kasneb

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) 0 0 0 1 1 0 1 0 + 0 0 0 0 1 1 0 0. (2 marks)

(ii) 0 0 1 0 0 1 0 1 – 0 0 0 1 0 0 0 0. (2 marks)

(iii) 0 0 1 0 1 0 0 1 x 0 0 0 0 0 1 1 0. (2 marks)

(iv) 0 0 1 0 1 0 1 0 ÷ 0 0 0 0 0 1 1 0. (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,

$$\cap(A) = 20$$
$$\cap(B) = 28$$
$$\cap(A \cup B) = 36$$

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:

$$2x - 3y = 8$$
$$3x + 5y = 15$$

(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)

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