CBCS SCHEME

USN | | | | | | | | | | | **15EC552**

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Switching and Finite Automata Theory

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define Threshold element. **(05 Marks)**

b. Define Unate function. Find whether the function $f = \bar{x}_1 x_2 + x_1 x_2 \bar{x}_3$ is unate or not. **(03 Marks)**

c. Determine whether the function $f(x_1, x_2, x_3, x_4) = \sum(0,1,3,4,5,6,7,12,13)$ is a threshold function and if it is, find a weight-threshold vector. **(08 Marks)**

OR

2 a. By examining the linear inequalities, determine whether the given function is a threshold function or not. If it is a threshold function find the corresponding weight-threshold vector. Also find a realization for $\bar{f}(\bar{x}_1, x_2, x_3)$. Given function $f(x_1, x_2, x_3) = \sum(1,2,3,7)$ **(10 Marks)**

b. Explain the concept of linear separability. **(06 Marks)**

Module-2

3 a. Analyse the circuit shown in Fig. Q3 (a) for static hazards, redesign the circuit so that it becomes hazard free. **(06 Marks)**

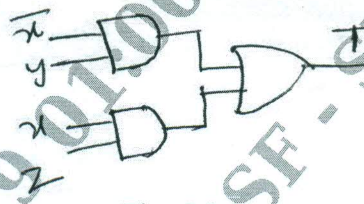

Fig. Q3 (a)

b. Explain and construct the fault table for the circuit shown in Fig. Q3 (b). **(10 Marks)**

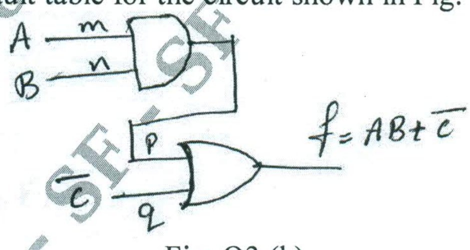

Fig. Q3 (b)

OR

4 a. Discuss the properties of Boolean differences. **(05 Marks)**

b. Define the Boolean difference with respect to x_3 for the function $f(x) = (x_1 + x_2)\bar{x}_3 + x_3 x_4$. **(05 Marks)**

c. Explain chain rule. **(06 Marks)**

Module-3

5 a. Find the equivalence partion for the machine M_1 shown in table Q5 (a). Show a standard form of the corresponding reduced machine. **(12 Marks)**

Machine M_1

PS	NS,Z	
	x = 0	x = 1
A	E, 0	C, 0
B	C, 0	A, 0
C	B, 0	G, 0
D	G, 0	A, 0
E	F, 1	B, 0
F	E, 0	D, 0
G	D, 0	G, 0

Table Q5 (a)

b. Prove that the equivalence partion is unique. **(04 Marks)**

OR

6 a. Draw the merger and compatibility graph for the incompletely specified machine M_2 shown in Table Q6 (a) and find the minimal machine which covers M_2. **(12 Marks)**

Machine M_2

PS	NS, Z			
	I_1	I_2	I_3	I_4
A	–	–	E, 1	–
B	C, 0	A, 1	B, 0	–
C	C, 0	D, 1	–	A, 0
D	–	E, 1	B, –	A, 0
E	B, 0	–	C, –	B, 0

Table Q6 (a)

b. Prove that if two states Si and Sj of machine M are distinguishable, then they are distinguishable by a sequence of length $n-1$ or less, where n is the number of states in M. **(04 Marks)**

Module-4

7 a. Given the machine table in Table Q7 (a). M_3 and two assignments α and β, derive in each case the logical equation for the state variables and the output function.

Machine M_3

PS	NS		Z	
	x = 0	x = 1	x = 0	x = 1
A	A	D	0	1
B	A	C	0	0
C	C	B	0	0
D	C	A	0	1

Fig. Q7 (a)

Assignment α

y_1y_2	Y_1Y_2		Z	
	x = 0	x = 1	x = 0	x = 1
A →0 0	0 0	1 0	0	1
B →0 1	0 0	1 1	0	0
C →1 1	1 1	0 1	0	0
D →1 0	1 1	0 0	0	1

Assignment β

y_1y_2	Y_1Y_2		Z	
	x = 0	x = 1	x = 0	x = 1
A →0 0	0 0	1 1	0	1
B →0 1	0 0	1 0	0	0
C →1 0	1 0	0 1	0	0
D →1 1	1 0	0 0	0	1

(10 Marks)

b. Explain the lattice of closed partitions. **(06 Marks)**

OR

8 a. Construct the π – lattice for the machine M4 shown in Table Q8 (a). **(10 Marks)**

M4

PS	NS	
	X = 0	X = 1
A	E	B
B	E	A
C	D	A
D	C	F
E	F	C
F	E	C

Table Q8 (a)

b. Explain the following :
   (i) Covers
   (ii) The implication graph. **(06 Marks)**

Module-5

9 a. Draw the homing tree and synchronizing tree of machine M5 shown in table Q9 (a) and explain it. **(10 Marks)**

Machine M5

PS	NS, Z	
	X = 0	X = 1
A	B, 0	D, 0
B	A, 0	B, 0
C	D, 1	A, 0
D	D, 1	C, 0

Table Q9 (a)

b. Write a note on:
   (i) Distinguishable tree.
   (ii) Adaptive distinguishing experiments. **(06 Marks)**

OR

10 a. List the general procedure in second algorithm for the design of fault detection experiments. **(06 Marks)**

b. What is diagnosable sequence machine? Construct testing table and graph for machine M6 shown in table Q10 (b).

PS	NS, Z	
	X = 0	X = 1
A	B, 0	D, 0
B	A, 0	B, 0
C	D, 1	A, 0
D	D, 1	C, 0

Table Q10 (b)

(10 Marks)

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