

Roll No. 0902348.....

BCA-202(N)

**B. C. A. (Second Semester)
EXAMINATION, May, 2018**

(New Course)

Paper Second

**DIGITAL ELECTRONICS AND COMPUTER
ORGANIZATION**

Time : Three Hours] [Maximum Marks : 75

Note : Attempt questions from all Sections as directed.

Inst. : The candidates are required to answer only in serial order. If there are many parts of a question, answer them in continuation.

Section—A

(Short Answer Type Questions)

Note : All questions are compulsory. Each question carries 3 marks.

1. (A) State the absorption law of Boolean Algebra.
- (B) State and prove the De-Morgan's theorem and simplify the expression :

$$[((AB)'C)'D']$$

- (C) Find the minterms of the logical expression :

$$Y = A'B'C' + A'B'C + A'BC + ABC'$$

(B-54) P. T. O.

- (D) Find the base (or radix) of the number system such that the following equation holds : $\frac{312}{20} = 13.1$.
- (E) What is Cache memory ? Design 32×8 RAM structure.
- (F) How many 256×8 RAM chips are needed to provide a memory capacity of 2048 bytes ? Also find the number of address lines and data lines.
- (G) Express the boolean function $F = x + y'z$ as a product of max term.
- (H) What is flip-flop ? Explain the working of RS flip-flop using logic diagram.
- (I) Represent decimal number 8620 in BCD and Excess-3 code.

Section—B

(Long Answer Type Questions)

Note : Attempt any two questions. Each question carries 12 marks.

2. (a) Implement EX-OR gate with NOR gate only.
- (b) Simplify the following Boolean function :
 $F(P, Q, R, S) = \Sigma(2, 3, 4, 5, 6, 7, 11, 14, 15)$
 and implement of means of NAND Gate.
- (c) Differentiate between combinational and sequential circuit.
3. Design a BCD to excess-3 code converter.
4. (a) Design a MUX for the function of time variable :

$$F(A, B, C) = \Sigma(1, 3, 5, 6)$$

Draw the implementation table.

- (b) What is decoder ? Show the logic circuit of 3×8 decoder.
5. Write short notes on any two of the following :
- (i) Full Adder circuit
 - (ii) Simplify the Boolean function :
 $F(w, x, y, z) = \Sigma(0, 1, 2, 3, 7, 8, 10)$
 $d(w, x, y, z) = \Sigma(5, 6, 11, 15)$
 - (iii) Virtual memory

Section—C

(Long Answer Type Questions)

Note : Attempt any two questions. Each question carries 12 marks.

6. What is Encoder ? Explain.
 Construct a logic diagram of 4×16 line decoder using 3×8 line decoder.
7. What is counter ? Explain.
 Design a counter that has repeated sequence of six states 0, 1, 2, 4, 5, 6 using JK flip-flop.
8. (a) Explain the working of RS and D flip-flops.
 (b) Implement the following function with NAND gates :
 $F(x, y, z) = \Sigma(0, 6)$
9. Design a logic construction of 32×4 ROM. What is the size of decoder used ?