

2021  
B.E. (Electronics and Communication Engineering)  
Fifth Semester  
EC-505: Digital System Design

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit. Use of scientific calculator is allowed.

x-x-x

I. Attempt all questions: -

- What are essential prime implicants with suitable example?
- What must be the minimum distance for a code to be an error detecting code?
- Describe the pulse mode and explain how it is different from the fundamental mode.
- Discuss critical Races in digital circuits.
- What do you mean by distinguishing sequences? (5x2)

UNIT - I

II. Minimize the following multiple output function.

$$F_1 (X_1, X_2, X_3, X_4) = \Sigma(2,3, 4,5,6,7,11,14) + d \Sigma (9,10,13,15)$$

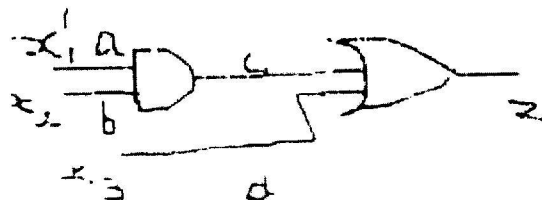
$$F_2 (X_1, X_2, X_3, X_4) = \Sigma (0, 1,3,4,5,7,11,14) + d \Sigma (8,10,12,13) \quad (10)$$

III. a) Find the systematic and Nonsystematic cyclic code for message 1010.

$$\text{Given } g(x) = X^3 + X^2 + 1.$$

b) What are different properties of Boolean difference method for fault detection and location. (2x5)

IV. a) Find the essential test vectors in the following logic diagram by using Fault table method.



b) Design full adder using two half adders and OR gate.

(2x5)  
P.T.O.

(2)

**UNIT - II**

- V. Design asynchronous sequential circuit with two inputs X and Y and with one output Z. When Y=1, input X is transferred to Z. When Y is 0, the output doesn't change for any change in X. Use SR latch for implementation of the circuit, (10)
- VI. a) Explain Races and Cycles in asynchronous sequential circuit.  
b) Determine a minimal state table equivalent to the state table given:

Present State	Next State, Output	
	X=0	X=1
1	1,0	1,0
2	1,1	6,1
3	4,0	5,0
4	1,1	7,0
5	2,0	3,0
6	4,0	5,0
7	2,0	3,0

(2x5)

- VII. Design a sequence detector to detect sequence 100011 by using JK flip flop. (10)

x-x-x