80

RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (Information and Communication Technology) Degree
Second Year - Semester II Examination – February/March 2019

ICT 2408 – COMPUTER ORGANIZATION AND ARCHITECTURE

Time: Three (3) hours

Answer All questions

1. a) What is the difference between computer organization and computer architecture? (4 Marks)

b) Explain the difference between an architectural design issue and an organizational design issue using an example. (4 Marks)

c) Use a diagram to show the main components of a computer based on the Von Neumann architecture. State the functions of each component. (6 Marks)

d) The Von Neumann machine made use of several registers. Describe briefly the use of the following registers.

i. MBR.

ii. MAR.

iii. IBR. (6 Marks)

2. a) Distinguish between Customized Hardware and General-purpose Hardware. (5 marks)

b) Explain the use of control signals in a General-purpose Hardware system and describe how they are generated. (5 marks)

c) The basic function performed by a computer is execution of a program, which consists of a set of instructions stored in memory. Explain what you mean by execution of a program on a computer. (4 marks)

d) Draw the detailed "Instruction Cycle State Diagram" (without the interrupt cycle) to illustrate the processing required for an instruction. (6 marks)

3. a) What is the role of IR and PC in a CPU? (4 marks)

b) What are user-visible Registers? What are the categories of data commonly supported by user-visible registers? (5 marks)

c) What do you mean by Zero-address instructions? Give an example. (5 marks)

d) Given the following "IAS" instructions:

Opcode	Assembly Code	Description
00000001	LOAD M(X)	Transfer the contents of memory location X to AC.
00100001	STOR M(X)	Transfer the contents of AC to memory location X.
00000101	ADD M(X)	Add the contents of memory location X to AC.

Show the assembly language program segment for the following instructions and explain what the program segment does.

00000001	000000000100	00000101	000000000100
00000101	000000001000	00100001	000000001000

(6 marks)

4. a) What is data buffering in an I/O module? (4 marks)

b) Briefly define the following techniques for performing I/O operations.

i. Programmed I/O.

ii. Interrupt-driven I/O. (6 marks)

c) What is the need for an interconnection structure in a computer system? (5 marks)

d) Identify the interconnections of the main memory and draw them in a diagram. (5 marks)

5. a) What is instruction pipelining? (4 marks)

b) Assume that there is only a two-stage pipeline (fetch, execute). Draw a diagram to show how many time units are needed for a sequence of six instructions. (6 marks)

c) What is the difference between instruction pipelining and superscalar architecture? (5 marks)

d) What are the key features of RISC architecture? (5 marks)

END