B.E. EXTC (VII)(R) 21/5/15

Int. to VLSI Design

Q.P. Code : 8484

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

N.B. : (1) Question No. **1** is **compulsory**
(2) Solve any **four** from out of remaining **six**.
(3) Assume suitable data whenever required.
(4) **Figures** to the **right** indicate **full** marks.

(Data: $\frac{KT}{q}$ = 26 mV, ni = 1.5x10 cm^{-3}, εo = 8.85x10^{-14}F/cm,

εsi = 11.7 x εo, εox = 3.9xεo, q = 1.6x10^{-19}C)

1. Solve any **four:-** **20**
   (a) Explain various lambda (λ) based layout design rules.
   (b) Explain effect of VDD on transfer characteristic of CMOS Inverter.
   (c) With the help of energy band diagram, explain working of MOS capacitor in accumulation, deletion and inversion region.
   (d) Explain concept of charge sharing.
   (e) Explain advantages of twin-tub CMOS technology over n-well and p-well and technology.

2. (a) Write VHDL/Verilog code to implement 5-bit updown counter using D-FF. **10**
   (b) Compare SRAM and DRAM cell. Draw the circuit diagram for both and explain how reading and writing operation is performed. **10**

3. (a) Draw voltage transfer characteristics of CMOS inverter and derive expression for V_{IL}, V_{IH}, V_{OL} and V_{OH}. **10**
   (b) Explain the clock generation and different type of clocking schemes for VLSI circuit. Also explain what do you mean by clock skew and clock jitter and how it can be estimated. **10**

4. (a) In CMOS inverter $\mu_n C_{ox}$ = 150 μA/V^2, $\left(\frac{W}{L}\right)_n$ =10, $\left(\frac{W}{L}\right)_P$ =30, load capacitance is 5pf, and V_{DD} = 5V. Find **10**
      (i) Inverter threshold (V_{INV})
      (ii) High to low propagation delay (t_{pHL})
      (iii) Low to High propagation dalay (t_{pLH}).
   (b) Draw six transistor SRAM cell and explain various design contraints on transistor sizes for safe read and write operations with appropriate design equations. **10**

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5. (a) Implement clocked SR flip flop using CMOS logic and explain its working with the help of its truth table and appropriate waveforms. **10**

6. (a) Implement 4:1 MUX using **10**
   (i) Pass transistor logic
   (ii) Transmission gate logic

   (b) Explain the effect of interconnect scaling on various performance parameters of VLSI chip. **10**

7. Write short notes on any **four**. **20**
   (a) cross-talk.
   (b) Programmable logic Array.
   (c) 3 transistor DRAM cell.
   (d) NOR based ROM Array.
   (e) NORA logic.

B.E. EXTC VII (R)

DCE

21/5/15

QP Code : **8481**

(3 Hours) [Total Marks : 100

N.B. (1) Question no. **1** is compulsory
(2) Attempt any **four** out of the remaining **six** questions.

1.	(a)	How are DPCM and ADPCM used for audio compression?	5
	(b)	Compare public key and private key cryptosystems giving an example for each.	5
	(c)	Explain the principle of " airthmetic coding" with a suitable example.	5
	(d)	What are digital signatures and how are they used?	5
2.	(a)	Compare statistical text compression and dictionary text compression. List the techniques in each method.	8
	(b)	Discuss various techniques for lossy and lossless image compression.	12
3.	(a)	Explain the working of an MP3 encoder and decoder for audio compression.	10
	(b)	What is motion compensation in video compression? Explain the MPEG video compression standard.	10
4.	(a)	Explain the working of triple DES with two and three keys.	10
	(b)	Explain RSA algorithm with an example.	10
5.	(a)	What is Diffie-Hellman key exchange? Explain with an example.	10
	(b)	What are the requirements on a Hash and a MAC function?	10
6.	(a)	What are various aspects of firewall design?	10
	(b)	What are digital signatures? How are they implemented?	10
7.	Write short notes on any **two**:-		20
	(a)	Chinese Remainder Theorem	
	(b)	Secure Electronic Payment System	
	(c)	Vinurses and Worms, their Counter-measures	

B.E. EXTC VII (Rev).

DTSP

15/5/15

QP Code : 8416

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

Instruction: 1. Question No. 1 is cumpolsory

2. Out of remaining question attempt any four questions.

3. In all five question to be attempted.

4. Figures to the right indicate full marks.

Q 1. a) One of zeros of a causal linear phase FIR filter is at $0.5\ e^{-i\pi/3}$. Show the locations of the zeros and hence find the transfer function and impulse response of the filter 05

b) Determine Zeros of the following FIR systems and indicate when the system is minimum phase maximum phase and mixed phase.

1. $H[z] = 6 + Z^{-1} + Z^{-2}$ 2. $H[z] = 1 - Z^{-1} - 6Z^{-2}$ 05

c) Find the number of complex multiplications and complex additions required to find DFT for 32 point sequence. Compare them with number of computation required if FFT algorithm is used. 05

d) What is linear phase filters. Define group delay and phase delay. 05

Q. 2. A) Derive Radix – 2 Decimation in Time Fast Fourier Transform and draw its signal flow graph. [10]

B) X[k] = { 36, -4+ j 9.656, -4 + j4, -4 + j1.656, -4, -4 - j1.656, -4 – j4, -4 - j 9.656}

Find x[n] using IFFT algorithm (use DIT IFFT) [10]

Q. 3 a) An 8 point sequence x[n] = {1, 2, 3, 4, 5, 6, 7, 8}

i) Find X[k] using DIF-FFT algorithm

ii) Let $x_1[n]$ = {5, 6, 7, 8, 1, 2, 3, 4} using appropriate DFT property and result of part (i) determine $X_1[k]$ [10]

b) Explain up sampling by non-integer factor, with a neat diagram and waveforms. [10]

Q.4 a) Design a Chebyshev I bandstop digital filter with the following specifications:

Passsband range: 0 to 275Hz and 2KHz to ∞

Stopband range: 550 to 1000Hz.

