

Code : 303402

BCA 4th Semester Theory Examination, 2017

**Digital Electronics, Computer System Architecture and
Organization**

Time : 3 hours

Full Marks : 60

Instructions :

- (i) The marks are indicated in the right-side margin.
 - (ii) There are seven questions in this Paper.
 - (iii) Attempt five questions in all.
 - (iv) Question No. 1 is compulsory.
1. Choose the correct answer of the following: $2 \times 6 = 12$
- (a) For two variable, $n = 2$, the number of possible Boolean function is
 - (i) 4
 - (ii) 8
 - (iii) 16
 - (iv) 12
 - (b) The one major advantages of CMOS is it's:
 - (i) Low Propagation delay
 - (ii) High propagation delay
 - (iii) Very low propagation delay
 - (iv) No delay

P.T.O.

- (c) 64K memory contains how many words of 8 bits each:
 - (i) 65, 536
 - (ii) 64,536
 - (iii) 65,436
 - (iv) 65,546
 - (d) What is Q, when $S=1$ and $R=1$ for SR flip-flop?
 - (i) No Change
 - (ii) Clear to 0
 - (iii) Set to 1
 - (iv) Intermediate
 - (e) The simplest way to determine cache locations in which to store memory blocks is the
 - (i) associative Mapping technique
 - (ii) Direct Mapping technique
 - (iii) Set-Associative Mapping technique
 - (iv) Indirect Mapping technique
 - (f) The registers found in the processor unit are
 - (i) operational register
 - (ii) Memory register
 - (iii) Storage register
 - (iv) Binary register
2. (a) Determine by means of a truth table the validity of D Morgan's theorem for three variables:
 $(ABC)' = A' + B' + C'$.

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- (b) Simplify the following Boolean function in sum-of-products form by means of a four-variable map. Draw the logic diagram with (a) AND-OR gates: (b) NAND gates.

6+6

$$F(A,B,C,D) = \sum (0,2,8,9,10,11,14,15)$$

3. (a) Draw the block diagram of a dual 4-to-1-line multiplexers and explain its operation by means of a function table.
 (b) What is the difference between serial and parallel transfer? Using a shift register with parallel load, explain how to convert serial input data to parallel output and parallel input data to serial output.

6+6

4. (a) Convert the hexadecimal number F3A7C2 to binary and octal

- (b) Obtain the 1's and 2's complements of the following eight-digit binary number:

10101110; 10000001; 10000000

6+6

5. (a) Design a 4-bit combinational circuit decremter using four full-adder circuits.

- (b) Design a digital circuit that performs the four logic operations of exclusive OR, exclusive-NOR, NOR and NAND. Use two selection variables. Show the logic diagram of one typical stage.

6+6

6. (a) What is the purpose of the address bus in microprocessor?

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- (b) What is the difference between a RAM and a ROM?
 (c) Can a microprocessor be used in place of microcontroller in applications? Justify your answer.

4+

7. A bus-organized CPU has 16-registers with 32 bits in each ALU, and a destination decoder.

- (i) How many multiplexers are there in the A bus, and what is the size of each multiplexer?

- (ii) How many inputs and outputs are there in the decoder?

- (iii) How many inputs and outputs are there in the ALU data, including input and output carries?

4+1

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