MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

DECEMBER SESSION EXAMINATION FOR

BACHELOR OF EDUCATION

SMA 160: INTRODUCTION TO PROBABILITY AND STATISTICS

DATE: SCHOOLBASED **TIME:**

INSTRUCTION: *Answer One and any other two Questions*

a) Distinguish the following terms as used in statistics

i) Sample and Population

ii) Descriptive statistics and inferential statistics

iii) Moments about the origin and moments about the mean

iv) Skewness and Kurtosis (8 marks)

b) The following information relates to Milani supermarket monthly budget, salaries take Ksh.42 millions which is 35% of its total monthly budget, marketing 20%, legal fees 5%, taxes and rates 25% and reserves 15% . Determine the amount in Ksh for each sector and present the information in a pie chart. (6 marks)

c) The number of days the college nurse was called for emergencies per month for the last 10 months were; 2,3,4,0,5,6,7,4,3,2. Determine the

i) Mean

ii) Mean Absolute Deviation.

iii) Variance

iv) Standard deviation (8 marks)

d) A mixed choir of 5 boys and 7 girls is to be chosen from 9 boys and 11 girls. In how many ways can this be done (4 marks)

e) Two managers were asked to rank a group of employees in order of their potential for eventually being top managers. The rankings were as follows:

Employees	A	B	C	D	E	F	G	H	I	J
Rank; manager 1	10	2	1	4	3	6	5	8	7	9
Rank; manager 2	9	4	2	3	1	5	6	8	7	10

Compute the coefficient of rank correlation and comment on the value. (4 marks)

QUESTION TWO (20 MARKS)

a) Distinguish the following terms as they apply in probability and statistics

i. Permutation and Combination

ii. Mutually exclusive events and independent events (4 marks)

b) The table below shows the frequency distribution of sales made by 100 shops

Sales Ksh '000'	*Number of Shops*
100-119	2
120-139	*"a"*
140-159	20
160-179	19
180-199	*"b"*
200-219	21
220-239	1

Given that the mean is Ksh 177,100, determine

i. The values of "*a*" and "*b*"

ii. The Median

iii. The Standard deviation

iv. Karl pearson's coefficient of skewness ($_{Skp}$) (16 marks)

QUESTION THREE (20 MARKS)

a) Highlight five properties of a good measure of data variation (5 marks)

b) In a class of 60 students pursuing bachelor of education first year students, 40 failed in basic mathematics, 32 failed in communication skills and 44 passed at least one of the two subjects. Determine the probability that a randomly selected student passed both subject. (5 marks)

c) Calculate the regression equations of age on sick off days of ABC co employees given

Sick off days	9	7	5	10	4	5	3	2
Age in years	45	42	41	60	30	34	25	20

i) Fit in the regress model values and calculate the residues

ii) Predict age of an employee if he had 20 days sick off (10 marks)

QUESTION FOUR (20 MARKS)

a) Records in a certain University showed that 50% of the students are admitted into the engineering courses and 15% of these are females; 30% of students are admitted into the business courses and 40% of these are females; and finally, 20% are admitted into humanities and 60% of these are females. If a student is picked at random from the University students, find the probability that it is a female. (5 marks)

b) Determine how many even numbers greater than 2000 can be obtained from the numbers, 1,2,4, and 6 (4 marks)

c) Given below are the weekly average air time allowances for the employees of Company A and B

Company	***n***	***Weekly Average allowance***	***Standard deviation***
A	150	2,500	400
B	100	2,000	200

Determine

i) The Company with the higher dispersion in awarding the air time allowance

ii) The combined standard deviation (11 marks)

QUESTION FIVE (20 MARKS)

a) By citing examples in each explain the **four** levels of measurement scales for statistical data. (8 marks)

b) Based on the recent observations 3% of the Machakos University (MU) male post graduate students have prostate cancer. The university clinic laboratory can detect 90% of the prostate cancer when present. It also gives 13% false positive results. If a male post graduate student in MU volunteered for a prostate cancer test in the university clinic laboratory, determine the following probabilities;

i) That the test result were positive

ii) That, given a positive result, he had a prostate cancer

iii) That, given a negative result, he had no prostate cancer

iv) That he was misclassified (12 marks)