KASNEB

DICT LEVEL I

COMPUTER MATHEMATICS

PILOT PAPER

September 2015. **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) Find the binary solutions for each of the following:

(i) 110111 + 011100. (1 mark)

(ii) 00010011 + 00111110. (1 mark)

(iii) 100010110 - 1111010. (1 mark)

(iv) 1110110 - 1010111. (1 mark)

(v) 101101011 x 1011. (1 mark)

(b) In April 2015, a survey was carried out on 200 students in the Computer Studies Department of Elegant College. The survey was to find out the number of students that visited the college website in the first quarter of the year 2015. The survey results revealed that:

36 students visited the website in March only.
46 students visited the website in March but not February.
16 students visited the website in March and January.
52 students visited the website in March.
96 students visited the website in January.
16 students visited the website in January and February.
48 students did not visit the website in any of the three months.

Required:
Draw a Venn diagram to represent the above information. (8 marks)

(c) With reference to (b) above, determine the number of students who:

(i) Visited the website in February. (2 marks)

(ii) Visited the website in two consecutive months. (2 marks)

(iii) Visited the website in January but not in February. (1 mark)

(iv) Visited the website in February and March but not in January. (2 marks)

(Total: 20 marks)

QUESTION TWO

(a) Explain the following types of matrices:

(i) Diagonal matrix. (1 mark)

(ii) Identity matrix. (1 mark)

(iii) Null matrix. (1 mark)

(iv) Square matrix. (1 mark)

(b) Given that:

$$A = \begin{pmatrix} 3 & 4 \\ 2 & 7 \end{pmatrix}$$

$$B = \begin{pmatrix} 3 & 2 & 7 \\ 1 & 5 & 9 \end{pmatrix}$$

$$C = \begin{pmatrix} 2 & -8 & 6 \\ 6 & 8 & 4 \end{pmatrix}$$

Find

(i) $2B + C$. (2 marks)

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

(iii) AB (2 marks)

(iv) A^{-1} (4 marks)

(c) Fama Techno Limited sells two types of cellphones A and B in its two shops; Tana Shop and Riva Shop.

The following table shows the number of units sold in each shop during the month of August 2015:

Shop	**Cellphone A (Units)**	**Cellphone B (Units)**
Tana	30	50
Riva	45	28

Cellphone A is sold at Sh.12,000 per unit while cellphone B is sold at Sh.8,000 per unit.

Required:
Using matrix algebra, determine the total sales for :

(i) Tana shop. (3 marks)

(ii) Riva shop. (2 marks)

(d) Comment on the sales performance of the two shops under (c) above. (1 mark)

(Total: 20 marks)

QUESTION THREE

(a) Explain the following number systems:

(i) Decimal number system. (1 mark)

(ii) Octal number system. (1 mark)

(iii) Hexadecimal number system. (1 mark)

(b) Convert the following into decimal numbers:

(i) 245_{16}. (2 marks)

(ii) 11001011_{2}. (2 marks)

(iii) 374_{8}. (2 marks)

(c) Convert:

(i) 79.68_{10} into binary equivalent. (3 marks)

(ii) $24B_{16}$ into octal equivalent. (3 marks)

(d) The cost of 3 laptops and 2 printers is Sh.176,000. The cost of 7 laptops and 4 printers is Sh.394,000.

Required:

(i) Formulate two equations from the information above. (1 mark)

(ii) Use the two simultaneous equations in part (i) above, determine the cost of a laptop and a printer. (2 marks)

(iii) Exa Ltd. has a budget of Sh.268,000 to spend on equal number of laptops and printers.

Advise the management on the number of laptops and printers to purchase. (2 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Explain the difference between "primary data" and "secondary data". (4 marks)

(b) Highlight five characteristics of a good average measure. (5 marks)

(c) Pillar Solutions Limited has the following data relating to 80 workers of the firm and their ages:

Age (years)	Number of workers
18 - 22	6
22 - 26	10
26 - 30	14
30 - 34	18
34 - 38	12
38 - 42	9
42 - 46	7
46 - 50	4

Required:

(i) The median age. (7 marks)

(ii) The modal age. (4 marks)

(Total: 20 marks)

QUESTION FIVE

(a) Differentiate between "conjunction" and "disjunction" as used in truth tables. (2 marks)

(b) p and q are statements.

(i) Construct a truth table showing:

- $p \wedge q$.
- $\sim p \wedge q$.
- $p \vee q$.

(4 marks)

(ii) Construct a truth table showing that $(q \rightarrow p) \vee (q \rightarrow p)$ is a tautology. (4 marks)

(c) Explain the following terms as used in probability:

(i) Compound event. (2 marks)

(ii) Mutually exclusive event. (2 marks)

(d) A basket contains 4 red marbles and 6 blue marbles.

2 marbles are picked at random without replacement.

Required:

(i) Draw a probability tree diagram to represent the information above. (3 marks)

(ii) Calculate the probability of picking both red marbles. (1 mark)

(iii) Calculate the probability of picking one of each colour. (2 marks)

(Total: 20 marks)

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