Sampling frequency: 8KHz

Passband attenuation: 1dB

Stopband attenuation: 15dB

Use BLT and assume T= 1sec. [10]

b) Design a Butterworth filter satisfying the following constraints:

$0.75 \leq |H(w)| \leq 1$ for $0 \leq w \leq \pi/2$

$|H(w)| \leq 0.2$ for $3\pi/4 \leq w \leq \pi$

Use Bilinear Transformation Method [10]

Q. 5 a) Design FIR digital highpass filter with a frequency response

$H(w) = 1 \quad \pi/4 \leq |w| \leq \pi$

$= 0 \quad |w| \leq \pi/4$

Use Hamming window. $N = 7$. [10]

b) With a neat diagram describe frequency sampling realization of FIR filters. [10]

Q. 6 a) An FIR filter is given by the difference equation

$$y[n] = 2x[n]\} + \frac{4}{5}x[n-1] + \frac{3}{2}x[n-2] + \frac{2}{3}x[n-3]$$

Determine the lattice form [10]

b) Using linear convolution find y[n] for the sequences x[n] = {1,2,-1,2,3,-2,-3,-1,1,2,-1} and h[n] = {1, 2}.Compare the result by solving the problem using overlap save method [10]

Q. 7 Write Short Notes on [20]

1. Digital Resonator
2. Parseval's Energy theorem and its significance
3. Goertzel Algorithm
4. Application of signal processing in RADAR

B.E. EXTC (VII)(R)
MCS

29/5/15

QP Code : 8552

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

Note:- 1. Q.No.1 is compulsory.
2. Solve any four out of remaining six question.
3. Assume suitable data where-ever necessary.

Q.1 a) Derive relationship between S/I (Signal to interference radio) and cluster N. [20]
b) Explain HSCSD network
c) Explain Cell dragging in GSM
d) Explain hard hand-off and soft hand-off

Q.2 a) Assume a receiver is located 10 kms from a 50W transmitter. [10]
The carrier frequency is 900MHz. Free space propagation is assumed, Gt=1 and Gr=2.

Find a) the power at the receiver.
b) the magnitude of the E-field at the receiver antenna.
c) the rms voltage applied to the receiver input assuming that the receiver-antenna has a purely real impedance of 50 and is matched to the receiver.

b) Explain in detail GSM network architecture. [10]

Q.3 a) What is meaning of traffic channel, signaling channel, broadcast channels & common control channel w.r.t. GSM [10]

b) Compare SDMA,TDMA, FDMA, CDMA techniques. [10]

Q4 a) Describe open loop and closed loop system of power control in a CDMA system. [10]
b) Sketch the block diagram of reverse traffic channel of IS -95. Explain function of each block. [10]

Q.5 a) How is power control applied in forward traffic channel of IS 95? [10]
b) Draw and explain GPRS architecture. [10]

Q.6 a) Discuss in detail IMT 2000 [10]
b) Explain forward link features of CDMA 2000 and also explain basic service provided by upper layers of CDMA 2000 [10]

Q.7 Write short notes on:- [20]

a) Umbrella cell approach b) Effect of Doppler spread on fast fading and slow fading.
c) Rake receiver d) Hand off in GSM

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RJ-Con. 10757-15.

B.E. Sem VII (R) (EXTC). 2/6/15

Fundamentals of Microwave Engg

QP Code : 8608

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

N.B. : (1) Question No. 1 is **compulsory**.
(2) Answer **any four** questions out of **remaining six** questions.
(3) **Illustrate** answers with **sketches**.
(4) Use of **Smith chart** is **compulsory**.

1. (a) State and explain Lorentz reciprocity theorem. **5**
(b) Explain the terms frequency pushing and frequency pulling with reference to magnetrons. **5**
(c) Differentiate between transit time devices and transferred electron devices. **5**
(d) Explain in brief point contact diode and its applications **5**

2. (a) Describe the mechanism of velocity modulation in a two cavity Klystron and hence obtain an expression for the bunched beam current. Also findout condition for maximum power output. **10**
(b) With a neat diagram explain the working of a Magic Tee. Derive its scattering matrix. **10**

3. (a) Derive equations for phase velocity, cutoff frequency, cutoff wavelength and field equations for rectangular waveguide. **10**
(b) Explain various types of microwave solid state devices along with their applications. **10**

4. (a) A lossless line of characteristic impeldance $R_o = 50\Omega$ is to be matched to a load $Z_L = 50/\left[2 + j\left(2+\sqrt{3}\right)\right]\Omega$ by means of a lossless short-circuited stub. The characteristic impedance of the stub is 100Ω . Find the stub position and length so that a match is obtained. **10**
(b) Explain the working of a negative resistance parametric amplifier. **10**

5. (a) Explain the procedure of measurement of dielectric constant at microwave frequency. **10**
(b) What are different microwave band classification? Give applications of various microwave bands. What is the band of rectangular waveguide with dimensions 2.3 cm and 1 cm? **10**

6. (a) What is TWT? Explain its construction and amplification process. **10**
(b) Explain the working and derive S-matrix for a two-hole directional coupler. **10**

7. Write short notes on :-
(a) Resonant re-entrant cavities **5**
(b) Modes on Gunn diode **5**
(c) Power dividers **5**
(d) Microwave filters. **5**
