B.E. EXTC – Sem – 7 (Rev) 5/12/13

Ash5-D:\Data-87 Mobile Communication Systems.

Con. 8710-13. **LJ-14071**

(REVISED 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) Assume **suitable** data wherever **necessary.**

1.	(a)	Discuss non–linear effects in FDMA.	**5**
	(b)	Explain cell dragging and dwell time.	**5**
	(c)	Explain handoff strategies for 1G to 3G cellular system.	**5**
	(d)	Discuss about frequency reuse in cellular system.	**5**
2.	(a)	Explain GSM protocol architecture in detail.	**10**
	(b)	Explain signal processing in GSM.	**10**
3.	(a)	Explain block called delayed and block call cleared system.	**10**
	(b)	Discuss different methods used for improvement of cellular capacity with suitable diagram.	**10**
4.	(a)	With suitable diagram explain role of Rake Receiver.	**10**
	(b)	A transmitter which radiates a carrier frequency of 1850 MHZ for a vehicle moving 60 mph, calculate the received carrier frequency if the mobile is moving :– mile per hour (a) Directly toward the transmitter. (b) Directly away from the transmitter. (c) In the direction which is perpendicular to the direction of arrival of the transmitted signal.	**10**
5.	(a)	Compare SDMA, TDMA, CDMA and FDMA system.	**10**
	(b)	Explain frequency and channel specifications of IS–95.	**10**
6.	(a)	Explain handoff in 3G system.	**10**
	(b)	Elaborate on forward W–CDMA Channel.	**10**
7.	Write short notes any **two** :– (a) 3G CDMA evolutionary path. (b) Security and authentication in GSM. (c) Discuss GPRS technology.		**20**

11/12/13

SEM VII FUNDAMENTALS OF MICROWAVE ENGG. NOV-DEC 2013

19-11-13-DTP-P-14-AK-11

Con. 9079-13. **LJ-14126**

EXTC

(Revised Course)

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

David Pozar.

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

1. (a) Explain the relationship between work and energy at microwave frequency. **5**
(b) Justify why waveguide does not support TEM propogation. **5**
(c) How can circulator be implemented using 2 Maig TEE's and phase shifter of 180°. **5**
(d) Differentiate between Transit time devices and Transferred Electron devices. **5**

2. (a) How matched impedence is achieved in transmission line ? Explain any one method in detail. **10**
(b) Explain the construction and working of Microwave FET in detail. **10**

3. (a) Why phase focussing is required in magnetron ? What is back heating ? How it can be controlled ? **10**
(b) Explain the significance of RWH model and two valley model in GUNN diode. **10**

4. (a) Explain wave propogation in circular waveguide in detail. **10**
(b) What are 'O' type tubes ? Explain. A TWT operates under following parameters. **10**

Beam voltage	:	2.5 KV
Beam current	:	50 mA
Characteristic impedance of helix	:	6.75 Ω
Circuit Length	:	45
Frequency	:	8 GHz

Determine gain parameter, power gain and all four prepogation constants.

5. (a) A waveguide has internal length of 3cm and carries the dominant mode of a signal of unknown frequency. If Z_{TE} is 500Ω, what is this frequency ? **10**
(b) What are periodic structures ? Why are they termed as filters. **10**

6. (a) Why are detectors used at microwave frequency ? Explain its application in detail. **10**
(b) Design a Butterworth low pass filter with microwave components of order 4 wih Ro = 50Ω operating at a frequency of 3 GHz. ⟶ five coefficients **10**

7. Write short notes on :-
(a) Measurement of VSWR. **5**
(b) Resorating Re-entrant cavities. **5**
(c) Microstrip transmisson lines. **5**
(d) Diode used in Parametric Devices. **5**

B.E (EXTC) Sem VII 17/12/13

Comp Communication Network

C:\data\SP\Con No. 16

54

Con. 9651-13. **LJ-14258**

(REVISED 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) **Illustrate** answers with **sketches** wherever **required**.
(4) **Figures** to the **right** indicate marks.

1. (a) Explain the difference between a data link layer delivery and a network layer delivery. **5**
(b) Differentiate between Circuit switching and Packet switching. **5**
(c) Why do you require a limit on the minimum size of Ethernet frame ? **5**
(d) Explain ALOHA and slotted ALOHA. **5**

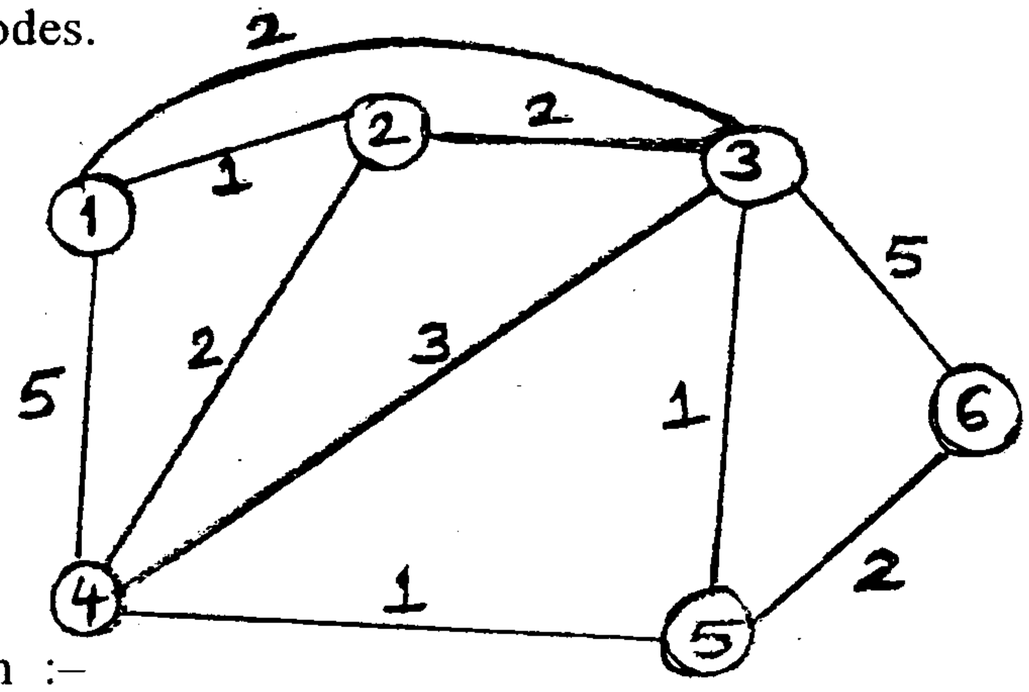
2. (a) What does the term error control mean in data link layer ? With neat diagram explain Go back N and selective repeat ARQ protocols. Compare their merits and demerits. **10**
(b) Explain OSI model and explain the process of data encapsulation in detail. **10**

