



# MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECOND YEAR, FIRST SEMESTER EXAMINATIONS FOR

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

DIPLOMA IN BUILDING AND CIVIL ENGINEERING

DIPLOMA IN MECHANICAL ENGINEERING

SPECIAL EXAMINATION

MATHEMATICS V

DATE: 19/12/2017

TIME: 2.00-4.00P.M

## INSTRUCTIONS

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Answer Question One and Any Other Two Questions

### QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Define the following terms
- i) sample (2 marks)
  - ii) probability (2 marks)
  - iii) Mutually exclusive event (2 marks)

- b) Given the data

0 – 10	10 – 20	20 – 30	30 - 40	40 – 50	50 - 60	60 – 70	70 - 80
12	8	20	15	35	20	6	4

Calculate

- i) Median
- ii) Mode
- iii) Mean

- iv) Standard deviation (10 marks)
- j) Cards are selected from a deck of cards with replacement what is the probability that
- a) The first selected will be a king or Jack (2 marks)
- b) The 1<sup>st</sup> selected will be an ace of hearts and the second will be a two of diamonds (2 marks)
- k) A variable  $x$  is distributed under a binomial form

X	0	1	2	3	4	5	6
f	10	4	6	20	14	2	4

Find

- I.  $E[X]$  (4 marks)
- II.  $E[X^2]$  (4 marks)
- III.  $E[X - \mu]^2$  (4 marks)

### QUESTION TWO (20 MARKS)

- a) Find the mean and the standard deviation for the data below (10 marks)

Height	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44
Frequency	10	22	40	56	44	18	10

- b) A group of people consists of 20 single and 40 married men with 30 single and 10 married women. Find the probability of selecting a person at random who
- I. Is a single man
- II. Is a single woman
- III. Is a single person (5 marks)
- c) The probability of outcomes A, B and C are 0.3, 0.2 and 0.5 and of outcomes X and Y are 0.6 and 0.4 respectively. Represent the information in a tree diagram given that event A, B, C and events X, Y are dependent events. Hence find
- I.  $P(A \text{ and } X)$
- II.  $P(B \text{ and } Y)$
- III.  $P(C \text{ and } X)$  (5 marks)

### QUESTION THREE (20 MARKS)

The data below was collected from a sample of a certain population and tabulated as follows

Group	20 – 29	30 – 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 – 99
Frequency	1	3	5	15	19	20	8	2

- I. Draw a histogram and find the modal value
- II. Draw a cumulative frequency curve and estimate the median
- III. Use 64.5 as an assumed mean and find the mean standard deviation

#### QUESTION FOUR (20 MARKS)

A P.d.f  $f(x)$  is given by

$$f(x) = \begin{cases} kx^2 & 0 \leq x \leq 1 \\ 0, & \text{elsewhere} \end{cases}$$

Find

- i) The value of k
- ii)  $p(x \geq \frac{1}{2})$  (5 marks)
- iii)  $P(\frac{1}{4} \leq x \leq \frac{1}{2})$  (5 marks)
- iv)  $E(X)$  (5 marks)
- v)  $VAR(X)$  (5 marks)