Code No.: R23XXXX II B.Tech II Semester Supplementary Examinations, November 2024
Computer Architecture (Common to CSE, IT, AI & DS, AI & ML, CSD, CSIT, CSM, CSE (AI &
ML), CSE (IoT), CSE (Cyber Security)) Time: 3 Hours Max Marks: 70

Instructions:

- The question paper consists of two parts: Part-A and Part-B.
- Answer ALL questions in Part-A.
- Answer any FIVE questions from Part-B.
- All questions carry equal marks.

PART-A (10 x 2 = 20 Marks)

1. Convert the decimal number 125.75 into binary, octal, and hexadecimal systems.
2. Explain the difference between fixed-point and floating-point representation.
3. What are universal gates? Give examples.
4. Simplify the Boolean expression: AB + A'B + AB'.
5. What is the difference between combinational and sequential circuits?
6. State the role of the control unit in a computer system.
7. Explain the concept of pipelining in processors.
8. What is the purpose of cache memory? How does it impact performance?
9. Define Direct Memory Access (DMA) and its significance.
10. What is the Von-Neumann architecture? Briefly explain.

PART-B (5 x 10 = 50 Marks)

UNIT I

11.a) Convert the hexadecimal number 3F.AC to binary and decimal forms and explain the
process in detail.

OR

11.b) Simplify the following Boolean function using a 4-variable K-map: F(A, B, C, D) = Σ(1, 3, 5,
7, 9, 11, 13, 15). Draw the resulting circuit using basic gates.

UNIT II

12.a) Design a 3-bit binary counter using JK flip-flops. Explain the design steps and operation.

OR

12.b) Describe the Von-Neumann architecture. Discuss its advantages and limitations with a
suitable diagram.

UNIT III

13.a) Explain the working of a carry-lookahead adder. Design a 4-bit carry-lookahead adder and explain the logic.

OR

13.b) Discuss the steps involved in the execution of an instruction cycle in a processor.

UNIT IV

14.a) Explain the concept of cache memory. Discuss different cache mapping techniques with examples.

OR

14.b) Describe virtual memory. How does paging help implement virtual memory?

UNIT V

15.a) What is an interrupt? Explain the different types of interrupts with suitable examples.

OR

15.b) Discuss the working of Direct Memory Access (DMA). How does it improve I/O operations?

End of Paper