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Question Paper Code: 41233

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Third Semester

Computer Science and Engineering

14UCS303 - COMPUTER ORGANIZATION AND ARCHITECTURE

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- The time between the start and completion of a task is referred to as
(a) response time (b) execution time (c) throughput (d) both a and b
- Add 20(R0, R1), R2 is an example of
(a) Indirect addressing (b) Absolute addressing
(c) Indexed Addressing (d) Direct Addressing
- Arithmetic Logic Unit (ALU) is used to perform
(a) addition (b) left shift (c) right shift (d) all of these
- How many full adders are required for k bit addition?
(a) k (b) $k+1$ (c) $2k$ (d) $k-1$
- The throughput of an ideal pipeline with k stages is _____ instruction/clock cycle.
(a) k (b) $k-1$ (c) 1 (d) 2
- Which of the following MIPS instruction takes more execution time?
(a) Load word(lw) (b) Store word(sw) (c) R-format(add) (d) Branch(beq)

7. Which one of the following is related with Flynn's classification?
- (a) Classification of software based on their memory size
 - (b) Classification of parallel and sequential computers
 - (c) Classification of computers based on their size
 - (d) Classification of software based on their performance
8. A microprocessor containing multiple processors in a single integrated circuit is
- (a) multiprocessor
 - (b) cluster
 - (c) multi-core microprocessor
 - (d) all of these
9. The extra time needed to bring the data into memory in case of a miss is called as
- (a) Delay
 - (b) Propagation time
 - (c) Miss penalty
 - (d) Data latency
10. The process of periodically checking status bits to see if it is time for the next I/O operation is called
- (a) polling
 - (b) interrupt
 - (c) DMA
 - (d) none of these

PART - B (5 x 2 = 10 Marks)

11. What is meant by spilling registers?
12. What is the purpose of guard bits in floating point operations?
13. List the five steps to be followed for executing MIPS instructions.
14. What is loop unrolling? Give an example?
15. What is polling?

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Explain the basic components of a computer system. (10)
- (ii) Consider the following 32-bit MIPS instructions

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lw  r8, 1200(r9)
add r8, r18, r8
sw  r8, 1200(r9)
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What is the MIPS machine language code for these three instructions? Note that the opcodes of lw, add and sw are 35, 0 and 43 respectively. (6)

Or

- (b) (i) Suppose we have two implementations of the same instruction set architecture. Computer *A* has a clock cycle time of 250 ps and a CPI of 2.0 for some program, and computer *B* has a clock cycle time of 500 ps and a CPI of 1.2 for the same program. Which computer is faster for this program and by how much? (4)
- (ii) Describe the different types of addressing modes with example. (12)
17. (a) (i) Design a fast adder by deriving generate and propagate functions. (8)
- (ii) Explain the steps in Booth algorithm. (8)

Or

- (b) (i) Explain the non – restoring and restoring division algorithms. Simulate the same for 23/5. (12)
- (ii) Explain the floating point addition subtraction logic. (4)
18. (a) Explain briefly the operation of a simple data path with control unit with neat diagram. (16)

Or

- (b) (i) What are pipeline hazards? Discuss its different types and describe the solutions to each type with examples. (12)
- (ii) Write short notes on superscalar operations. (4)
19. (a) Discuss about the hardware and Compiler approaches for instruction level parallelism. (16)

Or

- (b) Explain Flynn’s classification of computers. (16)
20. (a) What is virtual memory? Explain the address translation scheme. (16)

Or

- (b) (i) What is DMA? What are the steps in DMA transfer? (8)
- (ii) Explain the working of a DMA controller with a diagram. (8)

