BCA–202(N)

B. C. A. (Second Semester)
EXAMINATION, May/June, 2015

(New Course)

Paper Second

DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

Time : Three Hours]　　　　　　　[*Maximum Marks : 75*

Note : Section A is compulsory. Attempt any *two* questions from Section B and any *two* questions from Section C.

Section—A　　　　　　3 each

(Short Answer Type Questions)

1. (A) How many 32 K × 1 RAM chips are needed to provide a memory capacity of 256 K bytes ?

　　(B) What is the minimum number of gates required to implement the Boolean function (AB + C) if we have to use only 2 input NOR gates ?

　　(C) Find the minimum number of D flip-flops needed to design a mode 258 counter.

(D) Given f_1, f_3 and f is canonical sum of products form (in decimal) for the circuit.
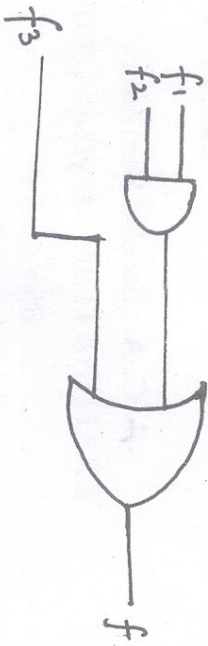

$f_1 = \Sigma m (4, 5, 6, 7, 8)$

$f_3 = \Sigma m (1, 6, 15)$

$f = \Sigma m (1, 6, 8, 15)$

Fig.

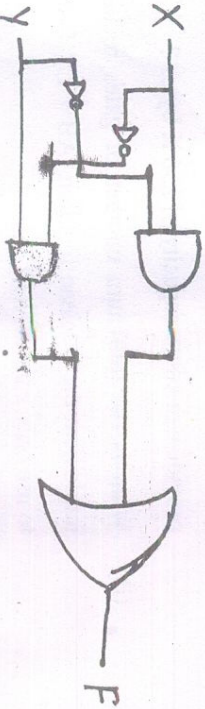(E) Find the output of the following logic diagram.

then find f_2.

Fig.

(F) Implement EX-NOR gate with the help of NAND gate. Show the output at each step.

(G) Express the Boolean function $F = P + Q'R$ in a sum of mini terms.

(H) Simplify the Boolean function :

$F = (A'BC + AB'C' + ABC + ABC')$

(I) Explain the JK flip-flop with its working.

Section—B

(Long Answer Type Questions)

2. What is PLA ? A combinational circuit is defined by the functions :   12

   $F_1 (A, B, C) = \Sigma (3, 5, 6, 7)$

   $F_2 (A, B, C) = \Sigma (0, 2, 4, 7)$

   Implement the circuit with PLA having three inputs, four product terms and two outputs.

3. (i) Implement the following function using the don't care conditions :   10, 2

   $f (c, d, a, b) = \Sigma (0, 2, 6, 8)$

   and $d (c, d, a, b) = \Sigma (1, 4, 10)$

   (ii) What is the use of min terms and max terms ?

4. Design a counter with the following binary sequence : 0, 1, 3, 7, 6, 4 and represent using T flip-flops.   12

5. Write short notes on any *three* of the following :   4 each

   (i) Shaft register

   (ii) Race condition in RS flip-flop

   (iii) Full adder

   (iv) Design procedure of sequential circuits

Section—C 8 each

(Long Answer Type Questions)

6. A RAM chip has a capacity of 1024 words of 8 bits each (1 k × 8). Find the number of 2 × 4 decoders with enable lines needed to construct a 16 k × 16 RAM from 1 k × 8 RAM. 12

7. What is decoder ? Design a BCD to Decimal decoder. 10, 2

8. Draw the block diagram of sequential circuit and discuss it.

   Implement the function F $(A, B, C) = \Sigma (1, 3, 5, 6)$ with multiplexer. 2, 10

9. Answer any *three* of the following : 4 each

   (i) Design 4 ×16 decoder with two 3× 8 decoder

   (ii) Logic diagram of a look ahead carry generator

   (iii) Half-substractor

   (iv) Simplify the Boolean function :

   $$F\left(x, y, z\right) = \Sigma\left(0, 2, 4, 5, 6\right)$$