DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH - IT - Semester - III
SUBJECT: (IT 301) Design of Digital Circuits

Examination	: Third Sessional	**Seat No.**	:
Date	: 11/10/2014	**Day**	: Saturday
Time	: 9:30 to 10:45	**Max. Marks**	: 36

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed. **[12]**
(a) Obtain Characteristic Table and Excitation table of RS flip-flop. **[2]**
(b) What is the difference between serial and parallel transfer? What type of register is used in each case? **[2]**
(c) The memory unit has capacity of 8192 words of 32 bits/word. What is the length of a memory address (input bits)? **[2]**
(d) What are decade counters? Show the block diagram of a BCD counter which counts from 0 to 999. **[3]**
(e) Explain the working of Ring-counter with logic diagram. **[3]**

Q.2 Attempt following questions. **[12]**
(a) Answer the following: **[6]**
   (I) Draw and explain basic memory cell used in Random Access Memory. **[4]**
   (II) Define the following term: **(1) Bit Time (2) Word Time** **[2]**
(b) Design a counter with the following binary sequence**: 0,1,5,7,6,4** and repeat. Use T flip-flops. Draw the logic diagram. **[6]**

OR

(b) Design a sequential circuit described by the following state equations. Use JK flip-flops. **[6]**
   $A(t+1) = xAB+yA'C+xy$
   $B(t+1) = xAC+y'BC'$
   $C(t+1) = x'B+yAB'$

Q.3 Attempt following questions **[12]**
(a) Reduce the no of states in the following state table **fig-1** & tabulate the reduced state table. State no of flip flop required before and after reduction. **[4]**
(b) A sequential circuit has the flip-flops (**X & Y**), two inputs (**a & b**), and one output (**c**). The flip-flop input function and the circuit output function are as follow: **[8]**

   $JX = aY+b'Y'$ $JY = aX'$ $c = abX+a'b'Y$
   $KX = ab'Y'$ $KY = ab'+X$

   Obtain the **state table** and **state diagram.**

OR

Q.3 Attempt following questions **[12]**
(a) Construct a mod 08-counter using MSI circuit. Give two alternatives **[4]**
(b) Design a sequential circuit whose state table is given below (**fig-2**) using a 2-bit register and combinational gates. (draw the logic diagram). **[8]**

Present state	Next state		Output	
	X=0	X=1	X=0	X=1
a	f	b	0	0
b	d	c	0	0
c	f	e	0	0
d	g	a	1	0
e	d	c	0	0
f	f	b	1	1
g	g	h	0	1
h	g	a	1	0

(Fig-1)

Present State		Input	Next State	
A	B	x	A	B
0	0	0	0	0
0	0	1	0	1
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	1	1
1	1	0	1	0
1	1	1	0	1

(Fig-2)