JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
T-2 EXAMINATION - October 2018
B.Tech VIIth Semester (ECE)

COURSE CODE: 12B1WEC732
MAX. MARKS: 25
COURSE NAME: Digital System Design
COURSE CREDITS: 3
MAX. TIME: 1.5Hrs.

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1 Construct the state diagram for a Mealy sequential machine that will detect the following input sequences: $x = 01101$ or 01111. If the input sequence $x = 01101$ is met, cause $z_1 = 1$. If $x = 01111$, cause $z_2 = 1$. Each input sequence may overlap with itself or the other sequence. **[5 Marks] [CO2]**

Q2 Construct the state diagram and a state table or a up-down Modulo-16 counter. Use a gray code state assignment. When $x = 1$ the counter is to count up; when $x = 0$ the counter is to count down. When the terminal count of 15 is detected and the unit is counting up, or when the terminal count of 0 is reached and the unit is counting down, cause terminal count $(TC)' = 0$. **[5 Marks] [CO2]**

Q3 Reduce the following state table using a merger diagram and compatible graph. **[5 Marks] [CO2]**

Present State	Next State/ Output			
	xy=00	xy=00	xy=00	xy=00
a	a/-	c/1	e/1	b/1
b	e/0	c/-	-/-	-/-
c	f/0	f/1	e/0	-/-
d	-/-	e/0	a/-	-/-
e	-/-	-/-	a/0	d/1
f	c/0	-/-	b/0	c/1

Q4 (a) Reduce the following incompletely specified state table using implication chart. Identify the compatible state pair. Specify the value of output don't cares after reduction. **[3 Marks] [CO3]**

Present State	Next State		Output	
	x=0	x=1	x=0	x=1
A	A	B	0	-
B	C	B	0	1
C	D	A	-	1
D	A	E	0	-
E	E	A	-	0

(b) Explain the difference between equivalent and compatible states. **[2 Marks] [CO3]**

Q5 (a) State the guidelines for state assignment. How many permutations are possible with three state variables and six states? Also calculate the non equivalent states. **[3 Marks] [CO4]**

(b) What are the major building blocks of an ASM chart? Briefly explain about each block. **[2 Marks] [CO1]**

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