RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (Information and Communication Technology) Degree
Second Year - Semester II Examination – November/December 2016

ICT 2408 – COMPUTER ORGANIZATION AND ARCHITECTURE

Time: Three (3) hours

Answer all questions

1. (a) What do you mean by Computer Generations? Write a short note on first generation computers. [6 Marks]

(b) Briefly explain the four basic functions of a computer. [4 Marks]

(c) A computer design based on the John von Neumann's stored program concept is referred to as von Neumann Architecture. Explain the key concepts used in the Von Neumann Architecture. [4 Marks]

(d) Use a diagram to show the main components of a computer based on the Von Neumann architecture. Explain the functions of each component. [6 Marks]

2. (a) What are CPU registers? How are they useful in instruction execution? [4 marks]

(b) Explain the use of the following registers:

i. Condition Code Registers.

ii. Control and Status Registers. [6 marks]

(c) What are the typical elements of a machine instruction? [4 marks]

(d) A digital computer has a main memory with 24 bits words. The instruction set consists of 150 different operations. All instructions have an operation code and an address field. The length of each instruction in the instruction set is equal to a memory word. Draw the instruction format and specify the number of bits in each field. [6 marks]

3. (a) One of the differences among memory types is the method of accessing units of data. What are the differences among sequential access, direct access, and random access? [6 marks]

(b) What do you mean by memory hierarchy? What is the general relationship among access time, memory cost, and capacity? [5 marks]

(c) What is RAID and why do we need it? [4 marks]

(d) Explain RAID1 with its advantages and disadvantages? [5 marks]

4. (a) Explain the need for an I/O module in a computer system. [4 marks]

(b) Briefly explain the following functions of an I/O module:

i. CPU Communication.

ii. Data Buffering. [6 marks]

(c) List the basic operations of the I/O module in interrupt-driven I/O when a READ command is issued by the processor for reading a block of data from an input device. [5 marks]

(d) Explain DMA based data transfer technique for I/O devices. [5 marks]

5. (a) Explain the function of JMP assembly language instruction. [4 marks]

(b) Write assembly language instructions to perform the following tasks:

i. Set register CX equal to zero.

ii. Copy the content of the memory location pointed by the register BX to register AX.

iii. Test the contents of memory locations A and B.

iv. Branch to the label LARGE if the content of register AX is greater than to the content of memory location A. [6 marks]

(c) Describe how a character string is displayed on the monitor using assembly language. [4 marks]

(d) Write an assembly language program segment to add two single-digit numbers entered through the keyboard and to display the result on the monitor. [6 marks]

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