Course Code : CST 214 **CXDW/RW – 18 / 5019**

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 equal marks.
(2) Assume suitable data wherever necessary.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Illustrate your answers wherever necessary with the help of neat sketches.

1. Solve any **Two** :—

(a) Express the following equation in the minterm form and maxterm form:

$F(w, x, y, z) = y'z + wxy' + wxz' + w'x'z$ 5(CO 1)

(b) Simplify the following expression using k-map:

$F = \Sigma m(0, 2, 3, 5, 6, 8, 9) + d(8,9,10,11,12,13,14)$ 5(CO 1)

(c) Explain Look Ahead Carry Adder with the help of diagram. 5(CO 1)

2. Solve any **Two** :

(a) Explain and design the BCD subtractor using 9's complement method with the help of diagram and example. 5(CO 2)

(b) What do you mean by demultiplexor ? Draw demultiplexor tree for implementing 1:16 demultiplexor using 1:2 demultiplexors. State most significant bit and least significant bit of the input. 5(CO 2)

(c) Design priority encoder having four inputs and 2 outputs with following priority : D0>D2>D3>D1. 5(CO 2)

3. Solve any **Two** :

(a) State the difference between latch and Flipflop. Explain SR latch and SR flipflop. 5(CO 3)

(b) Derive the state table and state diagram for the following Circuit where X is external input and Y is output :

$Ja = B, \quad Ka = BX'$

$Jb = B'X, \quad Kb = AX' + A'X, \quad Y = AB'$ 5(CO 3)

(c) Design a circuit that reads stream of bits of 0s and 1s and generates an output '1' if sequence 000 or 111 is detected without overlap. 5(CO 3)

4. Solve any **Two** :

(a) Write a note on :

(i) Ring counter.

(ii) Johnson's Counter. 5(CO 3,4)

(b) Design 3 bit up/down synchronous counter using T flipflop. 5(CO 3,4)

(c) What do you mean by shift register and elaborate its types ? 5(CO 3,4)

5. Solve any **Two** :

(a) Design PAL for the realization of 3:8 Decoder. 5(CO 2,4)

(b) Design a circuit for implement ROM for following Boolean functions:

$A(x, y, z) = \Sigma m(3, 6, 7)$

$B(x, y, z) = \Sigma m(0, 1, 4, 5, 6)$

$C(x, y, z) = \Sigma m(2, 3, 4)$

$D(x, y, z) = \Sigma m(2, 3, 4, 7)$ 5(CO 2,4)

(c) What do you mean by Programmable logic device ? Explain its types in detail. 5(CO 2,4)

6. Solve any **Two** :

(a) Explain the following components :

(i) ALE

(ii) Ready

(iii) TRAP

(iv) HOLD

(v) S1 and S0 5(CO 4)

(b) Explain the Addressing modes in 8085 microprocessor. 5(CO 4)

(c) Write an assembly language program for searching an element stored at memory location 0010H in the array of 10 databytes stored from memory location 0015H. Print '1' if element is present, otherwise '0' to memory location 0011H. 5(CO 4)