

[This question paper contains 2 printed pages.]

Sr. No. of Question Paper : 1903 C Roll No.....

Unique Paper Code : 234203

Name of the Course : B.Sc. (Hons.) Computer Science

Name of the Paper : Computer System Architecture (CSHT-204)

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. 1 is compulsory.
3. Attempt any four questions from Section B.
4. Parts of a question **must** be answered together.

SECTION – A

1. (a) Demonstrate the read and write cycles for the asynchronous bus operations with the help of timing diagrams. (5)
- (b) What is the purpose of a pseudoinstruction? Give three examples of pseudoinstructions. (5)
- (c) Convert the expression $(3+4) [10 (2+6) + 8]$ into RPN (postfix notation) and show stepwise the stack operations for evaluating the numerical result. (5)
- (d) Draw common bus diagram of basic computer and explain its functioning. (5)
- (e) Give the differences between program controlled I/O and interrupt initiated I/O. (5)
- (f) What are the advantages of using a register addressing mode over the memory addressing mode? What are its limitations? (5)
- (g) What is the principle of locality of reference? How does it benefit the system? (2+3)

P.T.O.

SECTION – B

2. (a) Design the control gates associated with the Address Register (AR) in the basic computer with the following register transfer statements :

$$R'T_0 : AR \leftarrow PC$$

$$R'T_2 : AR \leftarrow IR(0 - 11)$$

$$D'_7IT_3 : AR \leftarrow M[AR]$$

$$RT_0 : AR \leftarrow 0$$

$$D_5T_4 : AR \leftarrow AR + 1 \quad (5)$$

- (b) Explain the instruction cycle of basic computer with the help of a flowchart. (5)
3. (a) Briefly explain with the help of a diagram the mechanism of sequencer for the micro programmed control unit. (6)
- (b) Formulate a mapping procedure that provides sixteen consecutive micro-instructions of each routine of a typical computer. The operation code has five bits and the control memory has 2048 words. (4)
4. (a) Explain the organization of a micro programmed control unit with the help of a block diagram. (5)
- (b) What is the basic mechanism used for displacement addressing ? Briefly discuss all addressing modes fall under the purview of displacement addressing scheme ? (5)
5. (a) Derive an expression for a speed up factor of a k-segment instruction pipeline. Explain the functioning of a *four* segment instruction pipeline with its space-time diagram. (7)
- (b) List the three major difficulties that cause the instruction pipeline to deviate from normal operation. (3)
6. (a) What is Content Addressable Memory ? Explain the hardware organization of a CAM with the help of a diagram. (6)
- (b) Differentiate between RISC and CISC. (4)
7. (a) Briefly explain the following terms :
- (i) Write Back Cache (ii) Cache Initialization (5)
- (b) Explain functioning of Direct Memory Access (DMA) I/O operation with the help of block diagram. (5)