Bangabandhu Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science and Engineering

3rd Year 1st Semester B.Sc. Engineering Examination-2014

Course No: CSE-310 Course Title: Computer Architecture and Organization

Total marks: 70 Time: 4 hours.

N.B.

i. Answer **SIX** questions, taking any **THREE** from each section.
ii. All questions are of equal values
iii. Use separate answer script for each section

SECTION - A

1. (a) What, in general terms, is the distinction between computer architecture and organization? Draw the top-level structural view of a computer. 4

(b) Define Moore's law. Explain the consequences of Moore's law. 3

(c) When does multiple interrupt occur? What are the two approaches to dealing with multiple interrupt? Explain. $4\frac{2}{3}$

2. (a) What is the benefit of using multiple-bus architecture compared to single-bus architecture? Discuss the method of bus arbitration. $3\frac{2}{3}$

(b) What is the benefit of using cache memory? Show the flowchart of cache memory read operation. 4

(c) What is the problem of direct-mapping cache organization? How can it be eliminated in associative mapping? Explain. 4

3. (a) What are key properties of semiconductor memory? 2

(b) What are the differences between DRAM and SRAM in terms of characteristics such as speed, size, cost and application? 3

(c) Define EPROM, EEPROM and flash memory. 3

(d) What is magnetic disk? How are data read from a magnetic disk? $3\frac{2}{3}$

4. (a) What are the major functions of an I/O module? Draw the block diagram of it. 3

(b) Briefly define and compare three techniques for performing I/O. 3

(c) Distinguish between memory mapped I/O and isolated I/O. 2

(d) What is DMA controller? How DMA transfer is performed from memory to disk? $3\frac{2}{3}$

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SECTION-B

5. (a) Explain how to determine if a number is negative in the following representations: sign magnitude, twos complement with an example, Assume the negative number is -14. 3

   (b) How can an instruction be represented? Classify different types of instructions 3

   (c) Explain procedure call transfer-of-control operation. What is the best place for storing the return address and why? 4

   (d) Write the two-address machine instructions to compute the following statement: (A-B)/(C+D×E) $1\frac{2}{3}$

6. (a) What is stack? Describe typical stack implementation as a part of processor. 3

   (b) List and briefly explain basic addressing modes with an example of each respectively? 3

   (c) Draw the PDP-10 instruction format? What are the advantages and disadvantages of variable-length instruction format? 4

   (d) Define big endian and little endian of byte ordering. $1\frac{2}{3}$

7. (a) Draw the internal structure of the CPU. $2\frac{2}{3}$

   (b) Explain the pipelining strategy. What are the advantages of using pipelining? 4

   (c) How do number of instructions and number of stages relate to pipelining performance? 2

   (d) When does pipelining hazard occur? Describe data hazard briefly? 3

8. (a) Provide a brief description of the inputs and outputs of a control unit with a block diagram. $3\frac{2}{3}$

   (b) What do you mean by a hardwired implementation of a control unit? Explain. 3

   (c) Show the block diagram of micro-programmed control unit with its functioning. 3

   (d) What is the relationship between instructions and microinstructions? 2