**1129**

**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. I which is compulsory and selecting two questions from each Unit.*

x-x-x

I.   Attempt the following:-

   a)  What do you mean by canonical form?

   b)  How is a prime implicant chart reduced?

   c)  What are essential tests in fault detection?

   d)  What is terminal state in a finite state machine?

   e)  What is a merger table used for?                              (5x2)

## UNIT – I

II.   a) Express the function $Y = A + B'C$ in canonical SOP and canonical POS form.

   b) Obtain the minimal SOP expression for the function using K-map:
   $Y = \Sigma m(1, 5, 7, 13, 14, 15, 17, 18, 21, 22, 25, 29) + \Sigma d(6, 9, 19, 23, 30)$     (10)

III.  Find the minimal sum of products for the following Boolean expression using the Quine-McCluskey method:
   $F(W,X,Y,Z) = \Sigma m(1, 3, 4, 5, 9, 10, 11) + \Sigma d(6, 8)$                       (10)

IV.   Given the fault table shown below, where z denotes the fault-free output for the corresponding test:
   a)  Find the minimal set of tests to detect all single faults.
   b)  Find a preset set of tests to locate all single faults and show the corresponding fault dictionary.
   c)  Find a minimal adaptive fault-location experiment and compare the results with that of preset experiment.

| Faults / Tests | f1 | f2 | f3 | f4 | f5 | z |
|---|---|---|---|---|---|---|
| T1 | | | 1 | 1 | 1 | 1 |
| T2 | 1 | 1 | | | | 0 |
| T3 | | | | 1 | 1 | 1 |
| T4 | | 1 | | | | 0 |
| T5 | | | | | 1 | 0 |

                                                                    (10)
                                                                    P.T.O.

## UNIT – II

V. a) Design a sequence detector that detects a sequence of 1011101 in the given binary input stream in non-overlapped manner.

b) For the machine given below, find the equivalence partition and a corresponding reduced machine in standard form:

| PS | NS, z | |
|----|-------|--|
| | x =0 | x =1 |
| A | B,0 | E,0 |
| B | E,0 | D,0 |
| C | D,1 | A,0 |
| D | C,1 | E,0 |
| E | B,0 | D,0 |

(2x5)

VI. a) Design an asynchronous circuit that has two input inputs xl and x2 and one single output z. The circuit is required to give an output whenever the input sequence 00, 10,11 and 01 is received but only in that order.

b) What do you mean by hazard free asynchronous sequential circuits? How can essential hazards be eliminated? (2x5)

VII. Write short notes on:-

a) Sequential machine flow charts

b) Fault detection by path sensitizing (2x5)

x-x-x