ME ETRX I (Rev)
Microprocessor & Systems - I

VT-April-11-205

Con. 3586–11.

BB–4086

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) Assume **suitable** data wherever **necessary**.

1. Explain Trojan Horse attack. How an operating system can prevent such an attack using ARPL instruction. **20**

2. (a) Design 2-way set associative as well as Direct mapped cache organisation for the following :– **10**

Main Memory	=	4 GB
Cache Memory	=	32 KB
Cache Controller	=	82385 DX
Line Size	=	32 bits
One Set	=	8 lines.

Give the directory entry for both with respect to 82385 DX.

(b) Explain what is cache consistency problem, with reference to the above, explain in detail :– **10**
(i) Bus Snooping
(ii) Bus Snarfing
(iii) Write Policy.

3. Explain the rules for the protection of data, stack and code segment access in 80386DX with supporting diagrams. What is the mechanism of CALL GATE ? **20**

4. Explain the following translation mechanism with neat diagrams :– **20**
(a) 48-bit Virtual address to 32-bit Linear address.
(b) 32-bit Linear address to 32-bit Physical address.

5. (a) Explain how shareable interrupts are serviced in ISA bus. **10**
(b) Explain ISA DMA subsystem. **10**

6. Explain Indirect Task Switching in 80386DX with neat diagram. Explain the role of TSS. **20**

7. Write short notes :– **20**
(a) IRQZ redirect mechanism
(b) Configuration registers in 80386EX.

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ME Sem-I CETRX)
Discrete Time Signal Processing and Applications

Con. 3593-11. **BB-4083**

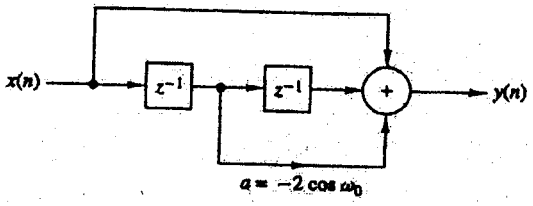
(3 Hours) **[Total Marks : 100**

Note: 1. Question No. 1 is compulsory.
2. Solve any **four** questions of the remaining questions.
3. All questions carry equal marks.

1. Solve any **FOUR** questions of the following. **(20)**

a. Differentiate between FIR and IIR filters.

b. Consider the digital filter shown below:



Determine the input-output relation, the impulse response and the output of this filter to the input $x(n)=3\cos\left(\frac{\pi n}{3}+30°\right)$, when $\omega_0=\pi/2$

c. A linear phase FIR filter has transfer function $H(z)=1+2z^{-1}+3z^{-2}+2z^{-3}+z^{-4}$. Using *Circular Convolution approach* determine response of this filter to the input, $x(n)=\delta(n)+\delta(n-1)-\delta(n-3)-\delta(n-4)$.

d. Find $x(n)$ if $X(e^{j\omega})=e^{-j\omega}\left[\frac{1}{2}+\frac{1}{2}\cos\omega\right]$.

e. Determine linear convolution of the following signals by means of *z*-transform.

$x_1(n)=\left(\frac{1}{2}\right)^n u(n)$ and $x_2(n)=\cos\pi n u(n)$.

2. *a.* Find 8-point DFT of the sequence $x(n)=\{1,2,3,4,4,3,2,1\}$ using DIT FFT algorithm. **(10)**

b. Realize following IIR system using Direct form – I and Direct form – II method. **(10)**

$$y(n)=-0.1y(n-1)+0.2y(n-2)+3x(n)+3.6x(n-1)+0.6x(n-2)$$

3. *a.* Determine and sketch the magnitude and phase response of the system given below. **(10)**
$y(n)=x(n)+0.9x(n-2)-0.4y(n-2)$.
[**Note:** Plot the magnitude and phase response on a graph paper only.]

