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Total Number of Pages: 02

B.Tech
RCS4D001

6th Semester Regular/Back Examination: 2022-23
SUBJECT: Computer Organisation and Architecture
BRANCH(S): EEE,EE

Time: 3 Hour

Max Marks: 100

Q. Code: M129

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right-hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- Define CPU (Central Processing Unit) in the context of a computer system.
- What are the main functional blocks of a computer system? Briefly explain each.
- Differentiate between CPU and memory in terms of their roles in a computer.
- Explain the concept of an instruction set architecture (ISA) of a CPU.
- Define signed number representation and explain its importance in computer arithmetic.
- What are the fixed-point and floating-point representations used in computers?
- How is a character represented in a computer system?
- Introduce the x86 architecture and its historical significance.
- Compare the hardwired and micro-programmed design approaches for CPU control units.
- Provide a brief overview of semiconductor memory technologies.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Illustrate the shift-and-add multiplication technique with an example.
- What is the Booth multiplier, and how does it improve the multiplication process?
- Differentiate between restoring and non-restoring division techniques in computer arithmetic.
- Convert the decimal number -42 to its equivalent 8-bit binary representation using two's complement.
- Perform the subtraction of two signed binary numbers: 101010 and 110111.
- Explain the steps involved in multiplying two binary numbers using the Booth multiplier algorithm.

- g) Compare cache memory with main memory in terms of access time and capacity.
- h) Compare the features and advantages of SCSI and USB as I/O device interfaces.
- i) Differentiate between privileged and non-privileged instructions, emphasizing their impact on system security.
- j) Illustrate the process of program-controlled I/O transfers in a computer system.
- k) Compare direct mapping, associative mapping, and set-associative mapping in cache memory.
- l) Analyze the performance of different replacement algorithms (e.g., LRU, FIFO) in cache memory.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Describe the role of memory management units (MMUs) in cache memory operations. Discuss the importance of cache coherence in multiprocessor systems. **(16)**
- Q4** Explain the concept of memory interleaving and its benefits in multiprocessor systems. Describe the hierarchy of memory organization in a computer system and its impact on performance. **(16)**
- Q5** How do input-output subsystems contribute to the overall performance of a computer? Explain the concept of process scheduling and its relation to I/O device interfaces. **(16)**
- Q6** Describe the steps involved in DMA (Direct Memory Access) I/O transfers and their benefits. Discuss the challenges and solutions in handling software interrupts and exceptions. **(16)**