ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER – 2008
COMPUTER ARCHITECTURE AND ORGANIZATION
SEMESTER – 5

Time : 3 Hours] [Full Marks : 70

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

i) Principle of locality justifies the use of

a) DMA b) Cache memory

c) Main memory d) None of these.

ii) In which addressing mode, the effective address of the operand is generated by adding a constant value to the contents of a register ?

a) Indirect mode b) Index mode

c) Absolute mode d) None of these.

iii) Associative memory is a

a) pointer addressable memory b) content addressable memory

c) slow memory d) none of these.

iv) Control unit operation is performed by

a) Hardwared control only

b) Micro-program control only

c) Hardwared or micro-programmed control

d) None of these.

v) The inter-instruction dependencies in program cause

a) data hazard b) structural hazard

c) control hazard d) both (a) and (c).

vi) DMA operation needs

a) switching logic between the I/O and system bus

b) I/O bus

c) special signals to CPU as hold and hold acknowledge

d) no CPU control signals.

vii) A ripple carry adder requires ..... time.

a) constant (i.e., N has no influence)

b) (O (log(N))

c) linear (O (N))

d) (O (N log (N)).

Where N is the number of bits in the sum.

viii) CPU gets the address of next instruction to be executed from

a) index register b) memory address register

c) instruction register d) program counter.

ix) Which one is the advantage of Virtual Memory ?

a) Faster access to memory on an average

b) Process can be given protected address spaces

c) Program larger than the physical memory size can be run

d) None of these.

x) A page fault

a) occurs when a program access to a page memory

b) is an error in a specific page

c) is an access to a page not currently in memory

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is Cache mapping ? Explain direct mapping for 256 × 8 RAM and 64 × 8 Cache memory. 1 + 4

3. Compare and construct RISC with CISC. 5

4. When floating point called normalized floating-point number ? Give reason (s) for converting a non-normalized floating-point number in normalized one.

5. What are the advantages and disadvantages of micro-programmed control unit over hardware control unit ? What are the different status flags in a processor ?

6. What do you mean by speedup, efficiency and throughput of a pipelined processor ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions. 3 × 15 = 45

7. a) Evaluate the following arithmetic expression using 0, 1, 2, 3-address instruction :

   F = (A+B) * (C+D)

   b) Briefly explain the different addressing modes. 8 + 7

8. a) What is virtual memory and why is it called virtual ?

   b) What do you mean by logical address space and physical address space ?

   c) Explain with an example how logical address is converted into physical address and explain how page replacements take place.

   d) Define seek time and rotational latency for magnetic disk.

e) A disk pack has 20 recording surfaces and has a total 4000 cylinders. There is an average of 300 sectors per track. Each sector contains 512 bytes of data.

i) What is the maximum number of bytes can be stored in this pack ?

ii) What is the data transfer rate in bytes per second at a rotational speed of 3600 rpm ? 2 + 2 + 4 + 2 + 5

9. a) Apply Booth's algorithm to multiply the two numbers +14 and –12.

b) What is the limitation of direct mapping method ? Explain with example how it can be improved is set-associative mapping ?

c) Use 8-bit 2's complement integer to perform – 34 + (– 12).

d) What is a tri-state buffer ? Design a common bus system using tri-state buffers for two registers of 4 bits each.

e) What is serial adder ? Discuss it briefly with diagram. 3 + 4 + 3 + 3 + 2

10. a) Explain the basic Direct Memory Access (DMA) operation for transfer of data bytes between memory and peripherals.

b) Give the main reason why DMA based I/O is better in some circumstance than interrupt driven I/O.

c) What is programmed I/O technique ? Why is it not very useful ?

d) Where does DMA mode of data transfer find its use ?

e) What are the different types of DMA controllers and how do they differ in their functioning ? 5 + 2 + 3 + 2 + 3

11. Write short notes on any *three* of the following : 3 × 5

a) DMA controller

b) Pipeline hazards

c) CMOS RAM architecture

d) Cache Memory Addressing Techniques

e) Virtual memory.

END