Course Code : CST 214 **KOLP/RW – 19 / 9034**

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) Illustrate your answers wherever necessary with the help of neat sketches.

1. Solve any **Two** :—

(a) Implement the following Boolean function using only NOR gates :

$F = A \oplus B \oplus C$ 5 (CO 1)

(b) Prove the following Boolean expression using Boolean algebra rules :

(i) $(A' + C)(A' + C')(A + B + CD) = A'(B + CD)$

(ii) $AB + A(B + C) + B(B + C) = AC + B$ 5 (CO 1)

(c) Simplify the following expression using K – map :

$F = \Sigma m(2, 3, 4, 6, 8, 10, 12, 22, 23) + d(0, 9, 20, 25)$ 5 (CO 1)

2. Solve any **Two** :—

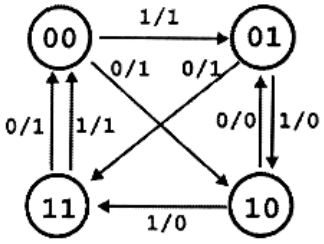
(a) Design a 3 bit input combinational circuit for binary to gray code convertor. 5 (CO 2)

(b) State the concept of decoder with the help of one example. Design 4 : 16 decoder using only 2 : 4 decoders. 5 (CO 2)

(c) Design a combinational circuit for BCD adder and example with one example. 5 (CO 2)

3. Solve any **Two** :—

(a) Realize the circuit from the given state diagram using T flipflop.



5 (CO 3)

(b) What do you mean by flipflop ? Convert D flip flop to J – K flipflop. Give its truth table, equation and diagram. 5 (CO 3)

(c) Design an overlapping sequence detector for detecting the sequences 1101 using T flipflops. 5 (CO 3)

4. Solve any **Two** :—

(a) Design decade Down Counter using D Flipflop. 5 (CO 3, 4)

(b) Distinguish between synchronous and asynchronous counter. Give example of each with circuit diagram. 5 (CO 3, 4)

(c) State and explain bidirectional shift register. 5 (CO 3, 4)

5. Solve any **Two** :—

(a) Explain the following terms :

(i) PLD

(ii) Flash Memory. 5 (CO 4)

(b) Implement the following functions using PROM and state its size :
$F1 = \Sigma m(1, 5, 7, 8)$, $F2 = \Sigma m(0, 2, 3, 5, 7, 9, 10, 12, 18, 23, 37)$,
$F3 = \Sigma m(4, 5, 7, 13, 15, 21, 25)$. 5 (CO 4)

(c) Design PLA to implement following functions :—

$F1 = \Pi M(0, 1, 2, 4)$

$F2 = \Pi M(0, 5, 6, 7)$ 5 (CO 4)

6. Solve any **Two** :—

(a) Explain the flags of 8085 microprocessor. 5 (CO 4)

(b) Explain the following commands with example :

(i) DAD

(ii) PCHL

(iii) RAL 5 (CO 4)

(c) Write an assembly language program of microprocessor 8085 for unpacking the 2 digit number present at memory location 1100 H and store units place digit at 0012 H and tens place digit at 0013 H. 5 (CO 4)