UNIVERSITY COLLEGE
TATI

UNIVERSITY COLLEGE TATI (UCTATI)

FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE	: BCS1373
COURSE	: COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE
SEMESTER/SESSION	: 2 - 2024/2025
DURATION	: 3 HOURS

<u>Instructions:</u>

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 <u>4</u> PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) Explain **FIVE (5)** functions of Central Processing Unit (CPU).   (10 marks)

b) Differentiate between User-Visible Register and Control and Status Register   (4 marks)

c) Based on Figure 1a and Figure 1b shows two different types of addressing mode. Analyze the type of addressing mode and compare between these two modes.   (10 marks)
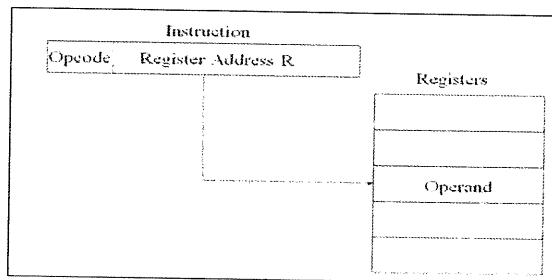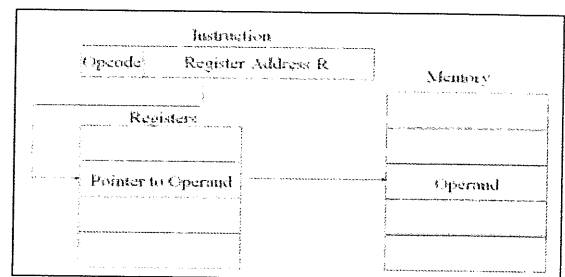

Figure 1a

Figure 1b

d) Figure 2 illustrate the sequence of event in Fetch Cycle. Tag the registers labeled **A, B, C,** and **D** in the CPU as in Figure 2.   (4 marks)
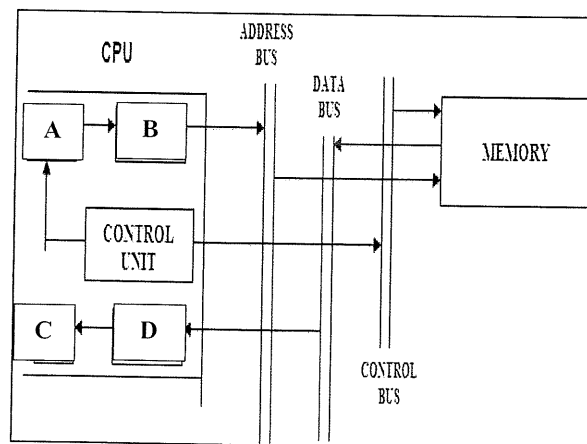

Figure 2

2

QUESTION 2

a)   Figure 3 below shows the hierarchy of memory unit. Identify **FOUR (4)** characteristics of storage device as one goes down the hierarchy.   (4 marks)
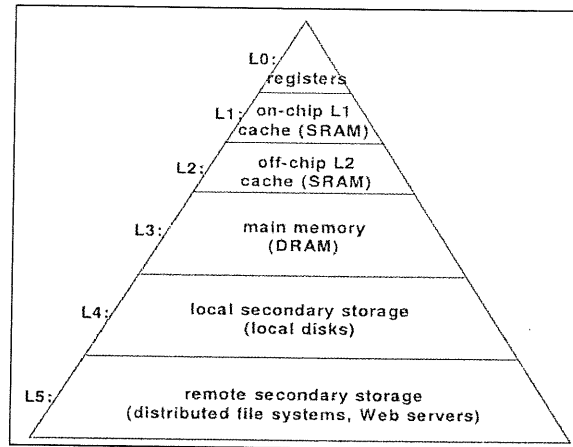

Figure 3

b)   Each block consists of 16 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)

QUESTION 3

a) Discuss the difference between **EPROM** and **EEPROM**. Your discussion should include the read/write operation, erasure operation and price. (8 marks)

b) Explain **TWO (2)** types of memory access method. (4 marks)

QUESTION 4

a) Convert the following numbers to **hexadecimal**. Show step by step calculation to prove your answer.
   i) 4567_8 (3 marks)
   ii) 111001100_2 (3 marks)
   iii) 919_{10} (3 marks)

b) Calculate - 3 + (- 6) using 2s complement in 8 bit-register. *(Your answer should be in 2s complement representation)* (6 marks)

c) Calculate the binary expressions below.
   i) $10111_2 + 10011_2$ (3 marks)
   ii) $1010111_2 - 101110_2$ (3 marks)
   iii) $10011110_2 + 1111_2$ (3 marks)

QUESTION 5

a) Based on expression: $Q = AB + BC(B + C)$, produce the output using following solutions:
   i)   Logic gates (4 marks)
   ii) Truth table (8 marks)
   iii) 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)

b) Simplify the following Boolean expression:
   i) $XY + X\bar{Y} + \bar{X}Z + \bar{X}\bar{Z}$ (3 marks)
   ii) $AB + AB\bar{C} + AB\bar{C} + ABC$ (3 marks)

--End of question--