b. Determine the response of the system $y(n)=\frac{5}{6}y(n-1)-\frac{1}{6}y(n-2)+x(n)$ to the input signal $x(n)=\delta(n)-\left(\frac{1}{3}\right)\delta(n-1)$. **(10)**

4. *a.* Determine circular convolution of sequences $x_1(n)=\{1,2,3,1\}$ and $x_2(n)=\{4,3,2,2\}$ using DFT based approach. **(10)**
[**Note:** Calculate DFT using DIF FFT and IDFT using DIT FFT algorithm.]

b. Draw the pole zero diagram for the following system and comment on its stability: **(10)**
$$y(n)-\frac{1}{4}y(n-1)+\frac{1}{4}y(n-2)-\frac{1}{16}y(n-3)=2x(n)+3x(n-1)$$

5. *a.* Design a digital Butterworth filer using bilinear transformation for the specifications given below. Assume T = 1 sec. **(10)**
$$0.8\le\left|H(e^{j\omega})\right|\le 1 \qquad 0\le\omega\le 0.2\pi$$
$$\left|H(e^{j\omega})\right|\le 0.2 \qquad 0.6\pi\le\omega\le\pi$$

b. Determine the unit step response of the system described by the difference equation, $y(n)-0.7y(n-1)+0.12y(n-2)=x(n-1)+x(n-2)$ using unilateral *z*-transform when the initial conditions are $y(-1)=y(-2)=1$. **(10)**

6. *a.* Using Hanning Window Function, design a sixth order linear phase FIR lowpass filter having cutoff frequency of $\frac{\pi}{4}$ rad **(10)**

b. Determine the coefficients of a linear phase FIR filter having a symmetric impulse response and a frequency response that satisfies the conditions given below using Frequency Sampling method. **(10)**
$$H\left(\frac{2\pi k}{15}\right)=\begin{cases}1 & ; \quad k=0,1,2,3\\ 0 & ; \quad k=4,5,6,7\end{cases}$$

7. *a.* A simple LRC notch filter has following normalized, s-plane transfer function: **(10)**
$$H(s)=\frac{s^2+1}{s^2+s+1}$$
Determine the transfer function of an equivalent digital filter using *bilinear transformation.* Assume notch frequency of 60 Hz and sampling frequency of 960 Hz

b. Convert the analog filter with system function, $H(s)=\frac{1}{(s+0.5)(s^2+0.5s+2)}$ into a digital IIR filter using *impulse invariance method*, with $T_s=1\text{sec}$. **(10)**

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AGJ 1st hall (n) 35

2|6|2011

ME ETRX - I (Rev)
Elective I - Image Processing

BB-4089

Con. 3343-11.

(4 Hours) **[Total Marks : 100**

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume **suitable** data if **necessary** with proper justification.

[20]

1. A) Explain two important properties of Unitary Transforms.
   B) State with reasons whether the following statement is true or false :-
   "When two images have the same histogram, they will have same total power and entropy".
   C) Explain the advantages of Wiener filter over Inverse filter.
   D) DCT is widely used in transform based image compression. Why ?

2. A) Suppose that 5 × 5 pixel image has the following gray level distribution. [10]

Gray level	0	1	2	3	4	5	6	7
No. of pixel	0	0	0	6	14	5	0	0

Perform histogram equalization

B) Explain various frequency domain enhancement techniques. [10]

3. A) Define and explain Moments, Normalized moments and Central moments. [10]
   B) Explain Hit – or – Miss Transform . [10]

3. A) Define and explain Moments, Normalized moments and Central moments. [10]

B) Explain Hit – or – Miss Transform . [10]

4. A) Develop a fast algorithm for computing Hadamard transform of a sequence of length 8. [10]

B) Prove the following properties of 2D-DFT [10]

i) Separable property

ii) Convolution property .

