C 47546 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
JUNE 2008

IT 2K 605—COMPUTER ARCHITECTURE

Time : Three Hours Maximum : 100 Marks

I. (a) What are the two instructions needed in the basic computer in order to set the E flip-flop to 1 ?

(b) Explain different types of hazards.

(c) How many times does the control unit refer to memory when it fetches and executes an indirect addressing mode instruction if the instruction is at a computational type requiring an operand from memory ?

(d) A weather forecasting computation requires 250 billion floating point operations. The problem is processed in a super computer that can perform 100 mega flops. How long will it take to do these calculations ?

(e) A non-pipeline system takes 50 ns. to process a task. The same task can be processed in a six-segment pipeline with a clock cycle of ions. Determine the speed up ratio of the pipeline for 100 tasks. What is the maximum speed up that can be achieved ?

(f) What is the basic advantage of using interrupt-initiated data transfer over transfer under program control without an interrupt ?

(g) Describe in words and by means of a block diagram how multiple matched words can be read out from an associative memory.

(h) What additional logic is required to give a no-match result for a word in an associative memory when all key bits are zeros ?

(8 × 5 = 40 marks)

II. (a) (i) The following transfer statements specify a memory. Explain the memory operation in each case :—

(a) R2 ← M[AR].

(b) M[AR] ← R3.

(c) R5 ← M[R5].

(7 marks)

(ii) Design a digital circuit that performs the four logic operations of exclusive - OR, exclusive —NOR, NOR and NAND. Use two selection variables show the logic diagram of one typical stage.

(8 marks)

Or

Turn over

(b) (i) What is the difference between a direct and an indirect address instruction ? How many references to memory are needed for each type of instruction to bring an operand into a processor register ?

(8 marks)

(ii) Derive the control gates associated with the program counter P.C. in the basic computer.

(7 marks)

III. (a) (i) Define the following :—

(a) micro operation. (b) micro instruction.

(c) micro program. (d) micro code.

(8 marks)

(ii) What is the difference between a microprocessor and a microprogram ? Is it possible to design a microprocessor without a microprogram ? Are all microprogrammed computers also microprocessors ?

(7 marks)

Or

(b) Give five examples of external interrupts and five examples of internal interrupts. What is the difference between a software interrupt and a subroutine call ?

(15 marks)

IV. (a) Formulate a six segment instruction pipeline for a computer. Specify the operations to be performed in each segment.

Or

(b) Explain four possible hardware schemes that can be used in an instruction pipeline in order to minimize the performance degradation caused by instruction branching.

(15 marks)

V. (a) (i) Give at least six status conditions for the setting of individual bits in the status register of an asynchronous communication interface.

(7 marks)

(ii) How many characters per second can be transmitted over a 1200 band line in each of the following modes ? (Assume a character code of eight bits).

(a) Synchronous social transmission.

(b) Asynchronous social transmission with two stop bits.

(c) Asynchronous social transmission with one stop bit.

(8 marks)

Or

(b) What is cache coherence and why is it important in shared-memory multiprocessor systems ? How can the problem be resolved with a snoopy cache controller ?

(15 marks)

[4 × 15 = 60 marks]