



MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS STATISTICS AND ACTUARIAL SCIENCE

SECOND YEAR SECOND SEMESTER EXAMINATION FOR
DIPLOMA IN EDUCATION

SMA 0102: INTRODUCTION TO PROBABILITY AND STATISTICS

DATE: 8/5/2019

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

Answer Question ONE and any other TWO questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) The life time in hours of a sample of fuses from a factory were recorded as in the table given:

Life time	frequency
800-849	10
850-899	23
900-949	30
950-999	36
1000-1049	77
1050-1099	24
1100-1149	15
1150-1199	11

Calculate the

- i) Median (3 marks)
- ii) Mode (3 marks)
- iii) quartile deviation (3 marks)
- iv) 8th decile (3 marks)
- v) 69th percentile (3 marks)

b) Define the following terms as used in probability

i) sample (1 mark)

ii) population (1 mark)

iii) mutually exclusive events (2 marks)

iv) experiment (1 mark)

c) A box contains 6 resistors 4 capacitors and 5 inductors. Another box contains 4 resistors 10 capacitors and 6 inductors. A box is selected at random and a component selected. Find the probability of selecting an inductor (5 marks)

d) Find the median and mode of the following data

17,18,13,14,13,16,14,21,13,18 (2 marks)

e) Use the data below to obtain the quartile deviation

140 ,121 ,133 ,101 ,143 ,115 ,139 ,116 ,107 ,124 (3 marks)

QUESTION TWO (20 MARKS)

a) The following frequency distribution table represents marks of students in a certain class

Marks	Number of students
0-10	4
10-20	9
20-30	13
30-40	8
40-50	6

Determine the median and the mode of the data. (8 marks)

b) A box contains 12 blue and 18 red identical washers, A washer is drawn at random from the box without replacement. A second washer is then drawn Determine the probability that

i) the first is blue and the second is red

ii) both are blue

iii) Neither is blue (6 marks)

c) A coin has a probability of $\frac{3}{5}$ of a head appearing when tossed. The coin was tossed twice. Find the probability of getting at least one head (6 marks)

QUESTION THREE (20 MARKS)

- a) The table below shows the frequency distribution of speed of vehicles passing at a section of a highway

Speed(km/hr)	Number of vehicles
50-60	5
60-70	H
70-80	8
80-90	13
90-100	15
100-110	M
110-120	10

Given that the mean speed is 89km/hr determine

- i) value of m and n (5 marks)
 - ii) standard deviation of the distribution (6 marks)
 - iii) co efficient of variation (4 marks)
- b) A box contains 80balls of which 16 balls are black. If 6 balls are chosen in turn without replacement, calculate the probability of picking
- i) one black ball
 - ii) more than 4 black balls (5 marks)

QUESTION FOUR (20 MARKS)

- a) The diameter of bolts produced by a certain machine have a probability density function given by;

$$f(x) = \begin{cases} kx(4-x) & 1 \leq x \leq 4 \\ 0 & elsewhere \end{cases}$$

Find the

- i) Constant k
 - ii) $p(1 \leq x \leq 3)$
 - iii) Mean and variance of the distribution (14 marks)
- b) Anne, John and Ali play a game of darts. The chance of either hitting the target is $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{3}$ respectively. the probability
- i) Ali only hits the target
 - ii) Two of them hitting the target (6 marks)

QUESTION FIVE (20 MARKS)

- a) 200 technicians sat for a test and the following results recorded

Marks out of 50	Number of technicians
10-14	10
15-19	22
20-24	40
25-29	56
30-34	44
35-39	18
40-44	10

Determine the mean score and the standard deviation (10 marks)

- b) It has been determined that out of 2000 patients 0.1% suffer from side effects of drugs administered. Use poisson distribution to determine the probability that:
- i) 4 patients suffer from the side effects
 - ii) less than 2 encounter the effects of the drug
 - iii) between 5 and 7 suffer from the effects of the drugs (10 marks)