



**DICT LEVEL I**

**COMPUTER MATHEMATICS**

**MONDAY: 26 November 2018.**

**Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

- (a) Convert each of the following numbers into base 10.
- (i)  $2D_{16}$ . (1 mark)
  - (ii)  $310A_{16}$ . (1 mark)
- (b) Convert each of the following numbers into hexadecimal form:
- (i)  $5280_{10}$ . (1 mark)
  - (ii)  $1110\ 1110_2$ . (1 mark)
- (c) Convert each of the following numbers into base 2.
- (i)  $194_{10}$ . (1 mark)
  - (ii)  $1000_{10}$ . (1 mark)
- (d) Convert each of the following numbers into binary form:
- (i)  $3B_{16}$ . (1 mark)
  - (ii)  $239_{16}$ . (1 mark)
- (e) Write the decimal number 3263 to:
- (i) Base 5. (2 marks)
  - (ii) Base 4. (2 marks)
  - (iii) Base 12 (using A = 10 and B = 11). (2 marks)
- (f) Convert each of the following numbers to its octal equivalent:
- (i)  $44444_{10}$ . (2 marks)
  - (ii)  $0.4_{10}$ . (2 marks)
- (g) Find the radix-minus-one (7s) complement and the (8s) complement of  $113355_8$ . (2 marks)

**(Total: 20 marks)**

## QUESTION TWO

(a) Define the following terms as used in probability theory:

- (i) Elementary events. (2 marks)
- (ii) Mutually exclusive events. (2 marks)
- (iii) Mutually inclusive events. (2 marks)

(b) Add the following hexadecimal digits:

- (i)  $E + E$ . (1 mark)
- (ii)  $6 + A$ . (1 mark)
- (iii)  $67.E9_{16} + A.BCDE_{16}$ . (2 marks)

(c) Decode the numeric 0101 1011 1000 encoded in the Xs – 3 BCD code. (2 marks)

(d) Encode the word "READY" to the following:

- (i) Binary EBCDIC. (2 marks)
- (ii) Hexadecimal EBCDIC. (2 marks)
- (iii) ASCII. (2 marks)

(e) A computer uses the 6-bit BCD code with odd parity. Explain how this computer would store the name "RICE". (2 marks)

**(Total: 20 marks)**

## QUESTION THREE

(a) Highlight three advantages and three disadvantages of observation as a method of collecting primary data. (6 marks)

(b) Perform each of the following binary arithmetic operations:

- (i)  $00011010 + 00001100$ . (2 marks)
- (ii)  $00100101 - 00010001$ . (2 marks)
- (iii)  $00101001 \times 00000110$ . (2 marks)
- (iv)  $00101010 \div 00000110$ . (2 marks)

(c) The following marks in percentage were obtained from a Computer Mathematics examination at Simanya Business College:

Marks in percentage	Number of students
0 – 10	5
10 – 20	8
20 – 30	12
30 – 40	15
40 – 50	20
50 – 60	14
60 – 70	12
70 – 80	6

### Required:

- (i) The mean mark of students. (3 marks)
- (ii) The median mark of students. (3 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Summarise four rules to be followed when drawing graphs. (4 marks)

(b) Let A and B be two finite sets such that,

$$\begin{aligned} \cap(A) &= 20 \\ \cap(B) &= 28 \\ \cap(A \cup B) &= 36 \end{aligned}$$

**Required:**

Find  $\cap(A \cap B)$ . (3 marks)

(c) In a class of 100 students, 72 students can speak English and 43 students can speak French.

**Required:**

Determine the number of students who can speak both English and French. (4 marks)

(d) Construct truth tables for the following:

(i)  $(P \rightarrow Q) \vee (Q \rightarrow P)$ . (3 marks)

(ii)  $(P \rightarrow Q) \vee (\sim P \vee Q)$ . (3 marks)

(iii)  $\sim P \wedge (P \rightarrow Q)$ . (3 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Explain how propositions logically imply a contradiction. (2 marks)

(b) Solve the following linear equation:

$$\frac{1}{2} - a - \frac{1}{6} + \frac{a}{3} = 2 - \frac{a}{4} - \frac{a}{6}$$

(3 marks)

(c) Solve the following simultaneous equations by elimination method:

$$\begin{aligned} 2x - 3y &= 8 \\ 3x + 5y &= 15 \end{aligned}$$

(3 marks)

(d) Given the following matrices:

$$A = \begin{pmatrix} 2 & -3 \\ 0 & 1 \end{pmatrix} \quad B = \begin{pmatrix} -1 & -5 \\ 4 & 3 \end{pmatrix} \quad C = \begin{pmatrix} 7 & 6 \\ 2 & -1 \end{pmatrix}$$

**Required:**

(i)  $3(A - B)$ . (2 marks)

(ii)  $B^{-1}$ . (2 marks)

(iii)  $C(A + B)$ . (2 marks)

(e) Chizingo Manufacturing Ltd. makes cups and glasses. The cost of making 8 cups and 5 glasses is Sh.1,400. The cost of making 3 cups and 7 glasses is Sh.730.

The company makes a profit margin of 30% and 40% on each cup and glass respectively.

**Required:**

(i) The cost of making a cup and a glass. (4 marks)

(ii) The selling price of a cup and a glass. (2 marks)

**(Total: 20 marks)**