

H

Roll No. 2292104

TBC-304/TBI-304

B. C. A. | B. Sc. (IT)

(THIRD SEMESTER) END SEMESTER
EXAMINATION, Dec., 2023

COMPUTER ORGANIZATION AND
ARCHITECTURE

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among
(a), (b) and (c) in each main question.

(iii) Total marks in each main question are
twenty.

(iv) Each sub-question carries 10 marks.

1. (a) What do you understand by Resistor-Transistor Logic (RTL) ? List the characteristics of RTL family. Describe the basic symbols for Register Transfers.

(CO1)

P. T. O.

- (b) Draw a diagram of bus system for four register of 4 bits each. The bus is to be constructed with multiplexer. Also explain the working of common bus system. (CO1)
- (c) Starting from an initial value of $R=11011101$, determine the sequence of binary values in R after a logical shift-left, followed by a circular shift-right, followed by a logical shift-right and a circular shift-left. (CO1)
2. (a) What is Address sequencing ? Explain with the help of flow chart. (CO2)
- (b) What do you understand by micro-programming ? Discuss about micro-programmed control unit, using a block diagram. Compare it with the hardwired control unit. (CO2)
- (c) The 8 bit registers A, B, C and D initially have the following values : (CO2)
- $A = 01101100$
 $B = 01010100$
 $C = 01010011$
 $D = 10001100$

after the execution of the following sequence of micro operations :

$$A \leftarrow A + D$$

$$A \leftarrow A - C$$

$$B \leftarrow B \wedge C$$

Determine the new value in each register.

3. (a) Write a program to evaluate the arithmetic statement : (CO3)

$$A * B + C * D$$

- (i) Using a general register computer with three address instruction.
- (ii) Using a general register computer with two address instruction.
- (iii) Using a stack organized computer with zero address instruction.
- (b) Explain any *five* Addressing mode with help of suitable example. (CO3)
- (c) What do you mean by Pipelining ? Also explain arithmetic pipelining in detail.

(CO3)

4. (a) Explain Direct Memory Access in detail.

(CO4)

- (b) Explain I/O interface ? What are the functions of an I/O interface ? (CO4)

P. T. O.

- (c) Explain Strobe control and Handshaking Asynchronous Data Transfer method in detail. (CO4)

5. (a) What is a cache memory ? Explain the various mapping techniques of cache memory. (CO5)

- (b) A digital computer has memory unit a $64\text{ K} \times 16$ and a cache memory of 1 K words. The cache uses direct mapping with a block size of 4 words. (CO5)

How many bits are there in the tag, index, block and word fields ?

How many bits are there in each word of cache and how are they divided into functions ? Include a valid bit ?

How many blocks can be accommodate ?

- (c) What do you understand by the term locality of reference ? Show the memory hierarchy with the help of a diagram showing speed, cost, and size variation.

(CO5)