



**GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY**  
Faculty of Engineering  
Department of Mathematics

BSc Engineering Degree  
Semester 4 Examination – November 2017  
(Intake 33 – ACM/AE/BM/CE/EE/ET/ME/MR/MT)

**MA 4051 – APPLIED STATISTICS**

Time allowed: 1 hour

16<sup>th</sup> November, 2017

**ADDITIONAL MATERIAL PROVIDED**

Statistical tables are provided

**INSTRUCTIONS TO CANDIDATES**

This paper contains 3 questions on 4 pages

Answer all questions

This is a closed book examination

This examination accounts for 70% of the module assessment. A total maximum mark obtainable is 100. The marks assigned for each question and parts thereof are indicated in square brackets

If you have any doubt as to the interpretation of the wordings of a question, make your own decision, but clearly state it on the script

Assume reasonable values for any data not given in or provided with the question paper, clearly make such assumptions made in the script

All examinations are conducted under the rules and regulations of the KDU

$$r = \frac{n \sum (xy) - (\sum x)(\sum y)}{\sqrt{[n \sum (x^2) - (\sum x)^2][n \sum (y^2) - (\sum y)^2]}}$$

$$\hat{y} = bx + a ; \quad b = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}, \quad a = \frac{\sum y}{n} - b \frac{\sum x}{n}$$

### Question 1

- (a) Suppose that  $X$  is a normally distributed random variable with a mean equals to 500 and a variance equals to 20. Find  $P(490 \leq x \leq 490)$ .

[5 marks]

- (b) The weight of a sophisticated running shoe is normally distributed with a mean of 12 ounces and a standard deviation of 0.5 ounce.

- (i) What is the probability that a shoe weight is more than 13 ounces?

- (ii) If 120 running shoes are randomly selected, approximately how many shoes will be where the wight is less than 13 ounces?

- (iii) What must the standard deviation of weight be, in order for the company to state that 99.9% of its shoes are less than 13 ounces?

[3×10=30 marks]

### Question 2

- (a) Measured lengths of a spring under various loads are as follows.

Weight (kg)	0.0	0.2	0.4	0.6	0.8	1.0
Length (cm)	5.01	5.06	5.12	5.13	5.14	5.16

- (i) Compute and interpret the linear correlation coefficient of weight and length of the spring. [10 marks]

- (ii) Find an equation of the linear regression line. [10 marks]

- (iii) Estimate the length of the spring under a load of 0.7 kg. [5 marks]

**Question 3**

- (a) A professor has been teaching mathematics for many years. His records show that the overall mean for final exam scores is 82, with a standard deviation of 10. The professor believes that this year's class is superior to his previous ones. The mean for final exam scores for this year's class of 65 students is 87. Test the claim of the professor under 0.05 significance level.

[20 marks]

- (b) The mean mass of 50 male students who showed above the average participation in college athletics was 68.2 kg with a standard deviation of 2.5 kg, while 50 male students who showed no interest in such participation had a mean mass of 67.5 kg with a standard deviation of 2.8 kg. Test the hypothesis that male students who participate in college athletics are more massive than the other male students. Use 0.05 level of significance.

[20 marks]

-----End of the question paper-----