UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UCTATI)

FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE	: BCS1373
COURSE	: COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE
SEMESTER/SESSION	: 1 - 2022/2023
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 5 questions. Answer ALL questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 5 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) Draw the top-level view of the major structural components of computer with correct label. (4 marks)

b) Give **TWO (2)** differences between computer organization and computer architecture. (4 marks)

c) State **FIVE (5)** techniques of addressing. (5 marks)

d) Figure 1 illustrate the sequence of event during fetch instruction.

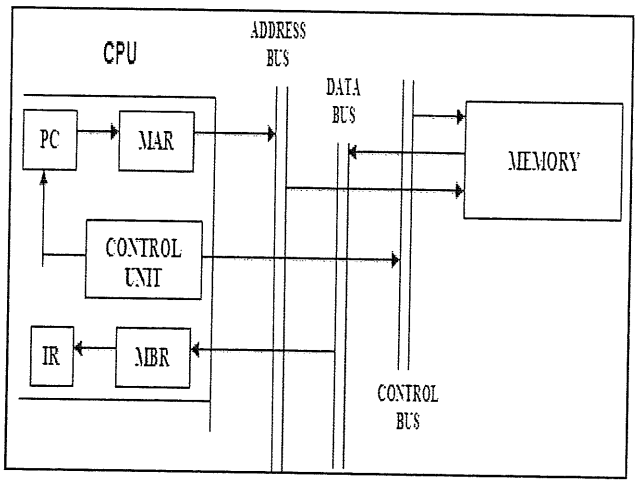

Figure 1

By referring to Figure 1, elaborate step-by-step process during fetch instruction. (8 marks)

QUESTION 2

a) Figure 2 shows the hierarchy of memory unit. (4 marks)

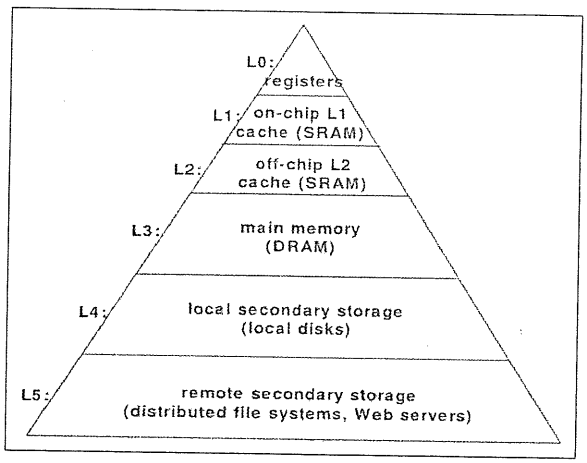

Figure 2

Identify **FOUR (4)** characteristics of storage device as one goes down the hierarchy.

b) Each block consists of 32 words each and each word is 8 bit (1 byte).

i) Calculate the capacity of the main memory, if the total number of blocks in the memory is 64. (4 marks)

ii) Calculate number of blocks in the main memory if the memory capacity is 256 Kbit. (4 marks)

c) Discuss the characteristics of Programmable Read-Only Memory (PROM). (3 marks)

d) Differentiate between Programmable Read Only Memory (PROM) and Electrical Erasable Programmable Read Only Memory (EEPROM) (2 marks)

QUESTION 3

a) Show step by step calculation to convert the following numbers to decimal:

i) 237_8 (2 marks)

ii) $3C_{16}$ (2 marks)

iii) 11011_2 (2 marks)

b) Calculate - 4 + (- 6) using 2s complement in 8 bit-register. *(Your answer should be in 2s complement representation)* (6 marks)

c) Construct the calculation of binary numbers given below.

i) $1010_2 + 1011_2$ (2 marks)

ii) $1010110_2 - 101010_2$ (2 marks)

QUESTION 4

a) Draw the logic gates circuit for the Boolean Expression. (4 marks)

$$Q = \mathrm{AB}(\overline{\mathrm{A}} + \overline{\mathrm{B}})$$

b) Based on expression: $X = \bar{A}\bar{B} + AB$ produce the output using following solutions:

i) Logic gates (4 marks)

ii) Truth table (3 marks)

c) According to Table 1, plot a three variable K-map and show grouping of two for marked cells and obtain the simplified Boolean Expression based on the K-map. (6 marks)

Table 1: Truth Table

A	B	C	Output
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

QUESTION 5

a) Explain the functions of following program: (6 marks)

b) Explain **THREE (3)** types of Programming Language. (6 marks)

c) Draw the relationship between assembler, linker and loader in order to produce the executable file for execution. (5 marks)

d) Illustrate the implementation of micro-programmed control unit. (6 marks)

e) Compare between hardwired and micro-programmed control. (6 marks)

----------End of question----------