EXTC Sem VII (R)
MCS

3/12/14.

QP Code : 15398

[Revised Course]
3 Hours

[Total Marks – 100]

NB: 1) Question no. 1 is compulsory
2) Attempt **any four** questions out of the remaining six questions.
3) Figures to the right indicate full marks.
4) Assume suitable **data** wherever necessary.

Q 1 a) Explain HSCSD network. [20]
b) Explain what Doppler shift is.
c) Explain authentication in GSM.
d) Explain path loss model.

Q 2 a) Discuss in detail GMS logical channels. [10]
b) How **system coverage and capacity** can be improved in GSM ?

Q 3 a) Discuss IMT 2000 system. [10]
b) Explain IS-95 reverse traffic channel. [10]

Q 4 a) Explain GSM services and features. [10]
b) Elaborate on forward W-CDMA channel [10]

Q 5 a) Explain signal processing in GSM [10]
b) What are the technical differences in W-CDMA and CDMA 2000. [10]

Q 6 a) Explain GSM system architecture. [10]
b) Explain in detail working of RAKE receiver. [10]

Q 7 Write short notes (any two) [20]
a) Small scale fading.
b) Frequency reuse.
c) GPRS technology.

BE EXTC Sem VII Rev

Elective - I Introduction to VLSI Design 27/11/2014

QP Code :15375

(3 Hours) [Total Marks : 100

N.B. : (1) Questions No. 1 is **compulsory**.
(2) Solve any **Four** from remaining six questions.
(3) Assume suitable data wherever necessary.

1. (a) Implement the following function using CMOS logic **4**

$$Y = \overline{A + \left(\overline{B} \cdot D\right) + \overline{C}}$$

(b) Design a transmission gate based OR gate and show its impementation. **4**

(c) Determine the oxide capacitance / cm^2 and the process transconductance A/v^2 for an nFET having gate oxide thickness of t_{ox} = 10nm and an elecron mobility of $\mu_n = 500 cm^2$ /V-sec, $\varepsilon_o = 8.85 \times 10^{-14}$ F/m, $\varepsilon_{si} = 11.7 \times \varepsilon_o$, $\varepsilon_{ox} = 3.9\ \varepsilon_o$, $q = 1.6 \times 10^{-19} C$ **4**

(d) Consider an interconnect pattern having a line of width 1 unit and length of 15 units and the sheet resisance is $R_s = 20\ \Omega$. Find the total resistance of the interconnect. **4**

(e) Determine the resistivity of a sample silicon that is doped ptype with boron added at a density of $10^{15}/cm^3$ the mobilities of the electron and hole are given as $\mu_n = 1350\ cm^2/V\text{-sec}$ $\mu_p = 400\ cm^2$ /V-sec. **4**

2. (a) Draw the transfer characteristics of CMOS inverter indicating clearly '5' regions of operation and explain its working for different W/L ratios. **10**

(b) Explain the twin-tub CMOS fabrication pocess in detail. **10**

3. (a) Consider a CMOS inverter with following parameter. **10**
nMOS : $V_{Ton} = 1V$, $\mu_n C_{ox} = 50\ \mu A/V^2$, $(W/L)_n = 8$
PMOS : $V_{Top} = -1V$, $\mu_p C_{ox} = 20\ \mu A/V^2$, $(W/L)_p = 12$
Calculate the noise margin and switching threshold (V_{th}) of this circuit, the power supply voltage is $V_{DD} = 5V$

(b) Draw the layout of a transmission gate using λ based rule. Use proper colour coding and aspect ratio. **10**

4. (a) Draw the pseudo - nmos circuits that provide the following logic operation **10**

(a) $f = \overline{a.b + c}$

(b) $h = \overline{(a+b+c)x + y.z}$

(c) $f = \overline{a + \left(c \cdot \left[x + y \cdot z\right]\right)}$

(b) What are the different types of fast multiplier circuits explain any one in detail. **10**

5. (a) Draw six transitor SRAM cell. Explain its read and write operation and also discuss its design consideration. **10**

(b) Draw 1 bit full adder using. **10**
(1) Standard CMOS logic
(2) Domino logic
(3) Dynamic logic
(4) Nora logic

6. (a) Write a verilog / VHDL. Module describing two serial in serial out shift register using DFF module / entity. **10**

(b) Explain in detail about the static power dissipation, dynamic power dissipation and short circuit power dissipation in CMOS logic. **10**

7. Write notes on (any **four**) : **20**
(a) Limitation of design rules (physical limitation)
(b) CMOS clock styles.
(c) Low power design considerations
(d) Modelling of MOS transistors in SPICE
(e) MOSFET parasitics.

