a point estimate of a population parameter.

(B) The contents (in ml) of bottles of shampoo are known to be normally distributed with a standard deviation of 30 ml. A random sample of 15 bottles is found to have the following contents :

189, 204, 205, 234, 200, 198, 215, 178, 210, 212, 232, 210, 188, 201, 199

- (i) Compute the point estimate of the mean content of the bottles.
- (ii) Compute the 95% confidence interval for the mean content of the bottles.
- (iii) Interpret what the interval estimated computed in part (ii) tells you.

(20 marks)

04. (A) Define the following terms in the context of correlation and regression.

- (i) Independent variable
- (ii) Dependent variable
- (iii) Product moment correlation coefficient
- (iv) Coefficient of determination

(B) The following data represent yearly sales volume (Y) and the advertising expenditures (X) of a carpet manufacturing firm.

Year	Advertising Expenditures (Rs. Million)	Sales Volume (Rs. Million)
1981	1.8	26
1982	2.3	31
1983	2.6	28
1984	2.4	30
1985	2.8	34
1986	3.0	38
1987	3.4	41
1988	3.2	44
1989	3.6	40
1990	3.8	43

- (i) Draw a scatter diagram of Y against X.
- (ii) Examine the Scatter plot and decide whether a straight line is a reasonable model.

- (iii) Calculate the correlation coefficient and comment on it.
- (iv) Obtain the linear least squares regression line of Y on X for the data.
- (v) Estimate the sales volume for advertising expenditure 2.5 million.

(20 marks)

05. (i) Define the term 'time series'.
- (ii) Explain the components of a time series briefly.
- (iii) The quarterly production of pine lumber in millions of board feet from 2003 is given below.

Year	Winter	Spring	Summer	Fall
2003	7.8	10.2	14.7	6.3
2004	6.9	11.6	17.5	9.3
2005	8.9	9.7	15.3	10.1
2006	10.7	12.4	16.8	10.7
2007	9.2	12.6	17.1	10.3

- (a) Determine a typical seasonal pattern for the production data using the ratio moving average method.
- (b) Interpret the pattern.
- (c) Deseasonalize the data.
- (d) Determine the linear trend equation using the least squares method.
- (e) Determine the seasonally adjusted production for the four quarters of 2008.

(20 marks)