

SE-SEM III (ETRA) (R.W) May 2013

20/5/13

D. S. D. - I

133 : 1ST HALF-13 (p)-JP

Con. 6453-13.

GS-6306

(3 Hours)

[ Total Marks : 100

N.B. (1) Question No. 1 is compulsory.

(2) Attempt any four, out of remaining six questions.

1. (a) Simplify  $y = A + B \bar{C} + A B \bar{D} + A B C D$  using Boolean theorems and implement it using only NAND gates. 20  
(b) Differentiate between Combinational and Sequential circuits.  
(c) Explain the term "Metastability", its causes and effects.  
(d) Draw the circuit diagram of 2 I/P CMOS NAND gate.
2. (a) Explain Gray Codes. Design 3-bit binary to gray code convertor using 74151 IC's. 20  
(b) Obtain Hamming code for "1010" data using odd parity? Why Hamming codes are called error correcting codes? Justify.
3. (a) Simplify  $F = \sum m(1, 2, 4, 7, 11, 13) + d(9, 15)$  using K-map. Implement the function using only NOR gates. 20  
(b) Explain comparator IC 7485. Write its function table and design 12 bit comparator using three 7485 IC'S.
4. (a) Using Quine McCluskey Simplification Method : 20  
Simplify  $F = \sum m(1, 3, 8, 9, 13, 15) + \sum d(10, 11)$ .  
(b) Briefly explain the classification of Logic families. Draw the diagram of 2 I/P TTL NAND gate and explain the advantages of Totem-pole output.
5. (a) Explain 4 bit Johnson counter using circuit diagram, state diagram and timing diagram. 20  
(b) Draw circuit diagram of JKFF using NAND gates. Derive its characteristic equation and excitation table. What is a Race around condition in JKFF and give any two remedies to overcome it.
6. (a) Design Mod-11 synchronous counter using TFF. 20  
(b) A lawn sprinkling system is controlled automatically by certain combination of the following variables –  
season ( $S = 1$  if summer, 0 otherwise)  
Temperature ( $T = 1$  if high; 0 if low)  
Atmospheric humidity ( $H = 1$ , if high; 0 if low)  
Moisture content of the soil ( $M = 1$ , if high; 0 if low)  
The sprinkler is turned ON under any of the following circumstances :  
(i) The moisture content is low in winter  
(ii) The temperature is high and moisture content is low in summer  
(iii) The temperature is high and humidity is high in summer  
(iv) The temperature is low and moisture content is low in summer  
(v) The temperature is high and humidity is low.
7. Write short notes on :— 20  
(a) Static and Dynamic Hazards (c) ECL Circuit for 2 I/P NOR Gate  
(b) Switch Debouncing Logic Circuit (d) Alphanumeric Codes.