

**Uva Wellassa University of Sri Lanka**  
**Faculty of Science and Technology**  
**Department of Computer Science and Technology**  
**200 level 1<sup>st</sup> Semester Examination – June / July 2017**  
**CST 212-3 Quantitative Techniques**



**Instructions to candidates:**

No. of pages : Two (02)

No. of questions : Five (05) Essay questions

Time allocation : Two (02) hours and fifteen (15) minutes

Marks allocation : 70 mark

**Answer All Questions**

1. A dryer manufacturer purchases heating elements from three different suppliers: Argostat, Bermrock and Thermttek. 30% of the heating elements are supplied by Argostat, 50% by Bermrock and 20% by Thermttek. The elements are mixed in a supply bin prior to inspection and installation. Based on past experience, 10% of the Argostat elements are defective, compared to only 5% of those supplied by Bermrock and just 4% of those from Thermttek. An assembly worker selected a non-defective element. What is the probability that the element was supplied by Argostat?

(10 mark)
  
2. The credit manager of a large department store claims that the mean balance for the store's charge account customer is Rs. 410.00. An independent auditor selects a random sample of 18 accounts and finds a mean balance of  $\bar{X} = \text{Rs. } 511.33$  and a standard deviation of  $s = \text{Rs. } 183.75$ . If the manager's claim is not supported by these data, the auditor intends to examine all charge account balance. Assume the population of account balance is approximately normally distributed.
  - a) Find the 95% confidence interval for mean balance. (07 mark)
  - b) What action should the auditor take? (Use a suitable hypothesis test to get the decision) (08 mark)
  
3. The finish time of computer process is normally distributed with a mean of 255 minutes and a standard deviation of 36 minutes.
  - a) What is the probability that a processing time will less than 4 hours? (3 mark)
  - b) What proportion of the processing time will complete between 4 hours and 5 hours? (3 mark)
  - c) Calculate to the nearest minute, the time by which the first 8% have completed the computer process? (4 mark)



4. A production manager has collected the scores of a test to check the fastness of employees in an assembly-line with their productivity. He wishes to perform the relationship between "score on test" and "units produced in one hour". Data has been collected from 5 employees as shown in below table (Table 01).

Table 01: Employees records

Employee	A	B	C	D	E
x = Score on test	12	14	17	16	11
y = Units produced in one hour	55	63	67	70	51

- What is the suitable statistical method to analysis above data? (2 mark)
  - Write down hypothesis for the particular analysis. (3 mark)
  - Construct the complete ANOVA table for the test. (Suppose that in usual notation,  $SSE = 22.8$  and  $SSTol = 256.8$ ) (5 mark)
  - Check the model adequacy at 5% significance level (using F ratio) (4 mark)
  - Find the coefficient of determination ( $R^2$ ) and interpret it. (3 mark)
  - What are the model assumption under ANOVA? (4 mark)
5. A farmer would like to compare three fertilizers for his beans field. He selects plot of same size, having similar soil, exposure to the sun. He tries fertilizers A, B and C respectively on 6,8 and 9 test plots with the following yields.

Fertilizer	Yields								
A	47	42	43	46	44	42			
B	51	58	62	49	53	51	50	59	
C	37	39	41	38	39	37	42	36	40

- Suggest the suitable model to analyze this data. (2 mark)
- Write down the appropriate hypothesis to test the significance difference in the average bean yield for the four types of fertilizer. (4 mark)
- Obtain the degree of freedom for the Fertilizer, Error and Total and calculate the F-ratio value (4 mark)
- Compare the calculated F-ratio value with F table value at 95% significance level and State whether the each fertilizer varieties are equally effect or not. ( $F_{3,26}(0.05) = 2.98$ ). (4 mark)

Source	Degree of freedom	Sum of squared values	Mean sum of squared	F-Ratio
Fertilizer	.....	1015.5	338.5	.....
Error	.....	277.9	10.7	
Total	.....	1293.4		