**Course Code : CST 214** **MQNR/MW – 19 / 9534**

# Third Semester B. E. (Computer Science and Engineering) Examination

## DIGITAL CIRCUITS AND FUNDAMENTALS OF MICROPROCESSOR

Time : 3 Hours ] [ Max. Marks : 60

**Instructions to Candidates :—**

(1) All questions carry marks as indicated against them.
(2) Due credit will be given to neatness and adequate dimensions.
(3) Assume suitable data and illustrate answers with neat sketches wherever necessary.

1. (a) Simplify the Boolean function F together with the don't care condition d and implement using logic gates :

$F(A, B, C, D) = \pi M(2, 3, 4, 10, 13, 15) \cdot d(0, 5, 6)$ 6 (CO 1)

(b) Convert $(53)_{10}$ to XS – 3 code. 2 (CO 1)

**OR**

(c) Write down the result for :

(a) $60_D + F1_{16} - 1001001_2$

(b) $FE_{16} - 88_{16}$ 8 (CO 1)

(d) Represent the decimal numbers 398 and 635 in BCD. 2 (CO 1)

2. (a) A Combinational circuit is defined by the following three Boolean functions :

$F1 = (X + Y)' + XYZ'$

$F2 = XYZ + (X + Y)'$ and

$F3 = (X + Y)' + X'YZ$

Design the circuit with a decoder and external OR gates. 8 (CO 2)

**OR**

(b) Design the Boolean equation

$Y = B'D + ABD' + A'B'C$ using 16:1 and 8:1 MUX. 8 (CO 2)

(c) Subtract using 2's complement method (66 – 44). 2 (CO 1)

3. (a) A sequential circuit with two D flip – flops A and B, two inputs X and Y and one output Z is specified by the following input equations :

$D_A = XY' + XA'$

$D_B = X'B' + XA$ and

$Z = X'B$

(a) Draw the logic diagram of the circuit.

(b) Derive state table.

(c) Derive state diagram. 10 (CO 3)

**OR**

4. (a) Explain with example how flip input equations are used for designing the sequential circuit. Describe its operation with the help of state table. 5 (CO 3)

(b) How a Latch can be converted into a Flip – flop ? Give any one example along with a truth table. 5 (CO 3)

5. (a) Design a Synchronous locked out MOD6 counter using T Flip – flop. 7 (CO 3)

**OR**

(b) Draw and explain the block diagram of Flip – Flop conversion logic by taking a suitable example. 7 (CO 3, 4)

(c) State the different types of registers and give the design of any one. 3 (CO 3, 4)

6. (a) Design a Full Adder circuit with three inputs and two outputs with the help of ROM. Specify the size of ROM required for the implementation. 7 (CO 2, 4)

**OR**

(b) Realize the following function using PLA :

$F1(A, B, C) = \Sigma m(3, 5, 7)$, $F2(A, B, C) = \Sigma m(4, 3, 5, 7)$

What is the significance of complement output in PLA ? 7 (CO 3, 4)

(c) Write a note on Flash memories. 3 (CO 3, 4)

7. (a) Specify the addressing mode and the operation performed by the following instructions :

(a) SHLD C200H

(b) STA 5000H

(c) ADD M

(d) PUSH Rp

(e) RAL 10 (CO 4)

**OR**

8. (a) Write a program using 8085 instruction which will transfer 10 data bytes which is stored at memory location C200H to the location C220H onwards. 5 (CO 4)

(b) Explain the functioning of the following pins of 8085 microprocessor. Indicate their activation status :

(i) Interrupt Control.

(ii) Status control.

(iii) Address / data demultiplexing. 5 (CO 4)