5. A) Explain image compression using LZW method. [10]

B) Form an arithmetic code to represent the five symbol message $a_1\ a_2\ a_3\ a_3\ a_4$. [10]

6. A) Explain Hough Transform and its applications [10]

B) Explain various Noise Probability Density Functions in Image Processing. [10]

7. Write short notes on : – [20]

A) Fourier Descriptors

B) Transform Coding

C) Homomorphic Filtering

D) K L Transform .

M.E ETRX I (REV)
Elective I - Digital system Design

AGJ 1st half (n) 32

Con. 3329-11. **BB-4092**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Out of remaining **six** questions solve any **four**.
(3) **Each** question carries **20** marks.
(4) Assume **suitable** data if **required**.

Que 1:-(a) Design a circuit which makes optimum utilization of a selected PLA to implement the following functions:

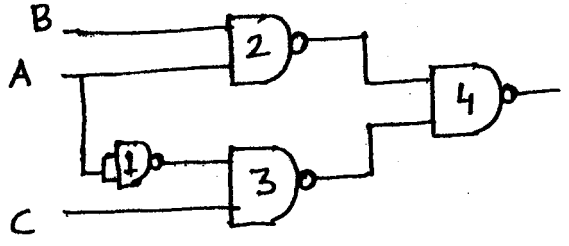
$F1 = \Sigma m\ (0,1,2,3,6,9,11)$

$F2 = \Sigma m\ (0,1,6,8,9)$

$F3 = \Sigma m\ (2,3,8,9,11)$

Specify the correct size of PLA used for optimum utilization.

(b) Find the hazards in the following circuit and suggest a hazard free circuit.



Que 2:- (a) Develope a ROM for BCD to Excess-three code converter.

(b) Use demultiplexer with active low O/Ps and gates with fan-in 2 to realize the following function:

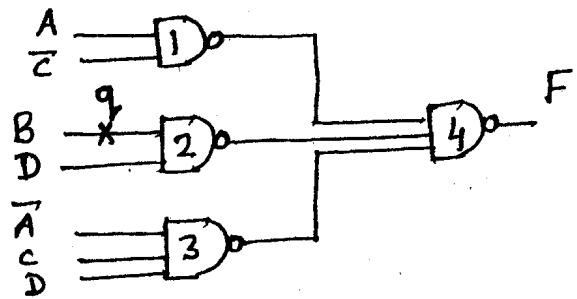
$$Y = F(A,B,C) = \Sigma m(1,2,5,7)$$

Que3:- Design a logic circuit which will provide high out put when invalid BCD code arrives in the form of a serial data.

Que4:- (a)Realize the following function with type 2 multiplexer design method and only one inverter:-

$$Y = F(A,B,C,D) = \Sigma m(0,1,2,3,9,11,12,13)$$

(b) For the following combinational circuit, obtain a test set covering all possible faults~~/~~ at q .

