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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2018/2019 ACADEMIC YEAR
CERTIFICATE IN INFORMATION TECHNOLOGY**

CIT 1003- COMPUTATIONAL MATHEMATICS

Date: 8th August 2018
Time: 2.30 Pm- 4.30 Pm

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) Let S be the set of all outcomes when two dice (one blue and one green) are thrown. Let A be the subset of outcomes in which both dice are odd, let B be the subset of outcomes in which both dice are even. Write C for the set of outcomes when the two dice have same number showing.
- i) Show the set out for set S (3 Marks)
 - ii) $||A||$ (2 Marks)
 - iii) $||B||$ (2 Marks)
 - iv) $||C||$ (2 Marks)
 - v) $||A \vee B||$ (2 Marks)
 - vi) $||A \cap B||$ (2 Marks)
 - vii) $||A \cap C||$ (2 Marks)
- b) Perform the following binary arithmetic operations and base conversion:
- i) $10011_2 + 11001_2$; (2 Marks)
 - ii) $110_2 - 111_2$ (3 Marks)
 - iii) 453_{10} to base hexadecimal (3 Marks)
 - iv) 1000001_2 to hexadecimal (3 Marks)
- c) Given the following;

$$\begin{bmatrix} a - b & 2a + c \\ 2a - b & 3c + d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$$

Find the values of a, b, c, and d from the equation. (3 Marks)

- d) i) $4\sqrt{2} + 6\sqrt{2}$
 ii) $10\sqrt{3} + 7\sqrt{3} - 4\sqrt{3}$ (1 Mark)

QUESTION TWO (20 MARKS)

- a) Suppose we look at sports scholarships awarded by American Universities. A total of 147,000 scholarships were earned in 2001. Out of the 5,500 scholarships for athletics, 1,500 were earned by women. Women earned 75,000 scholarships in total. How many men earned scholarships in athletics. What was the total number of scholarships earned by men? (3 Marks)
- b) What is a function? (3 Marks)
- c) Factorise $3x^2 + 5x - 12$ (3 Marks)
- d) Explain any six types of sets that you know (4 Marks)
- e) Define the cartesian product as used in set theory (1 Mark)
- f) Enumerate the THREE MAIN rules of probability (6 Marks)
- i) $0 \leq P[A] \leq 1$.
- ii) $P[S]=1$
- iii) For mutually events A and B $P[A \text{ or } B] = P[A] + P[B]$

QUESTION THREE (20 MARKS)

- a) With an example, define an event in probability (3 Marks)
- b) A man with n keys wants to open his door and tries the keys at random. Exactly one key will open the door. Let X denote the number of trials required to open the door for the first time. Find E(X) if;
- i) Unsuccessful keys are not eliminated from further selections (7 Marks)
- ii) Unsuccessful keys are eliminated (10 Marks)

QUESTION FOUR (20 MARKS)

- a) Consider the following table

	Employed	Unemployed	Total
Male	460	40	500
Female	140	260	400
Total	600	300	900

- i) What is the probability of choosing a male from the population? (2 Marks)
- ii) What is the probability of choosing a male who is unemployed? (3 Marks)

b) Let $A = \begin{pmatrix} 2 & 4 \\ 3 & 2 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 3 \\ -2 & 5 \end{pmatrix}$, $C = \begin{pmatrix} -2 & 5 \\ 3 & 4 \end{pmatrix}$

Find each of the following

- i) $A + B$ (2 Marks)
- ii) $A - B$ (2 Marks)
- iii) $3A - C$ (3 Marks)
- iv) AB (3 Marks)
- v) Find the inverse of the functions $f(x) = \frac{2x-5}{x+3}$ (5 Marks)

QUESTION FIVE (20 MARKS)

- a) Describe two methods through which statistic data can be collected from primary sources. (4 Marks)
- b) The ages of the 112 people who live on a tropical island are grouped as follows:

Age	Number of Ages
0-9	20
10-19	21
20-29	23
30-39	16
40-49	11
50-59	10
60-69	7

70-79	3
80-89	1

- i) Calculate the mean value (3 Marks)
 - ii) Calculate the median (2 Marks)
 - iii) Calculate the mode (2 Marks)
 - iv) Calculate the standard deviation of the ages (3 Marks)
- c) Solve the simultaneous equations using the inverse matrix method (6 Marks)

$$x + 2y = 4$$

$$3x - 5y = 1$$