

**18007**

**B.C.A. Examination, June-2023**  
**DIGITAL ELECTRONICS AND**  
**COMPUTER ORGANISATION**

**(BCA-204)**

Time : 3 Hours]

[Maximum Marks : 75

**Note:** Attempt questions from all Sections as per instructions.

**Section-A****(Very Short Answer Type Questions)**

**Note :** Attempt all the *five* questions. Each question carries 3 marks. Very short answer is required not exceeding 75 words.  $5 \times 3 = 15$

1. Give the logic diagram and truth table of RS flip-flop. 3
2. Why RAM is used in computer? How static RAM is different from Dynamic RAM and where these RAMs are used in computer system? 3
3. Construct half adder circuit using basic gates. 3
4. State and prove De-Morgan theorem. 3

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5. With logic diagram, characteristic table and the characteristic equation, explain the operation of a D Flip-Flop. 3

**Section-B****(Short Answer Type Questions)**

**Note:** Attempt any *two* questions out of the following three questions. Each question carries 7.5 marks. Short answer is required not exceeding 200 words.  $2 \times 7.5 = 15$

6. What are multiplexer and Demultiplexer? Also give the logical expression.  $7\frac{1}{2}$
7. Draw and explain SISO, SIPO, PISO and PIPO shift registers with suitable example.  $7\frac{1}{2}$
8. Implement following boolean function using multiplexers.  $7\frac{1}{2}$

$$F(ABCD) = \Sigma(0, 1, 3, 4, 9, 15)$$

**Section-C****(Descriptive Answer Type Questions)**

**Note:** Attempt any *three* questions out of the following five questions. Each question carries 15 marks. Answer is required in detail.  $3 \times 15 = 45$

9. Explain cache memory and cache initialization. Give the significance of cache memory.

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A two way set associative cache memory uses block of four words. The cache can accommodate a total of 2048 words from the main memory. The main memory size is  $128K \times 32$

- (a) Formulate all pertinent information required to construct the cache memory.
- (b) What is the size of cache memory? 15
10. Design a synchronous sequential circuit with 2 inputs T and C. The output attains a value of 1 when  $T = 1$  and C moves from 1 to 0. Otherwise output is 0. 15
11. What is decoder? Draw the circuit of a 2 to 4 decoder and explain its functions. 15
12. Explain the difference between all of the following- 15
- (a) Volatile and Non-Volatile memory
- (b) Static and Dynamic memory
- (c) Sequential and Random Access memory
- (d) Magnetic and Semi-Conductor memory
- (e) Sum of Product (SOP) and Product of Sum (POS)
13. Design an  $32 \times 8$  memory RAM chip using  $16 \times 4$  memory chips. 15