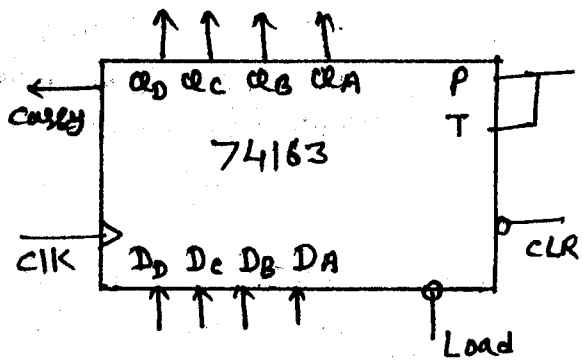


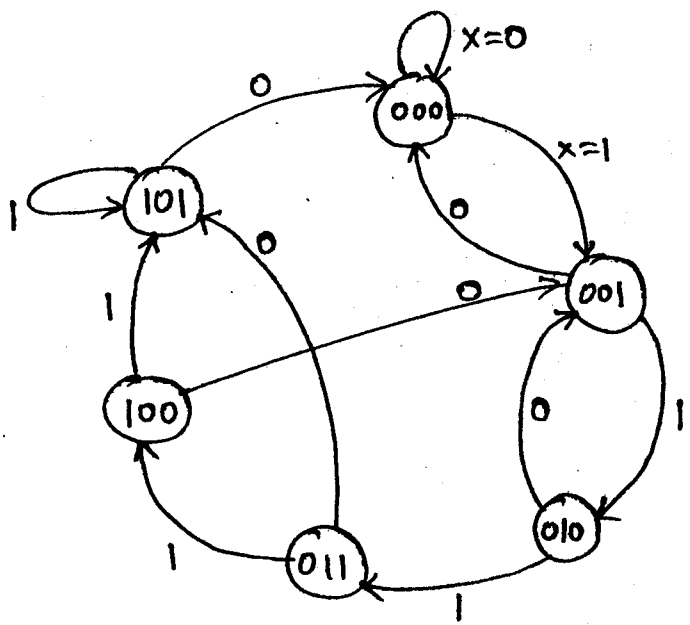
[TURN OVER

Con. 3329-BB–4092-11. **2**

Que5:- Design and implement the logic shown in the following state diagram . Use presettable binary counter IC 74163 and PLA for design.Function table of IC 74163 is given below.

CLEAR	LOAD	PT	FUNCTION
0	X	X	CLEAR
1	0	X	LOAD
1	1	0	NO CHANGE
1	1	1	INCREMENT



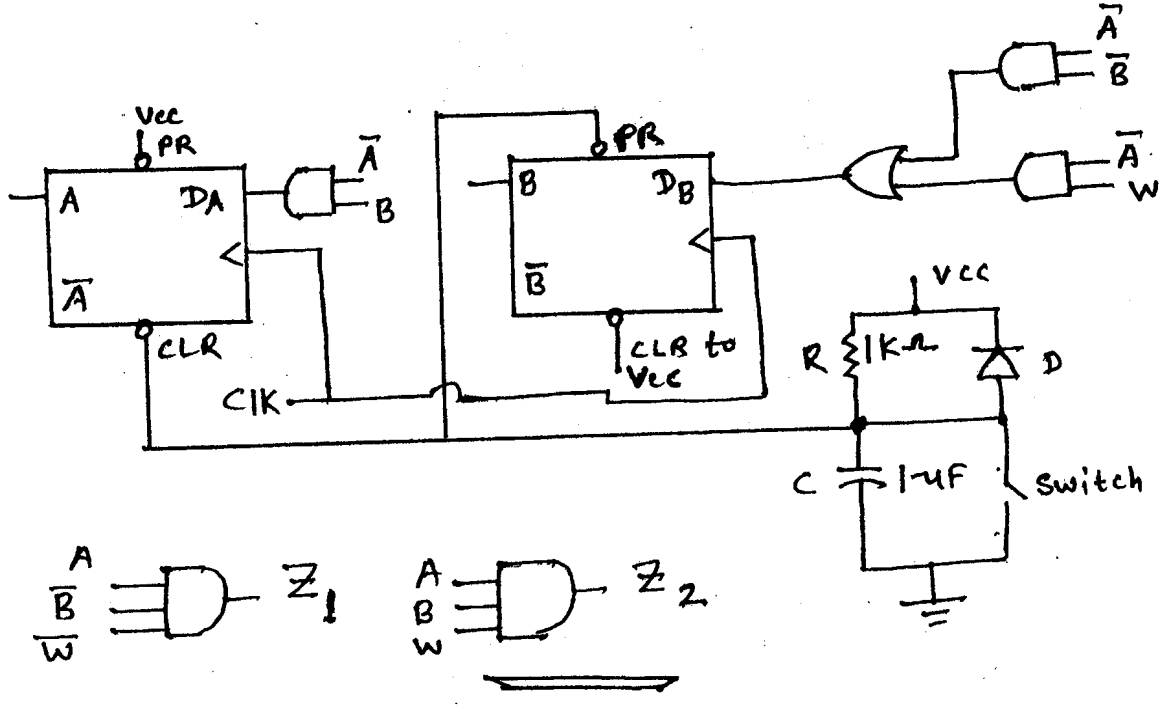


Que6:- Design a logic circuit for the following specifications :-

When START(H) signal is asserted output sequence ABC is 000 → 010 → 100 at 1 KHz. Stop and wait for END(H) signal to be asserted. When END(H) signal is asserted output sequence ABC as 100 → 101 → 111 → 000 at 10 KHz rate.

