53 (IT 301) COAR

2017

COMPUTER ORGANIZATION AND ARCHITECTURE

Paper : IT 301

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* What is priority interrupt technique? Explain parallel priority interrupt technique with the help of block diagram. 10

   (b) Explain DMA transfer in details with all relevant block diagram. 10

2. *(a)* A computer uses RAM chips.

   (i) How many 128 × 8 RAM chips are needed to provide a memory capacity of 2048 bytes?

(ii) How many lines of address bus must be used to access 2048 bytes of memory? How many of these lines will be common to all chips?

(iii) How many lines must be decoded for chip select? Specify the size of the decoders. 10

(b) A two-way set associative cache memory uses blocks of four words. The cache can accommodate a total of 2048 words from main memory. The main memory size is $128K \times 32$.

(i) Formulate all pertinent information required to construct the cache memory.

(ii) What is the size of the cache memory? 10

3. (a) Draw a space-time diagram for a six-segment pipeline showing the time it takes to process eight tasks. 10

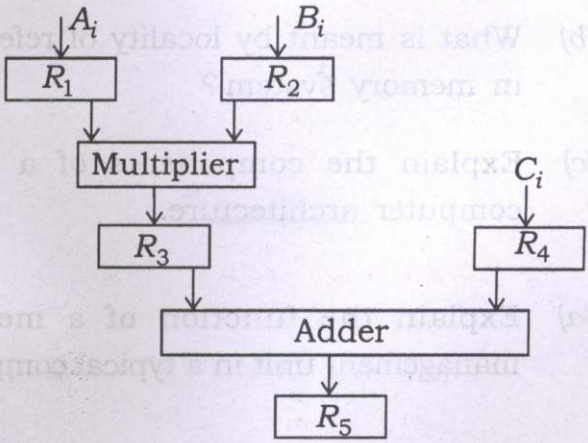
(b) The pipeline of figure, given below, has the following propagation times : 40*ns* for the operands to be read from memory into registers *R*1 and *R*2, 45*ns* for the signal to propagate through the multiplier, 5*ns* for the transfer into *R*3, and 15*ns* to add the two numbers into *R*5. 10

(i) What is the minimum clock cycle time that can be used ?

(ii) A nonpipeline system can perform the same operation by removing *R*3 and *R*4. How long will it take to multiply and add the operands without using the pipeline ?

(iii) Calculate the speedup of pipeline for 10 tasks and again for 100 tasks.

(iv) What is the maximum speed up that can be achieved ?



4. *(a)* Explain Booth's multiplication algorithm with the help of block diagram and a suitable example. 10

(b) Represent the following number using IEEE 754 floating point number format. (for 32 bit single format and 64 bit double format) 10

(i) $-0{\cdot}75$

(ii) $0{\cdot}00000045$.

5. *(a)* Explain various types of addressing modes employed in general purpose computer with example. 10

(b) What is meant by locality of reference in memory system? 4

(c) Explain the components of a basic computer architecture. 6

6. *(a)* Explain the function of a memory management unit in a typical computer. 10

(b) A ROM chip of 1024×8 bits has four select inputs and operates from a 5*volt* power supply. How many pins are needed for the IC package? Draw a block diagram and label all input and output terminals in the ROM. 10

7. Write short notes on : 20

(a) RISC

(b) Bus

(c) Virtual Memory

(d) Daisy Chaining priority.