

Uva Wellassa University of Sri Lanka  
 Faculty of Science and Technology  
 Science and Technology Degree Programme  
 2nd Year 2nd Semester Examination – August/September 2014



*SCT 202-2 Statistical Methods*

**Part C: Essay Questions**

Marks allocation : 30 marks

1. An experiment was carried out on random samples of steel to assess whether increasing the tempering temperature from 200°C to 250°C increases the failure stress. The samples were treated and tested and gave the following failure stresses (measured in units of 10 Mega Pascals).

									Mean	St.Dev
Tempering at 200°C	66	49	58	77	39	51	46	91	59.6	17.4
Tempering at 250°C	54	63	43	56	47	97	85		63.6	20.1

- a) Carry out a t-test, stating carefully your null and alternative hypotheses. (07 marks)
- b) State the assumptions you have made in carrying out the t-test and provide any suitable graphical evidence relevant to these assumptions. (04 marks)
- c) Summarize your conclusions and comment on the method used in your analysis. (04 marks)
2. A pharmaceutical company has developed a new headache treatment which is being field tested on 1000 volunteers. In a test some volunteers have received the treatment and some a placebo (a harmless neutral substance). The results of the test are as follows:

	Treatment received	Placebo received
Some improvement	600	125
No improvement	150	125

Calculate:

- a) the probability that a volunteer has shown some improvement. (03 marks)
- b) the conditional probability that the volunteer has shown some improvement given that he or she has received the treatment. (03 marks)
- c) the conditional probability that the volunteer has received the treatment given that no improvement has been observed. (03 marks)
- d) the conditional probability that the volunteer has received the placebo given that some improvement has been observed. (03 marks)
- e) Explain briefly what the evidence in the table suggests to you about the effectiveness of the treatment. (03 marks)