Sub Code:REC301

Paper Id: 130326 Roll No:

B. TECH.
(SEM-III) THEORY EXAMINATION 2018-19
DIGITAL LOGIC DESIGN

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. Define Digital System?

b. Write the definition of the Duality Theorem?

c. Define Rise Time?

d. What is the binary number system?

e. State the De Morgan's Theorem?

f. What are the applications of Flip-Flops?

g. What is the difference between Synchronous and Asynchronous Counters?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. What are prime implicant and essential prime implicant? simplify the Boolean function using K-Map and identify them
$f(a,b,c,d)=\Sigma\, m(0,1,2,5,6,7,8,9,10,13,14,15)$

b. Design a combinational logic circuit to check for even parity of three bits.

c. Using Quine McCluskey method & PI reduction table, determine the minimal SOP expression for the following using decimal notation
$f=\Sigma\, m(1,4,7,9,12,14)+\Sigma\, d(2,13)$

d. Write the compressed truth table for a 4 to 2 line priority encoder with a valid output and simplify the same using K-Map. Design the logic circuit for the same.

e. With the aid of block diagram clearly distinguish between a decoder and encoder.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Add and multiply the following numbers in the given base without converting to decimal: (i) $(123)_4$ and $(321)_4$ (ii) $(567)_8$ and $(234)_8$.

(b) Convert the decimal number 246.8 to base 3, base 5 and base 7.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Explain about ROM and PROM.

(b) Draw the basic circuit of the RTL NOR gate. Explain the operation.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) With the help of logic diagram, explain the 4 bit universal shift register using D flip-flops and 4:1 MUX.

(b) Write the truth table of the SR, JK, D & T flip-flops.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Simplify following logic function and realize using NOR gates.
$f(w,x,y,z)=\pi M(1,2,3,7,10,11)+d(0,15)$
$f(w,x,y,z) = \pi\, M\,(3,4,5,6,7,10,11,15)$

(b) Draw the basic circuit for the DTL NAND gate. Explain the operation.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) What is asynchronous counter? How would you design asynchronous counter?

(b) Design a BCD counter with JK flip flops.