Reg. No.															

Question Paper Code	13558

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Third Semester

Information Technology

(Common to Computer Science and Engineering)

20ITPC303 - COMPUTER ORGANIZATION AND ARCHITECTURE

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	What is the primary role of the arithmetic and logic unit (ALU) in a computer? (a) Storing data (b) Controlling input devices (c) Performing arithmetic and logic operations (d) Coordinating output operations	1	K1	CO1
2.	What is the characteristic of a random-access memory (RAM)? (a) It is inexpensive and permanent (b) It has a long access time. (c) Any location can be accessed in a short and fixed amount of time (d) It retains data when power is turned off	1	K1	CO1
3.	When dividing 0.75 by 0.25 using decimal arithmetic, what is the result? (a) 3 (b) 0.3 (c) 30 (d) 7.5	1	K1	CO2
4.	In floating-point multiplication, what is the exponent of the result? (a) The sum of the exponents of the operands (b) The difference between the exponents of the operands (c) The average of the exponents of the operands (d) The product of the exponents of the operands	1	K1	CO2
5.	What is a control hazard in a pipelined processor? (a) When an instruction depends on the result of a previous instruction (b) When the pipeline stage is stalled (c) When branch instructions affect the flow of control (d) When there is a cache miss	1	K1	CO3
6.	Which type of data hazard occurs when an instruction tries to write to a register before a previous instruction has read from it? (a) Read-After-Write (RAW) (b) Write-After-Read (WAR) (c) Write-After-Write (WAW) (d) Read-After-Read (RAR)	1	K1	CO3
7.	What is the primary method of communication in message-passing multiprocessors? (a)Shared memory (b) Cache coherence (c) Explicit message passing (d) Task-level parallelism	1	K1	CO4
8.	What major economic opportunity of scale led to the development of cloud computing? (a) Reduced operational costs (b) Enhanced server reliability (c) Increased cooling efficiency (d) Lower per-unit costs of Warehouse-Scale Computers (WSCs)	1	K1	CO4
9.	What is a cluster in the context of parallel computing? (a) A network of computers functioning as a single large multiprocessor over a local area network. (b) A cluster of servers with separate memory but interconnected cores. (c) A shared-memory multiprocessor system. (d) A group of interconnected microprocessors within a single server.	1	K1	CO5

10. Which of the following are examples of memory technologies? *1 K1 CO6*
    (a) DRAM, SRAM, and magnetic storage media
    (b) DRAM, SROM, and magnetic storage media
    (c) DROM, SRAM, and magnetic storage media
    (d) DRAM, RAM, and magnetic storage media

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Define computer architecture. *2 K1 CO1*
12. What is a program counter? *2 K2 CO1*
13. What is sub-word parallelism? *2 K2 CO2*
14. Define modified Booth's algorithm. *2 K1 CO2*
15. Point out the concept of exceptions and interrupts. *2 K1 CO3*
16. Draw the format for R-type, I-type and J-type instruction. *2 K2 CO3*
17. Define the terms SISD, MIMD with examples. *2 K2 CO4*
18. Explain MIMD and its significance in parallel computing. *2 K2 CO4*
19. List the benefits of clustering in computer architecture. *2 K1 CO5*
20. Discriminate UMA and NUMA. *2 K1 CO5*
21. Distinguish between asynchronies DRAM and synchronous RAM. *2 K2 CO6*
22. Distinguish Between Static RAM and Dynamic RAM? *2 K2 CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Discuss MIPS addressing modes with examples. *11 K2 CO1*

OR

b) Explain various instruction formats and illustrate the same with an example. *11 K2 CO1*

24. a) Interpret the result of multiplying the following signed numbers using Booth's algorithm, $A=(-34)_{10}=(1011110)_2$ and $B=(22)_{10} = (0010110)_2$ where B is multiplicand and A is multiplier. *11 K3 CO2*

OR

b) Interpret the result of multiplying the following pair of signed 2's complement numbers using Booth's algorithm, $A=(-13)_{10}=(110011)_2$ and $B=(-20)_{10} = (101100)_2$ where A is multiplicand and B is multiplier. *11 K3 CO2*

25. a) State and draw a simple MIPS datapath with control unit and explain the execution of ALU instruction. *11 K3 CO3*

OR

b) Explain the operation of the data path for an R-type, Load Word, branch, jump instructions in detail. *11 K3 CO3*

26. a) Describe data level parallelism in SIMD and MISD. *11 K2 CO4*

OR

b) Explain in detail about hardware multithreading. *11 K2 CO4*

27. a) Explain clusters in detail. *11 K2 CO5*

OR

b) Describe the working of warehouse scale computers in detail. *11 K2 CO5*

28. a) Identify the various mapping schemes memory. *11 K3 CO6*

OR

b) Discuss the methods used to measure and improve the performance of the cache. *11 K3 CO6*