Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
200 level 1st Semester Examination – July /August 2016
SCT 202-2/SCT 211-2 Statistical Methods

Uva Wellassa University

Part C

Instructions to candidates
Duration: 45 minutes
Number of questions: Three (03) essay questions
Mark allocation: 40
Answer All Questions.
Scientific Calculators are allowed.

1. A factory production line is manufacturing bolts using three machiens, A, B and C. Of the total output, machine A is responsible for 25%, machine B for 35% and machine C for the rest. It is known from previous experience with the machines that 5% of the output from machine A is defective, 4% from machine B and 2% from machine C. A bolt is chosen at random from the production line and found to be defective. What is the probability that it came from machine A?

(10 mark)

2. In a set of the effectiveness of a new battery design, 16 battery powdered music boxes are randomly provided with either the old design or the new version. Hours of playing time before battery failure were as follows (Table 01):

Table 01: Playing time before battery failure

New battery type (hrs)	Old battery type(hrs)
3.3	4.2
6.4	2.9
3.9	4.5
5.4	4.9
5.1	5
4.6	5.1
4.9	3.2
7.2	4

Table 02: Summary Statistics

	New battery type (hrs)	Old battery type(hrs)
Mean	5.10	4.23
Standard deviation	1.26	0.82

39

Assuming normal populations with equal standard deviations, use the 0.05 level to determine whether the new battery could be better than old design (use summary statistics in Table 02). (10 mark)

3. Each of fifteen 60-watt lightbulbs has been randomly placed into an outlut for which the voltage is 3 volts below the line voltage, 2 volts below the line voltage, or equal to the line voltage. The following data are the lifetimes of the bulbs, expressed in days of continous use.

Three Volts Below Line	58	63	46	57	51
Two Volts Blow Line	46	59	51	46	42
Equal to Line Voltage	52	48	38	48	42

a. Identify the most suitable experimental design for this experiment giving justifications. (3 mark)
b. What is the model that you will use? (3 mark)
c. What is (are) the main assumption(s) under the ANOVA (4 mark)
d. Construct the complete ANOVA table and interpret the results in ANOVA table with suitable hypothesis. (Suppose that in usual notation, SSE = 468 , and SSTol = 696.4 (6 mark)
e. What are the advantages and disadvantages of the experimental design you proposed? (4 mark)