ETRX - VII (O) - Micro computer Sys Design
4/6/2012

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Con. 4688–12.

(OLD COURSE)

(3 Hours)

GN–9113

[Total Marks : 100

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

1 a) Explain Why data cache of Pentium processor is triple ported 5
b) Explain the use of Branch target Buffer in Pentium Processor 5
c) What are CHS and LBA addressing in IDE? 5
d) Explain what are central resources in PCI bus. 5

2 a) Explain following signals of Pentium Processor 10
R/S#, LOCK#, CACHE#, AHOLD, SCYC
b) Explain what is split line access in Pentium processor and its purpose . 10

3 a) Explain with neat diagram data bus steering while executing the following instruction. Assume 16 bit device interfaced to Pentium processor. Indicate how many bus cycles are run for this operation 10
MOV EAX , [23420012 H]
b) Explain the stages in floating point instruction execution in Pentium processor 10

4 a) With respect to data cache of Pentium processor explain clean line replacement and bank conflict in simultaneous data access. 10
b) Write short note on bus parking in PCI bus. 10

5 a) Explain following signals in SCSI bus 10
ATN , MSG, BSY, SEL
b) Explain what is DEVSEL signal in PCI bus and its role in selecting the target device for transaction. Also explain what is subtractive decoding 10

6 a) Explain the protocol for data read and write command in IDE 10
b) Explain bus access latency in PCI bus and the factors affecting it. 10

7 a) What is the difference in selection and reselection phases of SCSI? 5
b) Explain what is sector interleave and its use. 5
c) Explain what is reflected wave switching in PCI bus. 5
d) Explain instruction pairing rules for Pentium Processor 5

B.E – Electronics VTU Old DC 30/5/12

Con. 4524-12.

(OLD COURSE)

GN-8543

(3 Hours) [Total Marks : 100

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

1. Attempt any **four** from the following :— 20
   (a) Prove that the maximum rate at which information may be arriving at the receiver is : $C = B \log_2 (1 + S/N)$
   B. = B. W., S/N = Signal to Noise ratio.
   (b) Justify BPSK Transmission is Coherent transmission.
   (c) What is meant by AMI signaling ? For the bit stream 10111001010111. Draw an AMI waveform and Manchester line code.
   (d) What is a Cyclic Code ? What are the two Fundamental Properties to be satisfied by it ?
   (e) What is DS-SSS ? How Chip duration is related to measurement accuracy in ranging by DS-SSS Specturm ?

2. (a) A discrete Memoryless Source has an alphabet of five symbol with the probabilities for its O/P. 5+5

Symbol	M_0	M_1	M_2	M_3	M_4
Probabilities	0·55	0·15	0·15	0·10	0·05

   Generate and compare two different Huffman Code for this source, hence for each of the two codes, find :—
   (i) Average Codeword Length (ii) Variance of Codeword.
   (b) Explain Lempel-Ziv alogrithm and its applications compare it with Huffman and Shannons Coding. 10

3. (a) Describe modified Duo-bineary System with neat diagram. What is its advantages over Duo-binary System ? Sketch and derive the expression for its impulse response. 10
   (b) What is meant by equalization ? Sketch and explain the working of tapped delay line equalizer. 10

4. (a) Differentiate between Source Coding and Channel Coding. 4
   (b) An error Control Code has the following Parity check matrix : 8

$$H = \begin{matrix} 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 1 \end{matrix}$$

   (i) Determine the generator matrix G.
   (ii) Find the Codeword for 110 and 101.
   (iii) Decode the received codeword 110110.
   (iv) Comment on error Detection and Correction Capability.
   (c) For a (7, 4), Cyclic Code with generator Polynomial $g(x) = x^3 + x^2 + 1$generate systematic and Non-Systematic Cyclic codeword for the Message Vector 1101. 8

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5. (a) Sketch a neat block diagram to explain the demodulation of non-offset QPSK Signal and Compare Offset QPSK with non-offset QPSK. 4+4
   (b) Differentiate between ASK, FSK, PSK, based on B. W. requirement, effect of Noise, Transmission rate, efficiency and application. 8
   (c) Justify the following :—
      (i) Gray Coding of the 1/P to M-ary System. 4
      (ii) Differential encoding of the 1/P in BPSK. System.

