MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

FIRST YEAR SEMESTER EXAMINATION FOR

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

2920/106: COMPUTATIONAL MATHEMATICS

DATE: 16/4/2019 **TIME: 8.30-11.30 AM**

INSTRUCTIONS: Answer QUESTION ONE and any other TWO QUESTIONS

QUESTION ONE (30MARKS)

a.) Define the following terms as used in set theory

i. Null set (3 marks)

ii. Subset (3 marks)

iii. Universal set (3 marks)

b.) Convert $42AD_{16}$ into a decimal number (3 marks)

c.) Let $\begin{bmatrix} 5 & y \\ 15 & z \end{bmatrix} = 5\begin{bmatrix} x & 3 \\ 3 & y \end{bmatrix}$. Find y and z (3 marks)

d.) Use binomial expansion to evaluate $(1.02)^6$ to 4 s.f (4 marks)

e.) Two coins are tossed. What is the probability that at least one head appears (3 marks)

f.) A company has three establishments E_1, E_2 and E_3 in three cities. Analysis of the monthly salaries paid to the employees in the three establishments is given below.

	Group I	**Group II**	**Group III**
No of items	100	150	250
Arithmetic mean	50	55	60
Variance	100	121	144

Find the combined standard deviation (8 marks)

QUESTION TWO (20MARKS)

a) Define and give examples of the following terms as used in statistics

i. Mutually exclusive events (3 marks)

ii. Collectively exhaustive events (3 marks)

iii. Equally likely events (3 marks)

b) Calculate Geometric Mean from the following data

Size: 125, 133, 141, 173, 182 (4 marks)

Frequency: 7 5 4 1 3

c) Express the following in venn diagrams

i. $A \cup B$ (2 marks)

ii. $A \cap B$ (2 marks)

What is the chance of getting two sixes in two rollings of a single die? (3 marks)

QUESTION THREE (20MARKS)

a.) Solve the following equations by completing the square method

i.) $x^2 + 4 - 6 = 0$ (3 marks)

ii.) $6x^2 + 5x - 6 = 0$ (3 marks)

b.) One white die and one black die are rolled. Find the probability that the white die shows a number smaller than 3 or the sum of the dice is greater than 9 (5 marks)

c.) Calculate mean, median and standard deviation from the following data (9 marks)

Marks:	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
No. of students:	5	6	15	10	5	4	2	2

QUESTION FOUR (20 MARKS)

a.) Solve the following inequalities

i.) $-5(x - 2) \leq 20 + x$ (3 marks)

ii.) $3 + x \leq 3x + 1 < 7x - 2$ (3 marks)

b.) Convert the following into decimal numbers

i.) 362.35_8 (3 marks)

ii.) $42A.12_{16}$ (3 marks)

c.) 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 (4 marks)

ii. The balls are not replaced before the second trial (4 marks)

Find the probability that the first drawing will give 3 white and the second 3 red balls.

QUESTION FIVE (20 MARKS)

a.) Expand $(1+x)^9$ up to the term x^3. Use the expansion to estimate $(0.98)^9$ correct to 3 decimal places. (5 marks)

b.) Discuss the Boolean algebra laws giving the equivalent switching circuits (15 marks)