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

BSc Engineering Degree
Semester 4 Examination – November 2016
(Intake 32 – ACM/AE/BM/CE/EE/ET/ME/MR/MT)

MA 4051 – APPLIED STATISTICS

Time allowed: 1 hour

24 November, 2016

ADDITIONAL MATERIAL PROVIDED

Standard normal table
Student 't' table

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

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

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

Question 1

(a)   Assume that the current measurements in a strip of wire follow a normal distribution with a mean of 10mA (milliamperes) and a variance of 4 $(mA)^2$.

    (i)   What is the probability that a measurement exceeds 13 milliamperes?

    (ii) Determine the value for which the probability that a current measurement is below this value is 0.98.

[2×5=10 marks]

(b)   The Automobile Association reports that the average time it takes to respond to an emergency call is 25 minutes. Assume that the variable is normally distributed and that standard deviation is 4.5 minutes. If 80 calls are randomly selected, approximately how many will be responded to in less than 15 minutes?

[15 marks]

Question 2

(a)   Compute and interpret the linear correlation coefficient for the following marks of 6 students selected at random.

Mathematics mark	70	92	80	74	65	83
English mark	74	84	63	87	78	90

[15 marks]

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(b)   The following data show the unit cost of producing certain electronic components and the number of units produced:

Lot size, x	50	100	250	500	1000
Unit cost($), y	108	53	24	9	5

It is believed that the regression equation is of the form $y = ax^b$. By simple linear regression technique, or otherwise, estimate the unit cost for a lot of 400 components.

[20 marks]

Question 3

(a)   The specifications for a certain kind of ribbon call for a mean breaking strength of 185 pounds. If five pieces randomly selected from different rolls have breaking strengths of 171.6, 191.8, 178.3, 184.9, and 189.1 pounds, test the null hypothesis $\mu = 185$ pounds against the alternative hypothesis $\mu < 185$ pounds at the 0.05 level of significance. [Note: Here the sample mean is 183.1 pounds and the sample standard deviation is 8.2 pounds]

[20 marks]

(b)   Mr. Sunil, product manager for a line of apparel, to introduce the product line into a new market area. Survey of a random sample of 400 households in that market showed a mean income per household of Rs. 30,000. Sunil strongly believes that the product line will be adequately profitable only in markets where the mean household income is greater than Rs. 29,000. Should Sunil introduce the product line into the new market?

[20 marks]

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

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