



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)