BE - EXTC Sem VII Rev

Elective I - Data Compression & Encryption 27/11/2014

QP Code :15372

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

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

1. (a) Discuss the basic data compression techniques with suitable examples. **20**
(b) Explain predictive coding techniques for compression.
(c) Explain Chinese remainder algorithm with example.
(d) What is the difference between MDC and MAC? Explain criteria for cryptographic hash function.

2. (a) Design a minimum variance huffman code for a source that put out letter from an alphabet A=$\{a_1,a_2,a_3,a_4,a_5,a_6\}$ with $P(a_1)=P(a_2)=0.2$, $P(a_3)=0.25$, $P(a_4)=0.05$, $P(a_5)=0.15$, $P(a_6)=0.15$ **20**
Find the entropy of the source, avg. length of the code and efficiency. Also comment on difference between huffman code and minimum variance huffman code.
(b) Encode the following sequence using the LZ-77 algorithm
barrayar♭by♭barrayarb♭bay. Assume you have a window size of 15 with look ahead buffer of size 7. Further more assume that c(a)=1, c(b)=2 , c(♭)=3 c(r)=4, c(y)=5.

3. (a) Discuss the drawbacks of different conventional method in audio compression. **20**
Explain silence compression in lossy audio compression technique.
(b) Describe the format of μ -law encoder and decoder specified by G.711.
Find out the codeword for -656 input sample using μ– law encoder specified by G.711
Give difference between μ– law and A law companding.

4. (a) Explain the attack on double DES. Discuss Triple DES with three keys and triple DES with two keys. **20**
(b) Explain steganography with example Distinguish between steganography and cryptography.

5. (a) State Fermat's little theorem and Euler's theorem. **20**
Find multiplicative inverse of following without using extended euclidean algorithm.
(i) 8^{-1} mod 77
(ii) 7^{-1} mod 15
Also explain the use of Euler's theorem in RSA cryptosystem.

[TURN OVER

(b) Explain digital signature using RSA with example. 20

6. (a) Write a short note on secure Electronic payment system.
(b) Discuss Intruders, viruses and worms in detail.
Also explain logical bomb and trojan horse
Given difference between viruses and worms. 20

7. Attempt **any two:–**
(a) JPEG in image compression
(b) MPEG video standard
(c) IDEA
(d) Biometric Authentication

B.E. EXTC Sem VII (R) 27/11/14
EPD.

QP Code :15381

(3 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 required with justification.

1. (a) Explain exponential law of reliability. **5**
(b) State performance parameters of PCB's. **5**
(c) State features of DPO. **5**
(d) What are the desirable features of assemblers and cross compilers? **5**

2. (a) What is a multilayer PCB and why is it preferred for IC's on densed embedded circuits. **10**
(b) Explain various tests, its outcome and action to be taken in order to estimate the stability of enclosure. **10**

3. (a) Specify with justification the choice of environmental tests to be carried out on following :— **10**
(i) CRO
(ii) Computer
(b) Explain the estimation of power supply sizing by using following modes :— **10**
(i) Static power consumption
(ii) Dynamic power consumption

4. (a) Explain following terms in relation to the logic analyzer :— **10**
(i) Timing acquisition
(ii) State acquisition
Also explain how logic analyzer can be used for debugging of address and data bus of microprocessor.
(b) Explain in details with example the software structured design stage use in software development. **10**

5. (a) Draw a sketch of front panel of a laboratory dual power supply and explain how ergonomics and aesthetic design considerations are taken care of this instrument. **10**
(b) Explain the different types of manuals for CRO. **10**

[TURN OVER

6. (a) Estimate the reliability of a power supply at $t = 2 \times 10^6$ hrs. 5

Components	Qty	FR per 10^{-6}	MTTF x 10^{-6}
(1) Transformer	1	0.6	1.667
(2) Rectifier diodes	4	0.2	5
(3) Capacitors	3	0.3	3.334
(4) Regulator	1	0.18	5.556

(b) Explain Metal-oxide varistor (mov) power supply protection device. 5
(c) Give the importance of CE certification and IP standards for electronic product. 5
(d) Write a short note on DIP soldering. 5

7. (a) What are the advantages of virtual instrumentation. 5
(b) Write a short note on SMD assemblies. 5
(c) What is monte-carlo analysis? 5
(d) Explain commonly used methods of bare board testing. 5

DISP (BE EXTC) Sem VII (R) 21/11/14

QP Code : 15306

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

N.B : (1) Question no.1 is **compulsory**.
(2) Answer any **four** questions out of remaining **six** question.
(3) **Figures** to the **right** indicate **full** marks.
(4) Illustrate the answers with sketches wherever required.

