B.Tech.

THIRD SEMESTER EXAMINATION 2015-16

EEC302

DIGITAL ELECTRONICS

Time: 3 hours **Max Mark: 100**

Note

- Attempt all questions.
- Marks and number of question to attempt from the section is mentioned before each section.
- Assume missing data suitably .Illustrate the answer with suitable sketch.

1. Attempt any four of the following: **[4x5]**

a) What is the difference between Binary Number and BCD number? obtain the 1's and 2's complements of the following binary numbers

i. 11101010

ii. 01111110

b) Subtract using 9's and 10's compliment of the given numbers –

i. $(9190)_{10}$-$(3578)_{10}$

ii. $(4566)_{10}$-$(6778)_{10}$

c) Covert the expression F= x'+x(x+y')(y+z') into standard POS form. Also draw the logic circuit using NOR gate.

d) Simplify the Boolean functions, using K-map

F(A,B,C,D) =∑m (3,7,11,13,14,15)

Also draw the expression using only NAND gates.

e) State and prove de-Morgan's first and second theorem. Convert the expression $(AB + C)(B + \bar{C}\,D)$ into sum of product.

f) Prove that

i. $((A + \bar{B}) + AB)(A + \bar{B})(\bar{A}\bar{B})=0$

ii. $A + \bar{A}B + AB = A + B$

2. Attempt any four of the following: **[4x5]**

a) Draw a 32:1 Multiplexer using 4:1 Multiplexer.

b) Draw the logic diagram of full adder and also derive from half adders.

c) Design a BCD to 7 segment decoder using a common cathode display.

d) Design a octal to binary encoder.

e) Minimize the following function using Quine-McCluskey method:

F(A,B,C,D) = ∑m (2,4,8,9,11,15)

f) Minimize the following standard expression using K-map

F(A,B,C,D) = ∑m (0,1,2,6,8,10,15) + d (3,5,9,11)

3. Attempt any two of the following: **[2x10]**

a) Draw and explain the master slave J-K flip flop. Explain how race around condition is avoided using master slave J-K flip -flop?

b) What is meant by sequential circuits? Write the steps for design of asynchronous sequential machine.

c) Design and Explain the conversion from S-R flip flop in to D flip flop with truth table. Give reason why D flip flop is called as data latch?

4. Attempt any two of the following: **[2x10]**

a) Describe the difference between the following-

i. PLA and PAL

ii. Static RAM and dynamic RAM

b) Classify the shift registers. Also draw and explain the circuit for serial in parallel out shift register.

c) Write short note on the following-

i. Sequence and random access memories

ii. Charge coupled devices (CCD)

5. Attempt any two of the following: **[2x10]**

a) What do you understand by fundamental mode of operation in Asynchronous sequential circuit? Give hazard-free realization for the following Boolean function.

f(A,B,C,D) =∑m (0,2,6,7,8,10,12)

b) What are the different types of hazards in asynchronous circuits? Differentiate Static-0 and Static-1 hazard with wave form.

c) Explain the following:

(i) Ring Counter

(ii)Critical race condition

OR

c) For the state diagram shown in figure 1, obtain the state table and design the circuit using minimum number of J-K flip flop.

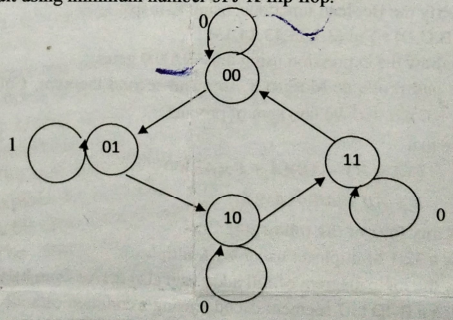

Figure 1