



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR THE BACHELOR OF SCIENCE IN
MECHANICAL ENGINEERING

SMA 2103: PROBABILITY & STATISTICS

END OF SEMESTER EXAMINATION

SERIES: APRIL 2013

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A & B**

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

Question One

- a) Define the following terms:
- (i) Sample space (1 mark)
 - (ii) Mutually exclusive events (1 mark)
 - (iii) An event (1 mark)
- b) A bag contains four red balls, five white and six black balls. If three balls are drawn at random, what is the probability that they are the same colour. (4 marks)
- c) Using the data below, draw a frequency polygon curve. (4 marks)

Viewing Time	Number of Students
300 - 399	14
400 - 499	46
500 - 599	58
600 - 699	76
700 - 799	68
800 - 899	62
900 - 99	18
1000 - 1099	22
1100 - 1199	6

- d) Suppose there is a school with 60% boys and 40% girls as its students. The female students wear trousers or skirts in equal numbers, the boys all wear trousers. An observer sees a student from a distance and sees that this student is wearing trouser. What is the probability this student is a girl? **(5 marks)**
- e) Suppose were group of 3 students whom 15 are blue eyed, 5 left handed and 2 both blue eyed and left handed. Find the probability of left handed given that they are blue eyed. **(4 marks)**
- f) A student final grades in Mathematics, Physics, English and Geography are 82, 86, 90 and 70 respectively. If the respective credits received for these courses are 3, 5, 3 and 1, determine an appropriate average grade. **(3 marks)**
- g) A manufacturer of television tube has two types of tubes, A and B respectively. The tubes have mean lifetimes of $\bar{X}_A = 1495$ hours and $\bar{X}_B = 1875$ hours and standard deviations of $S_A = 280$ hours and $S_B = 310$ hours which tube has a greater relative dispersion? **(4 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

- a) A man has been keeping a record of all expenses incurred in running his car for the last ten years as shown below:

Age of car years	1	2	3	4	5	6	7	8	9	10
Expenses Ksh	2000	3000	5000	8000	6000	9000	10000	13000	12000	13000

- (i) Calculate the product moment coefficient of correlation and interpret the results. **(7 marks)**
- (ii) Calculate the coefficient of determination and interpret the results. **(3 marks)**

- b) Two teams A and B play a football match against each other. The probability of each team scoring 0, 1, 2, 3 goals are shown below.

No of goals	Probabilities of Scoring	
	A	B
0	0.3	0.2

1	0.3	0.4
2	0.1	0.3
3	0.1	0.1

Find the probability of:

- (i) A winning
- (ii) B winning

(10 marks)

Question Three

a) The following are scores of students in a Statistics class in midterm and final exams.

	9	6	10	9	8	4	7			
Midterm	8	6	0	6	8	5	6	60	74	82
	9	7		8	8	6	7			
Final	0	4	98	8	0	2	8	74	86	84

- (i) Draw a scatter plot of the above data using midterm as the independent variable and final exam as the dependent variable. **(4 marks)**
- (ii) Comment on the scatter diagram above **(2 marks)**
- (iii) Construct a regression model between the midterm and the final exams. **(9 marks)**
- (iv) Predict the final score for a midterm score of 70 **(2 marks)**
- (v) What would be the residue for a midterm score of 60? **(3 marks)**

Question Four

The following data shows the number of vehicles produced per year by certain Japanese company.

553	526	521	528	538
523	538	546	524	544
532	554	417	549	512
528	523	510	555	545
524	519	525	543	532
533	512	521	536	534
541	535	531	551	535
519	530	549	518	531

- a) Construct a frequency distribution for the data with classes of equal width. **(5 marks)**
- b) Starting with a class of 510-520, calculate:
 - (i) Mean of the data **(5 marks)**
 - (ii) Standard deviation of the data **(5 marks)**
 - (iii) The quartile deviation of the data **(5 marks)**

Question Five

a) Define the following terms:

- (i) Discrete random variable (2 marks)
- (ii) Continuous random variable (2 marks)
- (iii) Probability distribution (2 marks)

b) The number of persons X , in a Ugandan family chosen at random has the following probability distribution.

X	1	2	3	4	5	6	7	8
						0.0	0.0	0.0
$D(X)$	0.34	0.44	0.11	0.06	0.02	1	1	1

- (i) Find the average family size (4 marks)
 - (ii) The variance of the distribution (4 marks)
 - (iii) The coefficient of variation of X (3 marks)
- c) State any **THREE** uses of graphs in statistics (3 marks)