1. (a) Compare impulse invariant and Bilinear transformation techniques. **5**
(b) A two pole low pass filter has the system function **5**

$$H(z) = \frac{b_0}{\left(1 - pz^{-1}\right)^2}$$

Determine the value of b_0 and p such that the frequency response $H(\omega)$ statisfies the conditions $H(0) = 1$ and $\left| H\left(\frac{\pi}{4}\right) \right|^2 = \frac{1}{2}$

(c) Explain Multirate sampling? What are the basic methods? List the advantages of it. **5**
(d) Explain the sub band coding of speech signal as an application of multirate signal processing. **5**

2. (a) If the impulse response of a FIR filters has the property $h(n) = \pm h(N-1-n)$, find the expression for magnitude response and phase response and show that filters will have linear phase response. **10**
(b) An 8 point sequence $x(n) = \{1, 2, 3, 4, 5, 6, 7, 8\}$ **10**
(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 $X_1[k]$

3. (a) Draw a lattice filter implementation for the all pole filter, **10**

$$H(z) = \frac{1}{1 - 0.2z^{-1} + 0.4z^{-2} + 0.6z^{-3}}$$

and determine the number of multiplications, additons and delays required to implement the filter.
(b) Compare minimum phase, maximum phase and mixed phase system. Determine the zeros of the following FIR systems and indicate whether the system is minimum phase, maximum phase or mixed phase , $H(z) = 6 + z^{-1} + z^{-2}$ **10**

4. (a) Develop DIT - FFT algorithm for decomposing the DFT for N = 6 and draw the flow diagrams for (i) N = 2 x 3 (ii) N = 3 x 2 **10**

(b) (i) Convert the following analog filter system function into digital IIR filter by means of Bilinear transformation. The digital filter should have resonant frequency of $\omega_r = \pi/4$. **10**

$$Ha(s) = \frac{(s+0.1)}{[(s+0.1)^2+9]}$$

(ii) For the analog transfer function

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

Determine H(z) using impulse invariant technique. Assume T = 1sec.

5. (a) The transfer function of discrete time causal system is given below **10**

$$H(z) = \frac{(1-z^{-1})}{(1-0.2z^{-1}+0.15z^{-2})}$$

(i) Find the differece equation.

(ii) DF - I and DF - II

(iii) Draw Parallel and Cascade realization.

(iv) Show pole and zero diagram and find magnitude at $\omega = 0$ and $\omega = \pi$.

(b) A filter is to be designed with the following desired frequency response **10**

$$H(e^{j\omega}) = 0 \quad ; \quad -\pi/4 \le |\omega| \le \pi/4$$

$$= e^{-j2\omega} \quad ; \quad -\pi/4 \le |\omega| \le \pi$$

Determine the filter coefficient h(n) if the window function is defined as

$$w(n) = 1, \quad 0 \le n \le 4$$

$$= 0, \quad \text{otherwise}$$

Also determine the frequency response $H(e^{j\omega})$ of the designed filter.

6. (a) Determine H(z) for a digital Butterworth filter that satisfying the following constraints **10**

$$\sqrt{0.5} \le |H_d(e^{j\omega})| \le 1 \quad ; \quad 0 \le \omega \le \pi/2$$

$$|H_d(e^{j\omega})| \le 0.2 \quad ; \quad 3\pi/4 \le \omega \le \pi$$

with T = 1sec. Apply impulse Invariant transformation.

(b) (i) A sequence is given as $x(n) = \{1 + 2j, 1 + 3j, 2 + 4j, 2 + 2j\}$, from the basic definition, find X(k). If $x_1(n) = \{1, 1, 2, 2\}$ and $x_1(n) = \{1, 1, 2, 2\}$. Find $X_1(k)$ and $X_2(k)$ by using DFT only. **10**

(ii) Sequence $x_p(n)$ is a periodic repletion of sequence x(n). What is the relationship between C_k of discrete time Fourier series of $x_p(n)$ and X(k) of x(n)?

7. Write notes on (any **three**) :— **10**

(a) Adaptive television echo cancellation

(b) Goertzel algorithm

(c) Decimation by integer factor (M) and interpolation by integer factor (L)

(d) Ovderlap add and overlap save method for long data sequence.

