

TEC-302

Printed Pages : 4

Roll No. to be filled in your Answer Book

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**B. Tech**

THIRD SEMESTER UTU EXAMINATION, 2013-14

**Digital Electronics and Design Aspects**

Time : Three Hours]

[Max. Marks : 100

Note:- Attempt All Questions. All Questions carry equal marks.

Q1. Attempt any four Questions of the following:- 4x5=20

- (a) Which are the factors that determine the operating speed of a logic gate? How can the speed performance of a TTL be improved?
- (b) Describe the realisation of the Boolean function,  $f(x, y, z) = \sum m(0, 2, 3, 5)$  using an 8-to-1 line multiplexer.
- (c) Explain, using example, a fault table. Discuss the advantages and disadvantages of fault-table method.
- (d) Design Mod-3 Counter
- (e) Convert the following hex into octal
- (i) F (ii) DF (iii) 15.AC (iv) 18FFC (v) 53

(1)

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- (f) Enumerate the features of Hamming code? How error correction is possible using that code?

Q2. Attempt any four Questions of the following:- 4x5=20

- (a) When do you use NMOS logic circuits? Write a brief note on CMOS logic
- (b) Implement the Full Adder using 8 x 1 Multiplexers
- (c) Explain the following with example  
 (i) static-0 hazard      (ii) static-1 hazard  
 (iii) Dynamic hazard    (iv) Essential hazard
- (d) Convert the following binary number into  
 (i) Gray code, (ii) Excess-3 code  
 (i) 110    (ii) 1011    (iii) 11100    (iv) 1010110    (v) 100001
- (e) simplify the expression using K Map  

$$s = \Sigma(0, 1, 2, 3, 8, 9, 10, 11, 15) + d(4, 5, 14)$$
- (f) What is finite state machine? Explain its significance.

Q3. Attempt any two Questions of the following:- 2x10=20

- (a) How do you compare a PAL device with the PLA? Illustrate the structure of a simple four-input, three-output PAL device and mention its features. Explain how the PAL device can be used to realise the two Boolean functions given below:

$$f_1(x, y, z) = \Sigma m(1, 2, 4, 5, 7) \text{ and } f_2(x, y, z) = \Sigma m(0, 1, 3, 5, 7)$$

- (b) What is the principle on which ECL operates? Based on this, what is the other name given to ECL? Draw the circuit of a two-input ECL OR/NOR gate and briefly explain.
- (c) With the help of a block schematic diagram and neat wave forms, explain a clocked J-K flip-flop that is triggered by the positive – going edge of the clock signal.

**Q4. Attempt any two Questions of the following:- 2x10=20**

- (a) Which are the saturated bipolar logic families of interest? Write the circuit of an unloaded BJT inverter and explain briefly its transfer characteristics.
- (b) What is an encoder? Draw the schematic of a general encoder with X inputs. Explain briefly its operation. Give the logic circuit and truth table for an octal-to-binary simple encoder with active-low inputs.
- (c) How does a static RAM cell differ from a dynamic RAM cell? What are the main drawbacks of dynamic RAM compared to a static RAM? List the advantages of dynamic RAM compared with static RAM.

**P.T.O.**

**Q5. Attempt any two Questions of the following:- 2x10=20**

- (a) Explain how shift register can be used as
- (i) serial to parallel data converter, and
  - (ii) parallel to serial data converter.
- (b) Explain following terms briefly w.r.t. semiconductor memories:
- (i) Memory cell
  - (ii) Memory capacity
  - (iii) Access time
  - (iv) Dynamic memory
  - (v) Read operation
  - (vi) Write operation
  - (vii) Erasable memory
  - (viii) Static memory
  - (ix) Random Access
  - (x) Memory bank
- (c) Reduce the function  $f(0,1,5,7,8,10,14,15)$  using Quine Mcclusky method

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