Que 7:-For the logic diagram in following figure draw the state diagram.

(W is an external i/p and Z_1, Z_2 are o/ps)



16/6/2011 ME (ETRX) Sem-I Communication Theory.

AGJ 1st half (q) 18

Con. 3688-11. **BB-4098**

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question **No:1** is **compulsory.**
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) Assume **suitable** data, wherever **necessary.**

1.	a	Explain sensitivity and selectivity with respect to a radio receiver. How can they be improved?	5
	b	Justify the use of compander in PCM system. Sketch and explain compander characteristics	5
	c	Differentiate between inter-symbol interference and inter-channel interference	5
	d	State the properties of probability density function	5
2.	a	A modulating signal given by $e_m(t) = 2\sin(2\pi 10^4 t)$ is used to amplitude modulate a carrier $e_c(t) = 10\sin(2\pi 10^6 t)$. The modulated wave is developed across 50Ω load resistor i) Give the expression for the modulated wave ii) Calculate the rms current in load iii) Calculate the total average power iv) Calculate the power in carrier and sidebands	8
	b	Explain double conversion AM receiver with a neat block diagram, bringing out its merits and demerits	6
	c	Explain Image frequency rejection with respect to AM receiver	6
3.	a	When the modulating frequency in an FM system is 400 HZ and the modulating voltage is 2.4V, the modulation index is 60. Calculate the maximum deviation. What is the modulation index at modulating voltage of 3V and modulating frequency 300 HZ?	6
	b	Sketch the block diagram of linear delta modulation system. With suitable input-output waveforms, illustrate i) Slope overload error ii) Quantization error How are the above errors related to step-size?	8
	c	Sketch the block diagram of a TDM-PCM system and explain the working. Sketch the frame-format.	6
4.	a	The binary sequence 001010011010 is applied to a DPSK transmitter. Draw the block diagram of DPSK transmitter and sketch the resulting waveform at the transmitter output.	6
	b	Derive and sketch power spectral density of polar NRZ signal. Hence sketch the power spectral density of BPSK signal and obtain bandwidth.	10
	c	With relevant expressions, compare the performance of M-ary FSK and M-ary PSK in terms of bandwidth efficiency and noise immunity.	4

[TURN OVER

5.	a	Ref The binary data 110110101 is applied to the input of a duobinary system with precoder i) Construct the duobinary coder output ii) If there is no error in transmission, show that the original binary sequence is detected correctly at the receiver iii) Suppose that due to error during transmission, the level at the receiver input produced by the second digit is reduced to zero. Construct the new receiver output. Does error propagate?	10
	b	Sketch BFSK receiver for : i) Coherent detection ii) Non-coherent detection	5
	c	MSK signal is shaped QPSK signal. Justify giving expressions for MSK and QPSK	5
6.	a	A binary source generates digits 1 and 0 randomly with equal probability. Assign probabilities to the following events. In ten digits generated by the source: i) There are exactly two 1's and eight 0's. ii) There are at least four 0's.	6
	b	Show that integrate and dump detection process represents an optimum detection process for baseband rectangular pulses.	8
	c	State sampling theorem for: i) Low pass signal ii) Bandpass signal	6
7.		Write short notes on any four:	20
	a	Partial response signalling	
	b	PN sequence generator	
	c	Matched filter	
	d	Fiber optic communication system	
	e	Noise triangle in FM	