B.E EXTC Sem VII (R). 9/12/14.

FME

QP Code :15496

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

N. B. : (1) Question **no.1** is **compulsory.**
(2) Answer any four questions from remaining.
(3) Assume suitable data wherever necessary.

1. (a) Mincrostrip line is also called an open strip line. Comment on this. **18**
(b) What do you understand by the terms cutoff wavelength, dominant mode, guide wavelengths, phase velocity and wave impedance.
(c) Explain the action of a rat-race junction.
(d) Discuss the power frequency, current frequency and power gain frequency limitations with reference to a microwave transister.

2. (a) What is the importance of beam-coupling coefficient. Derive the equation of velocity modulation in klystron. **18**
(b) A refler klystron operster at 8GHz at the peak of n=2 mode with $V_o = 300V$ R_{sn} =20k Ω and L=1mm. If the gap transit time and beam loading are neglected, find the (a) Repeller voltage (b) Beam current necessary to obtain an RF gap voltage of 200V.

3. (a) Discuss design procedure for filter using insertion loss method. Compare this with image-parameter method. **10**
(b) Explain the procedure of measurement of dielectric constant at microwave frequency. **10**

4. (a) Describe different modes of oscillation of gun-diode. Differentiate between transferred electron devices and transistors. **10**
(b) How is buchning actived in a cavity magnetron. Explain phase forcussing effect. What is strapping in magnatron. **10**

5. (a) Describe in detail the operation of a 2-hole directional coupler. Calculate the coupling factor if the power in the primary waveguide is 72mw and the power delivered to the dirational coupler is 8 mw. **10**
(b) A single stub tuner is to match a lossless line of 400 Ω to a local of 800-j300 Ω . The frequency is 3GHz. **10**
(i) Find the distance in meters from load to a tuning stub.
(ii) Determine the length in meters of the short circuited stub.

6. (a) Explain the working of a negative resistance Parametric amplifier and explain its application. **10**
(b) Derive plane wave equation and explain the significance. **10**

7. (a) Explain Travelling wave to be as an amplifier. **4**
(b) Explain Hybride junction **4**
(c) Explain Brillouinflow and derivian expression for Brillouin magnetic field Br. **8**
(d) Design a circulator using Magic-T **4**

BE. EXTC : SEM : VII (CR) 15/Dec 2019

CCN

QP Code :15629

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

N.B. : (1) Questions No. 1 is **compulsory.**
(2) Attempt any **4** questions out of remaining **six** questions.
(3) Illustrate answers with **sketches** wherever required.
(4) Figures to the **right** indicae **marks.**

1. (a) What is port address? What is significance of port address? **20**
(b) What is data transparency? Explain the property of data transparency with reference to HDLC.
(c) Explain the difference between a connection oriented and connectionless service.
(d) How does reservation work with medium access control?
(e) Why do you require a limit on the minimum size of Ethernet frame?

2. (a) With neat diagram explain sliding window flow control. suppose that frames are 1250 bytes long including 25 bytes of overhead. ACK frames are 25 bytes long. Calculate the efficiency of stop and wait ARQ in a system that transmits at channel transmission rate R = 1 Mbps. Round trip propogation delay is given as 1 ms. (Assuming channel is noiseless) **10**
(b) Explain Looping problem in Distance vector routing protocol with an example and method to avoid this problem. **10**

3. (a) Compare circuit switching, Datagram packet switching and virtual packet switching techniques. **10**
(b) Explain the meaning of various fields in TCP header. **10**

4. (a) Explain in detail Repeaters, hub, bridges, Routers and Switches. **10**
(b) For a classful network address 209.100.78.0 **10**
(i) How many host can this network support using the default mask.
(ii) What subnet mask is necessary to establish six usable subnets.
(iii) List the six subnet address in classless address notation.
(iv) How many host can be supported in each subnet?
(v) What is the broadcast address for subnet three.

5. (a) Explain HDLC frame format. Describe configuration and response modes supported by HDLC protocol. Differentiate between HDLC and PPP protocols. **10**
(b) Explain fragmentation and the fields related to the fragmentation in the IP datagram header. Discuss why IPV4 protocol needs to fragment some packets. **10**

6. (a) Explain the M/M/I model of queuing theory. **10**
   (b) Explain Dijkstras Algorithm and Bellman ford Algorithm using suitable example. **10**

7. Write Short Notes on any three **20**
   (a) IEEE 802.3 standard
   (b) ARP and RARP
   (c) Spanning tree Algorithm
   (d) OSI Model.
