

END TERM EXAMINATION

THIRD SEMESTER [BCA] JANUARY-FEBRUARY 2023

Paper Code: BCA-203

Subject: COMPUTER ORGANIZATION
AND ARCHITECTURE

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q.No.1 which is compulsory.
Select one question from each unit

- Q1. Attempt the following (any five) [5x5=25]
- (a) Why are NAND and NOR gates known as Universal Gates? Realize Ex-OR function using only NAND gates.
 - (b) Differentiate De-Multiplexer and decoder.
 - (c) What is instruction cycle? Draw a flowchart for instruction cycle of a basic computer?
 - (d) What is virtual memory and how does it works?
 - (e) Explain the advantage of SIPO over SISO. Discuss their applications.
 - (f) Design 4-bit Adder-Subtractor.

UNIT-I

- Q2. (a) Draw K-Map and simplify the following expression:

$$f(P, Q, R, S) = \sum m(0, 1, 4, 5, 7, 8, 9, 12, 13, 15) \quad [6.5]$$

- (b) Design a full adder using two half adder and OR gate. [6]

- Q3. (a) Reduce the following Boolean expression using Boolean laws.

$$Y = AB + A'B + AB' + (AB)' \text{ and also design using basic logic gates. } [6.5]$$

- (b) Design a 3:8 decoder using basic logic gates. [6]

UNIT-II

- Q4. (a) What is shortcoming in J-K flip flop? Explain how its shortcoming is removed. Describe its operating principle. [6.5]

- (b) Design 3-bit synchronous counter and draw output waveform. [6]

- Q5. (a) Describe the operation of 4-bit bidirectional shift register with the help of block diagram. <https://www.ggsipuonline.com> [6.5]

- (b) Realize D type flip-flop using J-K flip flop. [6]

UNIT-III

- Q6. (a) Explain instruction formats and its types using the following expression: $X = (A+B) - (C+D)$. [6.5]

- (b) What is register transfer language? Explain with the help of example. [6]

P.T.O.

- Q7. (a) Explain the different types of addressing modes in basic computer. **[6.5]**
- (b) What is meant by micro-operation? Explain the term selective set, selective compliment, selective clear micro operation? **[6]**

UNIT-IV

- Q8. (a) What is asynchronous data transfer? Explain different methods of asynchronous data transfer. **[6.5]**
- (b) What is DMA? Draw and explain the DMA controller in details. **[6]**
- Q9. Write short notes on the following:- **[12.5]**
1. Cache Memory 2. Auxiliary Memory 3. Associative Memory 4. EPROM
5. RAM

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