



# Machakos University College

(A Constituent College of Kenyatta University)

UNIVERSITY EXAMINATIONS 2013/2014

SCHOOL OF COMPUTING AND APPLIED SCIENCES

FIRST YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF

BACHELOR OF EDUCATION

**SMA 160: INTRODUCTION TO STATISTICS AND PROBABILITY**

DATE: Thursday, 3<sup>rd</sup> April, 2014

TIME: 8.30 a.m. – 10.30 a.m.

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## **INSTRUCTIONS:**

Answer Question **ONE** which is compulsory and any other **TWO**

### **Question 1.**

a) Distinguish between the following terms as used in Statistics and Probability:

- (i) Continuous and Categorical Variable
- (ii) Primary and Secondary Data
- (iii) Compound and Disjoint events
- (iv) Sample statistics and a Population parameters
- (v) Skewness and Kurtosis

(10 marks)

b) The data below relates to two companies A and B

	<b>Company A</b>	<b>Company B</b>
<b>No. of Employees</b>	50	100
<b>Mean wage per employee</b>	U\$ 120	U\$ 85
<b>Variance of daily wages per employee</b>	9	16

Which factory has greater variation in the distribution of daily wages per employee?

(4marks)

c) Jane goes for a pregnancy test that is known to be 90% accurate after her single sexual encounter but it is also known to give false-positive results at 50% of the time. If the probability of conception for any single sexual encounter is approximately 15%. What is the probability that Jane is surely expectant if her results turned to be positive? (4marks)

(d) The probability that a contractor will get a plumbing contract is  $\frac{2}{3}$  and the probability that he will not get the electric contract is  $\frac{5}{9}$ . If the probability of getting at least one contract is  $\frac{4}{5}$ , what is the probability that he will get both? (4marks)

(e) A committee of three men and four women is to be chosen from five men and seven women. In how many ways can this be done. (4 marks)

(f) Given  $A = \{x | \text{odd numbers} < 20\}$

$B = \{x | \text{prime numbers} < 20\}$  List the members of  $\{x | x \in (A \cap B)\}$  (4 marks)

## Question 2

The data below relates to ABC Co. Ltd. Employees selected at random

<b>Aptitude test score (X)</b>	11, 12, 13, 14, 15, 17, 18, 19, 21, 22
<b>Performance index (Y)</b>	13, 15, 14, 17, 19, 18, 20, 21, 22, 24

- (i) Determine the Karl Pearson's coefficient of correlation.
  - (ii) Determine the coefficient of determination and interpret its value.
  - (iii) By using least square method find the regression equation of Y on X
  - (iv) Estimate employee's performance index with an aptitude test score of 30
- (20 marks)

## Question 3

- (a) Three machines are designed to process same product but at different rates. The first machine,  $B_1$ , process 40 per cent, the second machine,  $B_2$ , process 35 per cent and the third machine,  $B_3$ , process 25 per cent of the products. The first machine has a defective rate of 0.04, the second has a defective rate of 0.06 and the third has a defective rate of 0.03. A product selected at random from a day's output was found to be defective. What is the probability that the product was processed by the first, second, or third machine, respectively.
- (4 marks)

(b) The first 4 moments of a distribution about the values 5 of the variable are 2, 20, 40 and 50.  
Find the mean and other moments about the mean. (4 marks)

(c) Using the data given below determine the

(i) Mode, Mean and Median

(ii) Karl Pearson's coefficient of skewness

<i>Marks</i>	<i>f</i>
0-10	2
10-20	7
20-30	11
30-40	6
40-50	4

(12 marks)

#### Question 4

(a) ABC limited has 3 enterprises in 3 different countries. Analysis of the monthly salaries paid to the top management is given below.

	<i>Country X</i>	<i>Country Y</i>	<i>Country Z</i>
<i>No. of employees</i>	100	150	250
<i>Mean (wage Ksh "000")</i>	100	121	144
<i>Variance (Ksh "000")</i>	50	55	60

Find the combined standard deviation.

(10 marks)

- (b) Two managers are asked to rank a group of employees in order of potential for eventually being top managers. The rankings are as follows:

<i>Employees</i>	<i>Ranking by Manager I</i>	<i>Ranking by Manager II</i>
<i>S</i>		
A	10	9
B	2	4
C	1	2
D	4	3
E	3	1
F	6	5
G	5	6
H	8	8
I	7	7
J	9	10

Compute the coefficient of rank correlation and comment on its value. (6 marks)

- (c) In how many ways can 8 people sit at a round table? (4 marks)

### Question 5.

(a) A bag contains 8 red and 5 white balls. The successive drawings of 3 balls are made such that

(i) balls are replaced before the second trial.

(ii) The balls are not replaced before the second trial.

Find the probability that the first drawing will give 3 white and the second 3 red balls in each case. (6 marks)

(b) Given that 50% of the undergraduate students in MUC are pursuing Bachelor of Education and 15% of these are females, 30% of the students are pursuing Bachelor of Commerce, and 40% of these are females and finally 20% are pursuing Bachelor of Science in Engineering and 10% of these are females. If a student is picked at a random from the population find the probability that she is a female. (6 marks)

- (c) A candidate is selected for interview of management trainees for 3 companies. For the first company there are 12 candidates, for the second there are 15 candidates and for the third, there are 10 candidates. What are the chances of him getting a job at least in one of the company? (4 marks)
- (d) Two computers A and B are to be marketed. A salesman who is assigned the job of finding customers for them has 60% and 40% chances respectively of succeeding in case of computer A and B. The computers can be sold independently. Given that he was able to sell at least one computer, what is the probability that computer A has been sold? (4 marks)