

Con. 5213-09.

(REVISED COURSE)

SP-7853

Analog & Digital Ic Design & Application

(3 Hours)

[Total Marks : 100

9/12/09

2-30 to 5:30 p.m.

- N.B. (1) Question No.1 is **compulsory**.
 (2) Answer any **four** questions from **remaining**.
 (3) Assume **suitable** data wherever **necessary**.
 (4) Draw **neat** circuit diagram wherever **necessary**.

1. (a) Give the comparison between Melay machine and Moore machine. 4
- (b) With neat circuit diagram, explain how the switch bouncing can be avoided using Flip-flop. 4
- (c) What are the differences between FPGAs and CPLDs. 4
- (d) Draw the block diagram of a typical Op-amp and explain the function of each block. 4
- (e) With neat circuit explain how a resistor can be simulated using switch capacitors. 4

2. (a) Design a melay state machine for overlap sequence detector for the string "1101".
 The output must be '1' when the input matches this string —
 - (i) Draw the state diagram 2
 - (ii) Write its transition and output table 4
 - (iii) Draw its logic diagram. 4
- (b) Using equal-components, design a second-order band-pass KRC filter with $f_0 = 2$ KHz and $BW = 400$ Hz. 8
 What is its resonant gain ? 2

3. (a) Analyse the snchronous state machine shown in **Figure 3(a)**. Draw its state diagram. 5

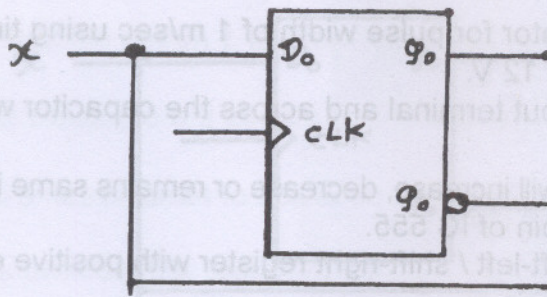
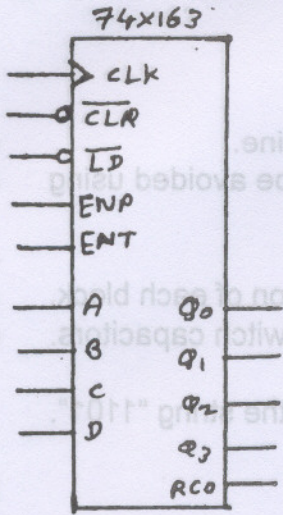


Fig. 3(a)

- (b) Explain how to arrange ROM cells in an array using two dimensional decoding. 5
- (c) Draw the block diagram of IC 810 audio power amplifier. 3
 Explain its operation. 4
 List the features of IC 810. 3

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4. (a) Design a modulo-10 counter with counting sequence 3, 4, 5, 12, 3, using MSI 74 × 163 IC. The pin diagram and the functionality of MSI 74 × 163 is given in Figure 4 (a).



Inputs				Current state				Next state			
CLR	LD	ENT	ENP	Q ₃	Q ₂	Q ₁	Q ₀	*Q ₃	*Q ₂	*Q ₁	*Q ₀
0	X	X	X	X	X	X	X	0	0	0	0
1	0	X	X	X	X	X	X	D	C	B	A
1	1	0	X	X	X	X	X	Q ₃	Q ₂	Q ₁	Q ₀
1	1	X	0	X	X	X	X	Q ₃	Q ₂	Q ₁	Q ₀
1	1	1	1	0	0	0	0	0	0	0	1
1	1	1	1	0	0	0	1	0	0	1	0
		⋮			⋮				⋮		
1	1	1	1	1	1	1	1	0	0	0	0

Fig. 4(a)

- (b) Explain the operation of sample and hold circuit. 4
 Draw its input and output waveforms. 4
- (c) Draw the block diagram of frequency multiplier using IC 565. 4
 Explain the block diagram of IC 565
5. (a) Design a monostable multivibrator for pulse width of 1 m/sec using timer IC 555 5
 operated with supply voltage of 12 V.
 Draw the waveforms at the output terminal and across the capacitor with respect 3
 to clock pulse.
 Explain whether the pulse width will increase, decrease or remains same if the 8 V dc 2
 is applied externally at control pin of IC 555.
- (b) Write a VHDL code for 8-bit shift-left / shift-right register with positive edge clock, 10
 serial in and parallel out.
6. (a) What is an Instrumentation Amplifier ? 2
 Draw a neat circuit of an Instrumentation amplifier using 3 Op-amps. 3
 Derive its output voltage equation. 5
- (b) Draw the internal structure of a synchronous SRAM. 5
 Explain the operation of SRAM. 5
7. (a) Draw a neat circuit of Non-inverting Schmitt Trigger. 3
 Draw its output and input waveforms. 2
- (b) Draw a neat circuit for voltage to current converter with grounded load. 2
 Derive its output current expression. 3
- (c) Give the features of IC 566 VCO. 5
- (d) Explain the various documentation standards of sequential circuits. 5