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**Fourth Semester B.E. Degree Examination, May/June 2010**  
**Computer Organization**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

1. a. PC contains the address of the instruction stored in main memory of the computer. The instruction is "MOVE (R3), R2". List the steps needed to execute the machine instruction MOVE (R3), R2. (08 Marks)
- b. Explain with examples, all the generic addressing modes, with assembler syntax. (12 Marks)
2. a. Convert the following pairs of signed decimal numbers to 5 bit 2's. Complement the numbers and add them. State whether overflow occurs or not.
  - i) -14 and 11      ii) -10 and -13      iii) -3 and -8. (06 Marks)
- b. What is word alignment of a machine (microprocessor based system)? Explain. What are the consecutive addresses of aligned words for 16, 32 and 64 bit word lengths of machines? Give two consecutive addresses for each case. (05 Marks)
- c. Bring out the five key differences between subroutine and interrupt service routine. (05 Marks)
- d. What is the function of an assembler directive? Give two examples of assembler directives used for the reservation of memory locations for variables. State their functions. (04 Marks)
3. a. Define and explain briefly the following:
  - i) interrupt.
  - ii) vectored interrupt.
  - iii) interrupt nesting.
  - iv) an exception and give two examples. (13 Marks)
- b. Explain in brief, with the help of a diagram, the working of daisy chain with multiple priority levels and multiple devices in each level. (07 Marks)
4. a. In a computer system, PCI bus is used to connect devices to the processor (system bus) bus. Consider a bus transaction in which the processor reads four 32-bit words from the memory. Explain the read operation on the PCI bus between memory and processor. Give signal and timing diagram. (12 Marks)
- b. Draw the block diagram of universal bus (USB) structure connected to the host computer. Briefly explain all fields of packets that are used for communication between a host and a device connected to an USB port. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

**PART – B**

- 5 a. Define and explain the following :
- i) Memory access time
  - ii) Memory cycle time
  - iii) Random access memory (RAM)
  - iv) Static memories. (04 Marks)
- b. Differentiate the static RAM (SRAM) and dynamic RAM (DRAM) giving four key differences. State the primary usage of SRAM and DRAM in contemporary computer systems. (04 Marks)
- c. Define memory latency and bandwidth in case of burst operation that is used for transferring a block of data to or from synchronous DRAM memory unit. (05 Marks)
- d. Draw a neat block diagram of memory hierarchy in a contemporary computer system. Also indicate relative variation of size, speed and cost per bit, in the hierarchy. (07 Marks)
- 6 a. Explain a simple method of translating virtual address of a program into physical address, with the help of a diagram. (08 Marks)
- b. Explain structural organization of moving head magnetic hard disk, with multiple surfaces for storage of data. Explain how moving head assembly works for reading data. (06 Marks)
- c. Answer the following with respect to the magnetic disk, the secondary storage device:
- i) seek time
  - ii) latency
  - iii) access time (06 Marks)
- 7 a. In carry – look ahead addition, explain generate  $G_i$  and propagate  $P_i$  functions for stage  $i$  with the help of Boolean expression for  $G_i$  and  $P_i$ . (04 Marks)
- b. Perform signed multiplication of numbers -12 and -11 using both multiplication algorithm. Represent the numbers in 5-bits including sign bit. Give booth multiplier recoding table that is used in the above multiplication. (08 Marks)
- c. Perform division of number 8 by 3 ( $8 \div 3$ ) using non-restoring division algorithm. (08 Marks)
- 8 a. Draw the block diagram of the three-bus organization of data path, which provides multiple internal paths to enable several transfers to take place in parallel. Label the registers and functional components of the processor and their connection to the respective bus of data path. (16 Marks)
- b. Draw a block diagram of a complete processor and identify the units. (04 Marks)

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**Fourth Semester B.E. Degree Examination, December 2010**  
**Computer Organization**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
at least TWO questions from each part.**

**PART - A**

- 1 a. What is a stored program concept? Explain the functional units of a stored program digital computer, along with a block diagram. (10 Marks)
- b. Define the following terms: (10 Marks)
- i) Processor clock                      ii) RISC                      iii) SPEC rating  
iv) Basic performance equation      v) the stack frame
- 2 a. Represent the decimal values 5, -2 and -10 in the following binary formats: (06 Marks)
- i) Sing and magnitude      ii) 1's complement      iii) 2's complement
- b. Registers  $R_1$  and  $R_2$  of a computer, contain the decimal values 1200 and 4600. What is EA of the memory operand in each of the following instructions? (05 Marks)
- i) Load  $20(R_1), R_5$   
ii) MOVE #3000,  $R_5$   
iii) Store  $R_5, 30(R_1, R_2)$   
iv) Add  $-(R_2), R_5$   
v) Subtract  $(R_1)+, R_5$
- c. Consider the following possibilities for saving the return address of a subroutine: (09 Marks)
- i) In a processor register  
ii) In a memory location  
iii) On a stack
- Which of these possibilities support the subroutine nesting and which support subroutine recursion?
- 3 a. What is an interrupt? Explain polling and vectored interrupts with their advantages and disadvantages. (08 Marks)
- b. What is DMA? What are its advantages? With the supporting diagram, explain different registers in a DMA interface. (06 Marks)
- c. What is bus arbitration? Explain the centralized arbitration, with a neat diagram. (06 Marks)
- 4 a. What is a synchronous bus? Explain the timing of an input transfer on a synchronous bus with a timing diagram. (06 Marks)
- b. Define: (08 Marks)
- i) Cycle stealing  
ii) burst mode  
iii) Full handshake  
iv) Plug-and-play
- c. What are the interface circuits? Explain a general 8-bit parallel interface, with a neat diagram. (06 Marks)

**PART – B**

- 5 a. Explain the synchronous DRAM, with a neat diagram. (10 Marks)  
b. What is a cache? Explain any two cache mapping functions. (10 Marks)
- 6 a. What are the replacement algorithms? Briefly explain the LRU replacement algorithm. (08 Marks)  
b. What is a virtual memory? With a neat block diagram, explain the virtual memory address translation. (08 Marks)  
c. Briefly explain the controller's major functions on the disk drive side. (04 Marks)
- 7 a. With a neat diagram, explain the floating point addition/subtraction unit. (10 Marks)  
b. With a neat block diagram, explain the 4-bit carry-lookahead adder. (10 Marks)
- 8 a. Explain the 3-bus organization of the data path with a neat diagram and write the control sequence for the instruction ADD R4, R5, R6 for the 3-bus organization. (10 Marks)  
b. With a neat block diagram, explain the hardwired control unit. (10 Marks)

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