

[Total No. of Questions - 8] [Total No. of Printed Pages - 3]
(2123)

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M. Tech 1st Semester Examination

Design of Electronics System

EC-102

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) Assume suitable data wherever necessary.

(ii) Attempt Any FIVE Questions.

1. (a) Explain the operation of flash type ADC with a suitable diagram. What are the limitations of this converter? Compare flash type ADC and successive approximation ADC in terms of accuracy, conversion speed and resolution. (10)
- (b) An analog voltage in the range of $-V$ to $+V$ is required to be converted into a 3-bit 2's complement digital format. The digital value for 0V should be 000 and the maximum quantization error should not exceed $\pm \frac{1}{2}$ LSB. Determine the quantization interval. (5)
- (c) How are signal assignment, variable assignment and constant declaration done in VHDL? (5)
2. (a) Design a BCD to Excess-3 code converter. Show all the necessary steps and K-maps. (10)
- (b) Draw and explain 4-bit magnitude comparator in detail. (10)
3. (a) What are the steps used for implementing combinational circuit using PLA? (08)

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- (b) How does architecture of PLA differ from ROM and PAL? (6)
- (c) Specify the size of ROM that will accommodate the truth table for following combinational circuit components
- a binary multiplier that multiplies two 4-bit numbers
 - a 4-bit adder (6)
4. (a) Implement the following Boolean function with only one 4X1 MUX
 $F(A, B, C, D) = \sum m(1, 3, 5, 7, 8, 11, 12, 15)$ (10)
- (b) Write the design procedure for synchronous counter. Also design MOD-5 ripple counter. (10)
5. (a) Carry out the following conversion:
- Convert a D-latch to a JK (10)
 - Convert D to SR (10)
- (b) Draw and explain the clocked JK flip-flop in detail. Also Explain the RACE AROUND condition in flip-flop. What is remedy for this problem? (10)
6. (a) Draw and explain 4-bit universal shift register. (8)
- (b) Analyze the sequential circuit as shown in Fig. 1. (12)

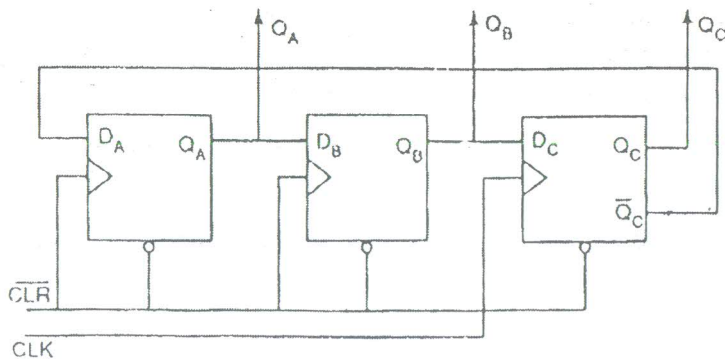


Fig. 1

7. (a) What do you mean by hazard free asynchronous sequential circuits. (6)
- (b) Define RACE in asynchronous sequential circuits. (4)
- (c) Implement the following function using PLA.
 $A(x,y,z) = \sum m(1,2,4,6)$
 $B(x,y,z) = \sum m(0,1,6,7)$
 $C(x,y,z) = \sum m(2,6)$ (10)
8. (a) Design a synchronous counter with states 0, 1, 2, 3, 0, 1 using JK flip flops. (8)
- (b) Design a clocked sequential circuit using T-flip-flops for state diagram as shown in Fig. 2. Use state reduction if possible. Also use straight binary state assignment. (12)

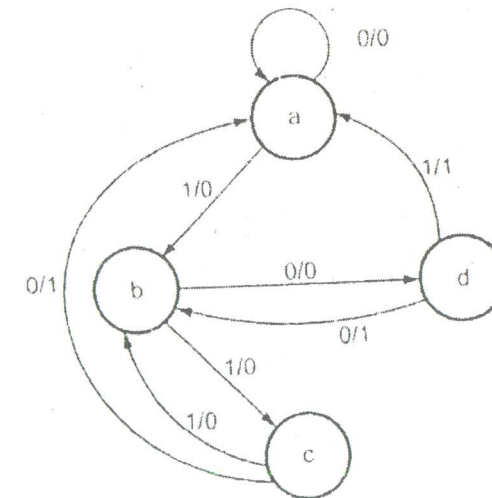


Fig. 2