

THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF SOFTWARE ENGINEERING
TTZ4161 – PROBABILITY AND STATISTICS
FINAL EXAMINATION – 2009/2010



DURATION – THREE HOURS

DATE: 16th May 2010

TIME: 0930- 1230 HOURS

Answer Question 01, which is compulsory and additional five (05) questions. Question 1 carries twenty-five marks and Questions 2 to 8 carry fifteen (15) marks each.

You should clearly show the steps involved in solving problems.
No marks are awarded for the mere answers without writing the necessary steps

01. Compulsory Question

- (A) Briefly describe the following terms used in statistics.
- (i) Random variable
 - (ii) Population
 - (iii) Weighted Sample Mean
 - (iv) Probability Distribution.

(08 Marks)

- (B) Following are the runs scored by a batsman in 10 innings
28, 32, 24, 46, 44, 40, 54, 38, 32, and 42

- (i) Calculate the mean and the median of the runs scored by the batsman.
- (ii) Calculate the standard deviation of the above runs.

(04 Marks)

- (C) A recent survey on how University students come to University reveals following data.

	Type of Students		Total
	Urban	Rural	
Own transport	50	20	70
Public transport	400	200	600
			670

If a student is selected at random, what is the probability that the student,

- (i) Is a rural student?
- (ii) Uses public transport?
- (iii) Is a rural student or uses public transport.
- (iv) Uses public transportation, given that he or she is an urban student.

(08 Marks)

- (D) Determine the area under the Standard Normal curve for following situations.

- Area to the left of $Z=1.32$
- Area to the right of $Z= 1.45$
- Area between $Z= - 1.23$ and 1.54

(02 Marks)

- (E) Briefly explain what you understand by "null hypothesis" and "alternate hypothesis".

(03 Marks)

Answer any Five questions from the below Seven questions

(02) (a) Describe the importance of the measures of dispersion (03 Marks)

(b) Following are the marks obtained by students for an assignment test. (Marks are given out of 50).

08	12	32	18	19	08
36	42	18	08	17	17
26	28	25	37	35	24
15	18	10	19	17	35
26	24	31	27	14	12

(i) Arrange them in a frequency table. (04 Marks)

(ii) Calculate mean, and median of the data. (04 Marks)

(iii) Calculate the variance, standard deviation and coefficient of variation (04 Marks)

(03) (a) Write the general rule of multiplication and general rule of addition in probability. (03 Marks)

(b) A bag contains 32 marbles. 04 of them are red, 09 are black, 12 are blue, 06 are yellow and 01 is purple.

Marbles are drawn one at a time from the bag **with replacements**.

What is the probability that,

(i) the second marble is yellow, given that first is a yellow one.

(ii) the second marble is blue, given that the first is a black.

(iii) the third marble is purple, given that both the first and second are blue

(iv) If the marbles are drawn one at a time **without replacements**, calculate the probabilities of (i), (ii) and (iii) above.

(12 Marks)

- (04) (a) Write the mathematical formula of the "Binomial probability distribution". (03 Marks)
- (b) In ABC company, absent percentage of the work force is 08%. Twenty employees are to be selected at random for a study.
- (i) What is the random variable in this problem?
 - (ii) Is the random variable discrete or continuous?
 - (iii) What is the probability of selecting twenty employees at random and finding that none of them is absent?
 - (iv) Develop binomial probability distribution for this experiment. (12 Marks)
- (05) (a) Write the mathematical formula of the 'Poisson probability distribution'. (03 Marks)
- (b) A study of the lines at the cash counters of the ABC Bank reveals that during rush hours, the numbers of customers waiting is averaged four. What is the probability that during the rush hours,
- (i) No customers are waiting .
 - (ii) Four customers are waiting.
 - (iii) Four or fewer are waiting.
 - (iv) Four or more are waiting. (12 Marks)
- (06) (a) State the "Central Limit Theorem" and describe its importance in statistics. (03 Marks)
- (b) What do you understand by the terms 'point estimation' and 'interval estimation'? (03 Marks)
- (c) With a view to estimate the mean daily output, the manager has taken a sample of 100 operators and observes that mean output of the sample is 450 units with a standard deviation of 50 units.
- Develop
- (i) 99%, confidence interval
 - (ii) 95%, confidence interval and
 - (iii) 92% confidence limits for mean daily output.
- (You should describe how would you obtained the answer) (09 Marks)

(07) (a) Describe what you understand by "Hypothesis Testing"? (03 Marks)

(b) The efficiency rating marks of ABC Apparel Company have been normally distributed over a period of time. The mean of the distribution is 90. The company has introduced modern production techniques and training programs for their employees in order to improve their efficiency rating.

After introducing the new changes, company want to know whether the ratings of the employees have been increased or not. The efficiency ratings of the 40 employees were analyzed and the mean of the sample was found to be 92 with a standard deviation of 5. Using the 0.01 level of significance, check whether the efficiency rating of the employees has been increased or not.

(i) State the "Null Hypothesis" and "Alternate Hypothesis" (02 Marks)

(ii) What is the decision rule? (03 Marks)

(iii) Compute the test statistics. (03 Marks)

(iv) Can the company conclude that the efficiency rating of the employees has increased? (04 Marks)