



**RAJARATA UNIVERSITY OF SRI LANKA  
FACULTY OF APPLIED SCIENCES**

**B.Sc. (Information and Communication Technology) Degree  
Second Year - Semester II Examination – September/October 2020**

**ICT 2408 – COMPUTER ORGANIZATION AND ARCHITECTURE**

**Time: Three (3) hours**

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**Answer All questions**

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1.
  - a) Give four (4) examples for architectural attributes of a computer system. (4 Marks)
  - b) What, in general terms, is the distinction between computer structure and computer function? (4 Marks)
  - c) List and briefly define the four (4) main components of a computer. (6 Marks)
  - d) Briefly describe the use of following instructions of the IAS computer.
    - i. LOAD MQ
    - ii. STOR M(X)
    - iii. JUMP + M(X,0:19)
 (6 Marks)
  
2.
  - a) What are the two (2) major components of a general-purpose hardware configuration? Draw a diagram to show how they work together to accept necessary inputs and produce results. (6 marks)
  - b) List in order the first four (4) states of the detailed instruction cycle state diagram which has eight (8) states. (4 marks)
  - c) To accommodate interrupts, an interrupt cycle is added to the instruction cycle. In the interrupt cycle, the processor checks to see if any interrupts have occurred, indicated by the presence of an interrupt signal. Explain what the processor does if an interrupt is pending. (4 marks)
  - d) List and briefly define two (2) approaches to deal with multiple interrupts. (6 marks)

3. a) List four (4) main functions of a CPU. (4 marks)
- b) The number of registers in the CPU is one of the design issues related to the CPU registers. Explain this issue. (4 marks)
- c) If the last operation performed on a computer with an 8-bit word was an addition in which the two operands were 1010 and 1011, what would be the values of the following flags?
- i. Zero flag.
  - ii. Overflow flag. (4 marks)
- d) Intel 8086 processor has four 16-bit general purpose registers. Give the names and explain the functions of them. (8 marks)
4. a) Briefly explain the following elements of a machine instruction.
- i. Opcode,
  - ii. Next instruction reference. (4 marks)
- b) What are the different types of instructions may present in a machine instruction set? (4 marks)
- c) Write down the zero-address, one-address, and three-address instructions for the expression  $X=A+B$ . State any assumptions. (6 marks)
- d) A computer has a main memory with 16 bits per word and a CPU with 16 general purpose registers. The instruction set consists of 10 different operations and each instruction has two operands. Each operand identifies an immediate value, a register value, or a memory location. The processor can access memory using 6-bit addresses. Specify the instruction format and the number of bits in each field if the instruction is stored in one word of memory. (6 marks)
5. a) Give the syntax of an x86 assembly language statement. Explain each field. (5 marks)
- b) Explain the function of MUL assembly language instruction. (4 marks)
- c) Write assembly language instructions to perform the following tasks:
- i. Set the register AX equal to zero.
  - ii. Add the content of the memory location pointed by the register BX to the register AX.
  - iii. Test the contents of memory locations X and Y. (6 marks)
- d) Describe how a character string is displayed on the monitor using assembly language. Give an example (Note: complete program is not required). (5 marks)

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