MACHAKOS UNIVERSITY

University Examinations for 2017/2018 academic year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST YEAR EXAMINATION FOR DEGREE IN BACHELOR OF EDUCATION (ARTS), ECONOMICS AND STATISTICS.

SMA 160: INTRODUCTION TO PROBABILITY AND STATISTICS

INSTRUCTIONS

ATTEMPT QUESTION ONE AND ANY TWO QUESTIONS

Answer Question **ONE** and any Other **TWO** questions

Section A
Question One

a) Differentiate between the following terms the following (6mks)
   i. Qualitative data and Quantitative data
   ii. Union of a set and intersection of a set
   iii. Descriptive statistics and inferential statistics

b) State the 3 axioms of probability (3mks)

c) A sample taken at random yielded the following weights; 102, 101, 97 and 96. Obtain the best estimate of the population mean weight and the true variance of weights (4mks)

d) State and define two measures of central tendency (4mks)

e) The probability that a randomly selected college student is a senior is 0.01. The joint probability that the student is a computer science major and senior is 0.03. find the conditional probability that the student is a computer science major given that he/she is a senior (3mks)

f) The following table shows the summary statistics for the daily wages of two types of companies

Company	N	Daily wages	
		Mean	Standard deviation
I	60	100	20
II	90	150	24

Compute the combined average wage and standard deviation (5mks)

g) Write the probability distribution of X given

No. of cars	0	1	2	3	4
Frequency	30	470	850	490	160

(5mks)

h) Differentiate between discrete random variable and continuous random variable(4mks)

Section B
Question Two

a) Two Mathematics teachers were given papers from the same students to mark and award marks on the scale of 1 to 50 to assess their ability to adhere to the marking scheme. A random sample of 12 students was taken and the marks awarded were as shown in the table below;

Student	A	B	C	D	E	F	G	H	J	K	L	K
Teacher X	12	08	35	45	24	32	36	18	50	25	15	28
Teacher Y	24	12	31	40	18	29	25	23	42	30	11	22

(i) Compute the Spearman's rank coefficient of correlation between the marks awarded by the two teachers (12mks)

(ii) Assess the consistency in marking between the two teachers (2mks)

b) State and explain three advantages of sampling over census (6mks)

Question Three

a) The following data represent masses of fish caught by a fisherman in a day

Class	8-12	13-17	18-22	23-27	28-32	33-37
Freq.	3	10	12	9	5	1

i. Calculate the median and 85^{th} percentile (6mks)

b) Using an illustration in each case, State and explain three types of correlation as used in statistics (6mks)

c) Find the Pearson r correlation between the sales and expenses from the data given below:

Firm:	A	B	C	D	E	F	G	H	I	J
Sales(Ksh.1000)	50	50	55	60	65	65	65	60	60	50
Expenses (Ksh. 1000)	11	13	14	16	16	15	15	14	13	13

(8mks)

Question Four

a) A market survey conducted by Kenya Breweries Ltd in the municipality of Nairobi, about beer consumption by adult residents showed that 80% of the females drink. From records of the previous government population census, 40% of the adult residents are male.

(i) Present the information in a tree diagram (4mks)

(ii) An adult resident is selected at random from the municipality. Determine that he or she drinks (4mks)

(iii) An adult resident who does not drink is selected at random from the municipality. Determine the probability that he is a male (2mks)

b) State and define three methods of data collection. State their advantages and disadvantages (10mks)

Question Five

a) Define the following.

i. Skewness (2mks)

ii. Kurtosis (1mks)

iii. Standard deviation (2mks)

b) Given the following data

X	1	2	3	4	5	6	7	8	9	10
Y	1	4	8	14	14	17	20	22	26	30

(i) Fit a least square regression line of Y on X (6mks)

(ii) Find the value Y when X=3.5 (1mks)

c) Explain the four measurement of scales for statistical data as outlined by Stevens(1946) giving two examples in each case (8mks)