Exam.Code:0929
Sub. Code: 6597

2063

B.E. (Electronics and Communication Engineering)

Fifth Semester

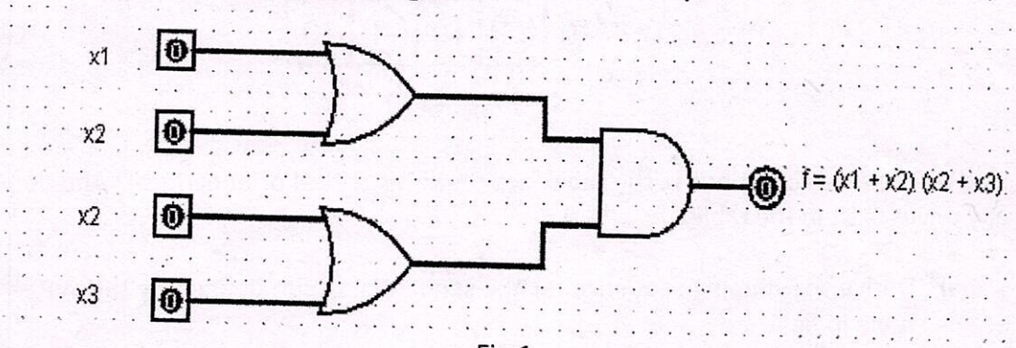
EC-505: Digital System Design

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt <u>five</u> questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions each from Section B-C.

x-x-x

Section - A

1	a) Compare state diagram and state table. b) What is machine equivalence? Give an example. c) Differentiate between ASM chart and a conventional flow chart. d) What is hamming distance? Give an example. e) Differentiate combinational and sequential circuits.	10
	Section-B (Attempt any two)	
2	a) Solve the following function using Q.M method. Y= $\sum m(0,3,4,5,8,9,11,12,13,15)+d(1,2)$	5
	b) Minimize and design the circuit using multiple output k-maps for F1=$\sum m(2,5,6,7,8,10,12,13,14,15)$, F2=$\sum m(5,8,9,10,11,12,13,14,15)$ and F3=$\sum m(2,6,7,9,11,13,15)$	5
3	a) Encode data bit 1101 into even parity hamming code. If received data is 1000101, then which bit encountered the error?	5
	b) Find the test-set for fault detection and location using fault table method for the circuit shown in Fig.1	
	 Fig.1	5
4	a) Minimize the function $f(x_1, x_2, x_3, x_4) = x_1x_2x'_3 + x'_1x_2x_3 + x_1x'_2x'_3 + x_1x_3x_4$ using the iterative consensus method and also verify using iterative consensus tabular method.	5
	b) Find the Boolean difference of $F(X) = x_1 x_2 + x_3$ with respect to x_2 using at least 4 methods.	5
	Section-C (Attempt any two)	
5	a) Design a synchronous sequential circuit with one input line and with one output line that recognizes the input string x = 1111. The circuit is also required to recognize the overlapping sequences, as can be seen in the output string z that results from the following input strings x = 1101111111010, z = 0000001111000.	5
	b) Derive the minimal circuit for the sequential machine shown in fig. 2.	

Contd.....P/2

	x 0 1 A B/1 D/0 B –/– B/0 C E/0 D/– D B/1 A/0 E –/– C/1 F –/0 E/1 Fig.2	5
6	a) Design a pulse mode circuit with input x_1 ,x_2 , x_3 and output z. The output must change from 0 to 1 if and only if the input sequence x_1-x_2-x_3 occurs while z = 0. The output must change from 1 to 0 only after an x_2 input occurs.	5
	b) Given the following excitation table shown in fig.3. x_1x_2 00 01 11 10 00 (00) (00) 11 01 01 11 (01) 10 (01) y_1y_2 11 00 00 (10) (10) 10 (11) 10 (11) 10 Y_1Y_2 Fig.3 Find all the race conditions in the table; are the races critical or noncritical? And do any cycles exist in the table?	5
7	a) Derive the homing sequence for the sequential circuit defined by the state table in fig.4 x 0 1 A C/0 A/1 B A/1 B/0 C D/0 B/1 D B/1 D/0 Fig.4	5
	b) Draw an ASM chart and state table for a 2-bit up-down counter having mode control input M=1 for down and M=0 for up counting	5