6. (a) Sketch the block diagram of Co-relator receiver and matched filter receiver and show that both are optimum filters. 8
   (b) Derive the expression for signal to Noise ratio of Integrator and dump receiver filter. Show that it enhances the signal relative to noise. 8
   (c) Define the following :—
      (i) Hamming Weight
      (ii) Hamming distance
      (iii) Code rate
      (iv) Convolutional Code. 4

7. (a) Draw the block diagram for frequency hop Spread Spectrum System and explain with waveform the fast frequency hopping. 8
   (b) Differentiate slow frequency hopping and fast frequency hopping. 4
   (c) Write short notes on any **two** :— 10
      (i) ISI and Eye diagram
      (ii) DEPSK
      (iii) MSK.

Basics of VLSI

Con. 4283–12.

(OLD COURSE)

GN–6638

(3 Hours)

[Total Marks : 100

NOTE:- 1) Question no 1 is compulsory.

2) Out of remaining six questions solve any four.

3) Each question carries 20 marks. Sub-questions carry equal marks.

4) Assume suitable data if required.

5) Useful physical constants are given in following table.

Name	Symbol	Value	Units
Boltzmann's constant	k	1.38×10^{-23}	J/K
Dielectric constant of vacuum	ε_0	8.854×10^{-14}	F/cm
Dielectric constant of Silicon	εsi	$11.7 \times \varepsilon_0$	F/cm
Dielectric constant of SiO_2	εox	$3.97 \times \varepsilon_0$	F/cm
Intrinsic carrier concentration of si	ni	1.45×10^{10} at 27 °c	cm^{-3}

1 (A) Write short notes on, "Transmission Gates".

(B) Realise EXOR gate using NMOS pass transistors.

(C) Write short notes on Clock tree in integrated circuits.

(D) An NMOS transistor with device transconductance, $K = 20\mu A/V^2$ and threshold voltage of 1.5 V is operated at $V_{GS} = 5V$ and $I_D = 80\ \mu A$. Find V_{DS}.

2 (A) Calculate the zero-bias threshold voltage for an NMOS Silicon- gate transistor that has well doping = $5 \times 10^{15}\ cm^{-3}$, gate doping = $N_D = 10^{20}\ cm^{-3}$, gate-oxide thickness = 100 A^0, and $4 \times 10^{10}/cm^2$ singly charged positive ions at the oxide-Silicon interface. Also calculate the ion-implant doses needed to achieve a threshold voltage of -1.25 V.

(B) Explain Euler's method with suitable example and discuss its advantages.

3 Draw a circuit diagram, stick diagram of 2 input CMOS NOR gate and its mask layout considering lambda based design rules.

4 (A) compare NMOS and CMOS logic families.

(B) Explain Latch up problem in VLSI and methods to avoid it.

5 (A) Explain buried contact and its advantages.

(B) Explain Importance of full scaling in VLSI.

6 (A) Explain lambda based design rules for:

(I) P Well.

(II) Metal pattern over contact cut.

(B) Draw static RAM cell and explain its working.

7 Explain processing sequence of CMOS inverter with all cross-sectional views. (Use P well technology).

BE / ETRX / VII (OLD) 21/5/12

Instrumentation System

GN-6656

Con. 3712-12.

(OLD COURSE)

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.

1. (a) Explain capacitive type of transducers with proper diagram. **5**
   (b) Derive the expression for ramp response of first order system. **5**
   (c) Explain ultrasonic flow meter. **5**
   (d) Explain importance of data acquisition and draw block diagram of DAS. **5**

2. (a) Give list of displacement transducers and explain how LVDT can be used for measuring linear as well as angular displacement. **10**
   (b) Explain concept of Virtual Instrumentation with its advantages and applications. **10**

3. (a) Draw and explain the generalized block diagram of instrumentation systems. **10**
   (b) What are different materials used for strain gauges. Explain different gauge circuits with used in instrumentation applications. **10**

4. (a) Differentiate based on principle of working, materials used, different Specification, advantages and disadvantages of RTD, Thermocouple and Thermistor temperature transducers. **10**
   (b) Explain the principle and operation of Photo-Voltaic cell. **10**

