MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2018/2019 ACADEMIC YEAR

SECOND SEMESTER EXAMINATION FOR, B/Ed Science, B/Ed Arts, BSc. M&Cs, BSc. M&E, BSc.Act.Sc., BIT, BSc.S.E and BSc. CS

AMS 101 – PROBABILITY AND STATISTICS 1

DURATION: 2 HOURS

DATE: 26/4/2019

TIME: 2.00pm-4.00pm

Instructions to candidates:

1. Answer question One and Any Other Two questions
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Differentiate between the following terms:

i) Population and sample 2marks

ii) A statistic and a parameter 2marks

iii) Independent events and mutually exclusive events 2marks

b) Differentiate between primary sources and secondary sources of data giving an example each case. 4marks

c) The time taken by 50 students to finish a race was recorded to the nearest seconds as shown below:

681	690	536	740	406	734	417	701	418	454
640	604	520	604	570	547	551	581	657	680
540	529	600	424	527	731	555	684	654	427
650	440	458	650	518	597	614	553	529	554
552	710	538	580	595	538	494	530	651	597

i) Construct grouped frequency distribution table for this data using class intervals of 400-449, 450-499,------- 2marks

ii) Using the frequency distribution obtained in (i), plot a histogram and a frequency polygon for the data on the same chart. 4marks

d) The data below shows the amount of wages paid to the workers in a certain factory per day.

Wages per day (US Dollars)	3-7	8-12	13-17	18-22	23-27	28-32	33-37
No. of workers	4	10	20	36	16	12	2

Calculate :

i) Median 3marks
ii) Mean 2marks
iii) Variance 3marks

e) In a factory machine A produces 30% of the output, machine B 25% of the output and C the remaining 45%. 1% of the output of machine A is defective, 1.2% of B's and 2% of C's. In a day's run the three machines produce 10,000 items. An item drawn at random from a day's output is defective. What is the probability that it was produced by:

(i) machine A 2marks

(ii) machine B 2marks

(iii) machine C 2marks

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a) The hardness of synthetic viper (Y) produced is thought to be linearly related to the amount (X) of a certain chemical supplement added to the raw materials while manufacturing it. The raw materials were added various quantities of chemical supplement and the hardness of the synthetic viper produced were measured for some time.
The results were as shown below.

X	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Y	29	40	46	42	52	44	69

i) Obtain a simple regression line of Y on X 10marks

ii) Using the results in (i), predict the amount of chemical supplement added to the raw materials given the hardness of synthetic viper was 27. 2marks

d) Evaluate Pearson's correlation coefficient for the following data and interpret the results.

8marks

X	1	3	4	6	8	9	11	14
Y	1	2	4	4	5	7	8	9

QUESTION THREE (20 MARKS)

a) The table below shows the distribution of height to the nearest cm of 40 students.

HEIGHT (cm)	145-149	150-154	155-159	160-164	165-169	170-174	175-179
frequency	2	5	16	9	5	2	1

Calculate:

i) Median Height 3marks

ii) Semi interquartile range 4marks

iii) 80^{th} percentile 3marks

iv) 7^{th} decile 3marks

b) The following table shows the number of casual workers, mean and standard deviations of daily wages in Kshs. paid to the casual workers by three road construction firms.

Name of firm	No. of employees	Mean	Standard deviation
Wang	100	850	15
Xui	180	600	25
Jong	120	900	27

Obtain the overall mean daily earnings and variance for all casual workers in the three companies 7marks

QUESTION FOUR (20 MARKS)

a) Define the term probability

b) A husband and a wife appeared for an interview for two vacancies in the same office. The probability of the husband being selected is 1/7 while that of the wife is 1/5.

a) What is the probability of both being taken 2marks

b) What is the probability that only one of them will be taken? 2marks

c) What is the probability that none of them will be selected? 2marks

d) Given that the lady has been selected, what is the probability of the man being selected?

2marks

e) The following data shows the score of students in a statistical test.

Score	90-94	95-99	100-104	105-109	110-114	115-119	120-124	125-129
f	8	10	13	7	4	3	3	2

Use an assumed mean of 107 to obtain

i) Mean score 4marks

ii) Mean deviation 3marks

iii) Standard deviation 3marks