

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Third Semester

Computer Science and Engineering (IoT)

20CIPC301 - COMPUTER ARCHITECTURE AND MICROCONTROLLERS

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. The address in the main memory is known as (a) Logical address (b) Physical address (c) Memory address (d) None of the above	1	K1	CO1
2. RISC stands for (a) Reduced Instruction Set Computer (b) Risk Instruction Sequential Compilation (c) Risk Instruction Source Compiler (d) None of the above	1	K1	CO1
3. In which of the following term the performance of cache memory is measured? (a) Chat ratio (b) Hit ratio (c) Copy ratio (d) Data ratio	1	K1	CO1
4. In integer division, what is the result when you divide a positive number by zero? (a) Zero (b) Undefined (c) The dividend value (d) one	1	K1	CO2
5. In floating-point arithmetic, what does the term "mantissa" represent? (a) The exponent (b) The sign bit (c) The integer part (d) The fractional part	1	K1	CO2
6. Which IEEE 754 format is used for representing single-precision floating-point numbers? (a) IEEE 754-32 (b) IEEE 754-64 (c) IEEE 754-128 (d) IEEE 754-16	1	K1	CO2
7. Match the architectural component with its function. Components: 1. ALU 2. Control Unit 3. Register File 4. Instruction Cache Functions: A. Stores frequently used instructions B. Performs arithmetic and logical operations C. Decodes instructions and generates control signals D. Holds data for immediate processing (a) 1 - C, 2 - B, 3 - D, 4 - A (b) 1 - B, 2 - D, 3 - C, 4 - A (c) 1 - B, 2 - C, 3 - A, 4 - D (d) 1 - B, 2 - C, 3 - D, 4 - A	1	K2	CO3
8. What is the ALU control line for Add? (a)0000 (b) 0010 (c)0110 (d) 0111	1	K1	CO3
9. How many steps are identical to implement every instruction? (a) 3 (b) 2 (c) 4 (d) 5	1	K1	CO3
10. Why microcontrollers are not called general purpose computers? (a) because they have built in RAM and ROM (b) because they design to perform dedicated task (c) because they are cheap (d) because they consume low power	1	K1	CO4
11. External RAM is accessed by _____ (a) DPTR (b) PC (c) R0 (d) R1	1	K1	CO4

12. The way in which the data operands are accessed by different instructions is known as the 1 K1 CO4
- (a) Assembler directives (b) Addressing modes
(c) Arithmetic instructions (d) None of the mentioned
13. In the 8051 microcontroller, _____ pins are designated as external hardware 1 K1 CO5
interrupts INT0 and INT1.
(a) P1.2 and P1.3 (b) P2.2 and P2.3 (c) P0.2 and P0.3 (d) P3.2 and P3.3
14. In _____ serial communication, receiver and transmitter are not synchronized by 1 K1 CO5
clock.
(a) parallel (b) Asynchronous (c) Synchronous (d) universal
15. What is the purpose of the RI (Receive Interrupt) flag in serial communication with the 1 K1 CO5
8051 microcontroller?
(a) To indicate the availability of a new byte in SBUF.
(b) To signal the end of a byte transfer.
(c) To set the baud rate for communication.
(d) To enable duplex communication.
16. In a level-triggered interrupt, when does the microcontroller respond to the interrupt 1 K1 CO5
signal?
(a) None of the mentioned.
(b) When the signal changes from high to low.
(c) When a high-level signal is applied.
(d) When the signal changes from low to high.
17. In the 8051 microcontroller _____ will act as standard UART mode. 1 K1 CO6
(a) Mode 1 (b) Mode 1 (c) Mode 1 (d) Mode 0
18. What problem does using interrupts solve when dealing with the timer flag (TF) being 1 K1 CO6
raised during timer roll-over in a microcontroller?
(a) It prevents the timer from rolling over.
(b) It ties down the microcontroller while waiting for TF to be raised
(c) It decreases the accuracy of timer operations
(d) It allows the microcontroller to perform other tasks while waiting for TF to be raised.
19. In keypad programming ,the status of each key is determined by the process is 1 K1 CO6
called _____
(a) scanning (b) receiving (c) transmitting (d) controlling
20. Which of the following commands is commonly used to clear the display of an LCD 1 K1 CO6
when interfaced with an 8051 microcontroller?
(a) 0x0C (b) 0x02 (c) 0x01 (d) 0x08

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21. If computer A runs a program in 10 seconds, and computer B runs the same program in 2 K2 CO1
15 seconds, how much faster is A over B.
22. Write the MIPS assembly code for the following C expression? $f = g + (h - 5)$. 2 K2 CO1
23. Define Guard bit and Rounding. 2 K1 CO2
24. Show the representation of single precision floating point number. 2 K2 CO2
25. What is meant by branch is taken? 2 K1 CO3
26. Draw the portion of data-path used for fetching an instruction and incrementing program 2 K2 CO3
counter.
27. Summarize the applications of 8051. 2 K2 CO4
28. Name the five interrupt sources of 8051. 2 K1 CO4
29. What is the use of a watch dog timer? 2 K1 CO5
30. How are interrupts handled in 8051? 2 K1 CO6

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) Consider three different processors, P1 P2 and P3, executing the same instruction set. P1 has a 3 GHz clock rate and a CPI of 1.5. P2 has a 2.5 GHz clock rate and a CPI of 1.0. P3 has a 4.0 GHz clock rate and a CPI of 2.2. 10 K2 CO1
Q1. Which processor has the highest performance expressed in instructions per second?
Q2. If the processors each execute a program in 10 seconds, find the number of cycles and the number of instructions.
- OR**
- b) Define addressing mode and explain the basic addressing modes of MIPS with an example for each. 10 K2 CO1
32. a) Multiply 1010 * 1110 using sequential multiplication algorithm. 10 K2 CO2
- OR**
- b) Represent -307.1875 in IEEE single precision and double precision formats. 10 K2 CO2
33. a) Explain the operation of the data path for R-type instructions in detail. 10 K2 CO3
- OR**
- b) Draw and explain the functional block diagram with control signals for basic implementation of MIPS subset. 10 K2 CO3
34. a) With a neat sketch explain the architecture and functional block diagram of a 8051 microcontroller. 10 K2 CO4
- OR**
- b) Explain the different addressing modes of 8051. 10 K2 CO4
35. a) Sketch the pin configuration of port 3 and explain the various operations performed by the pins of port 3. 10 K2 CO5
- OR**
- b) Explain TCON and TMOD SFR for 8051 Microcontroller. 10 K2 CO5
36. a) Explain the function of LCD interfacing with 8051. 10 K2 CO6
- OR**
- b) Interface a 4x4 keyboard to 8051 and write an ALP to send the key code to port P1 whenever a key pressed. 10 K2 CO6