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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 33407 Roll No. | | | | | | | | | | |

B. Tech. Examination 2021-22

(Even Semester)

COMPUTER ARCHITECTURE AND ORGANIZATION

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION – A

1. Attempt all parts of the following : 8×1=8

   (a) What is micro instruction and micro operation?

   (b) Write functions of computer system.

   (c) What do you mean by locality of reference.

   (d) Define roleof Program Counter (PC) in a program execution.

   (e) Define multitasking.

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(f) Define virtual memory.

(g) What is difference between RISC and CISC computers?

(h) What is the function of read/write signal in memory?

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) Discuss Van Neumann architecture in details. Why this architecture is so popular?

(b) Describe the principle of designing instruction set of a program. Explain important field of instruction format. Assume that memory locations A, B, C, D, E, F, G and X should not be changed. Write a program for simple three address, two address, one address and zero address machine perform :

$$x = (A + B - C) / (D * (5 * F - G))$$

(c) Why are use hierarchical memory structure? What are the parameters that affects the design of memory hierarchy?

(d) What is the mapping for cache organization? Explain the following with example :

(i) Associative mapping

(ii) Direct mapping

(iii) Set associative mapping

SECTION – C

Note :– Attempt all questions. Attempt any two parts from each questions. $5 \times 8 = 40$

3. (a) What is meant by the term bus arbitration? Why it is needed? How can bus arbitration be implemented in daisy chaining?

(b) (i) Discuss the shift micro-operation and its hardware implementation.

(ii) Differentiate between hardware control and microprogrammed control.

(c) Dissuss the Direct Memory Access (DMA) data transfer with the help of block diagram.

4. (a) What is an Arithmetic and Logic Operation (ALU)? Draw logic diagram of ALU that performs AND, OR logic operation and ADD, SUB arithmetic operation.

(b) Explain linear pipelines. Differentaite between asynchronous and synchronous models of linear pipelines.

(c) Draw and explain in architecture of register organization in a computer system. Write the procedure for PUSH and POP operation in the following :

(i) Register stack

(ii) Memory stack

5. (a) Explain any three addressing modes in detail by giving examples.

(b) What is Bus organization in a computer system? Explain the important features of following techniques :

(i) Daisy chaining technique

(ii) Polling technique

(iii) Independent request technique

(c) What are the reasons for having interrupts in computer? How can the interrupt be handled in computer? Suggest a scheme that can handle multiple interrupts at a time.

6. (a) What is the difference between a direct and an indirect address instruction? How many references to memory are needed for each type of instruction to bring an operand into a processor register?

(b) Write the algorithm steps for Signed Number Division Algorithm with logic circuit and flow chart and apply for the following :

$$(+7) \div (+3)$$

(c) What is instruction cycle for a program execution? Write the micro-operation for the following cycle :

(i) Fetch cycle

(ii) Indirect cycle

(iii) Interrupt cycle

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