Roll No. .....

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 :

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

(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 ?