5. (a) Explain different types of DAS and explain with block diagram PC based DAS. **10**
   (b) Explain different transduction principles used for pressure measurement and explain piezoelectric based pressure transducer. **10**

6. (a) Explain different types of transducers and explains its characteristics. **10**
   (b) Explain Absorption type and transmission type of Torque measurement. **10**

7. (a) Short note on : Data Logger. **10**
   (b) Explain Hall Effect and explain how it is used for angular displacement measurement. **10**

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BE | ETRX | VII (OLD) 16/5/12
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Con. 4011–12. **(OLD COURSE)** **GN–6642**

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

NB. 1) Question no 1 is compulsory.

2) Solve any four questions out of remaining 6 questions.

3) Make suitable assumption where ever it is required and necessary.

1	A)	Compare the IIR and FIR digital filter with respect to impulse response, ROC, design methods and realization structure.	04
1	B)	Explain the characteristics of different window function.	04
1	C)	Compare frequency response of Butterworth, Chebyshev (Type-I & Type - II) and elliptic filters.	04
1	D)	Why a linear phase FIR filter having odd symmetry in coefficients can never be a low pass filter.	04
1	E)	Explain why digital filters designed using rectangular window has more ripples in it's magnitude response characteristics than the filter designed using any other window.	04
2	A)	Find the impulse response of a linear phase third order FIR filter having symmetry coefficients, Filter should have only one real zero. Give the reason for the selection for zero.	08
2	B)	The frequency response of the filter has the form $H(e^{j\omega}) = e^{-3j\omega}[1 + 0.4\cos 3\omega + 0.2\cos 2\omega + 0.2\cos\omega]$ Find the impulse response of the system also comment on symmetry if there is any.	12
3	A)	Design a linear phase FIR low pass filter of length seven with cut off frequency 1 rad/sec using rectangular window.	10
3	B)	Determine impulse response h(n) of a filter having desired frequency response $H_d(e^{j\omega}) = \begin{cases} e^{-j(M-1)\omega/2} & 0 \le \omega \le \pi/2 \\ = 0 & \text{for } \pi/2 \le \omega \le \pi \end{cases}$ M=7, use frequency sampling approach.	10

4 A) Realize following system function using minimum number of multipliers 10

$$H(z) = 1 + \frac{1}{3}z^{-1} + \frac{1}{4}z^{-2} + \frac{1}{4}z^{-3} + \frac{1}{3}z^{-4} + z^{-5}$$

Also obtain linear phase realization of

$$h(n) = \left\{1, \frac{5}{2}, \frac{3}{2}, \frac{5}{2}, 1\right\}$$

4 B) The following transfer function characterizes a linear phase FIR filter (M=11), determine the magnitude response and show that the group delay is constant. 10

$$H(z) = \sum_{n=0}^{M-1} h(n)z^{-n}$$

5 A) Convert the analog filter with system function 10

$$H(s) = \frac{s + 0.1}{(s+1)^2 + 9}$$

Into a digital IIR filter using Bilinear transformation. The digital filter should have resonant frequency of $\omega_r = \pi/4$.

5 B) Design a digital Butterworth filter that satisfies the following constraints using bilinear transformation, Assume T=1s. 10

$0.9 \le H(e^{j\omega}) \le 1 \qquad 0 \le \omega \le \pi/2$

$\left|H(e^{j\omega})\right| \le 0.2 \qquad \frac{3\pi}{4} \le \omega \le \pi$

6 A) Design a low pass digital FIR filter using Kaiser window satisfying the specification given below 10

Pass band cut off frequency $f_p = 150Hz$, stop band cut off frequency $f_s = 250Hz$, pass band ripple $A_p = 0.1dB$, stop band attenuation $A_s = 40dB$ and sampling frequency $F = 1000Hz$

6 B) Explain chebyshev and inverse chebyshev low pass filter with relevant formulae, graphs and characteristics. 10

7 Write short note on :—

i) Analog Frequency transformation. 07

ii) s- plane to z-plane mapping. 07

iii) Gibb's Phenomenon. 06