3. (a) Explain in detail HDLC protocol with all the frame types supported by HDLC. Differentiate between HDLC and PPP protocols. **10**
(b) Discuss various scheduling medium access control techniques. **10**

4. (a) What is exterior and interior routing ? Explain in brief Distance vector routing and Link state routing. **10**
(b) Write a note on IEEE 802·3 Standard in detail. **10**

5. (a) Explain fragmentation and the fields related to the fragmentation in the IP datagram header. Discuss why IPV4 protocol needs to fragment some packets. **10**
(b) Discuss Queuing System classification. Explain M/M/I queuing system. **10**

6. (a) Explain the meaning of various fields in the TCP header format. **10**
(b) Find the shortest path between the source node 1 to all other nodes for the network given below using Dijkstra's algorithm. Also draw the shortest path tree from node 1 to all other nodes. **10**



7. Write short notes on :– **20**
(a) Private IPV4 addresses
(b) Looping in Distance Vector routing protocol
(c) DHCP and RARP.

B.E EXTC Sem - 2015 / NOV-13

Discrete Time Signal processing.

(Revised Course)

LJ-11-13-DTP7-RM-22

Con. 7728-13. **LJ-13936**

(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 data if required.

1. (a) Transfer functions of causal and stabel digital filters are given below. State whether these filters are **20**
Minimum / Maximum / Mixed Phased filters

(i) $H_1(Z) = \frac{(1-\frac{1}{2}z)(1-\frac{1}{4}z)}{(z-\frac{1}{3})(z-\frac{1}{5})}$

(ii) $H_2(Z) = \frac{(1-\frac{1}{2}z)(z-\frac{1}{4})}{(z-\frac{1}{3})(z-\frac{1}{5})}$

(iii) $H_3(Z) = \frac{(z-\frac{1}{2})(z-\frac{1}{4})}{(z-\frac{1}{3})(z-\frac{1}{5})}$

(b) Compute DFT of the sequence $X_1,(n) = \{1,2,4,2\}$ using property and not otherwise compute DFT of $x_2(n) = \{1+j, 2+2j, 4+4j, 2+2j\}$

(c) The impulse response of a system is $h(n) = a^n u(n)$, $a \neq 0$. Determine a and sketch pole zero plot for this system to act as :-
(i) Stable low pass filter.
(ii) Stable high pass filter.

(c) Draw direct form structure for a filter with transfer function, $H(z) = 1 + 3z^{-1} + 2z^{-3} - 4z^{-4}$

2. (a) Consider a filter with impulse response, $h(n) = \{0.5, 1, 0.5\}$. Sketch its amplitude spectrum. Find its response to the inputs **10**
(i) $x_1(n) = \cos(n\pi/2)$
(ii) $x_2(n) = 3+2\,\delta(n) - 4\cos(n\pi/2)$

(b) Determine circular convolution of $x(n) = \{1,2,1,4\}$ and $h(n) = \{1,2,3,2\}$ using time domain convolution and radix-2FFT. Also find circular correlation using time domain correlation. **10**

3. (a) Explain overlap and add method for long data filtering. Using this method find output of a system with impulse response, $h(n) = \{1,1,1\}$ and input $x(n) = \{1,2,3,3,4,5\}$. **10**

[TURN OVER

(b) Compute DFT of a requence, x(n) = {1,2,2,2,1,0,0,0} using DIF-FFT algorithm. Sketch its magnitude spectrum. **10**

4. (a) Draw lattice filter realization for a filter with the following transfer function. **10**

$$H(z) = \frac{1}{1+\frac{13}{24}z^{-1}+\frac{5}{8}z^{-2}+\frac{1}{3}z^{-3}}$$

(b) Design a low pass Buttre worth filter with order 4 and passband cut off frequency of 0.4π. Sketch pole zero plot. Use Bilinear transformation. Draw direct form II structure for the designed filter. **10**

5. (a) Design an FIR Bandpass filter with the following specifications :- **10**
length : 9
stop band cut off frequency : 0.7π
Use Hanning window.

(b) The transfer function of a filter has two poles at z=0, two zeroes at z =-1 and a dc gain of 8. Final transfer function and impulse response. **10**
Is this a causal or noncausal filter?
Is this a linear phase filter?
If another zero is added at z = -1 find transfer function and check whether it is a linear phase filter or not.

6. (a) Transfer function of an FIR filter is given by $H(z) = 1-z^{-N}$ **10**
Sketch pole zero plots for N = 4 and N = 5
Prove that it is a comb filter.

(b) Write about frequency sampling realization of FIR filters. **10**

7. (a) Explain the process of decimation for reducing sampling rate of signal. **10**

(b) Compare various windows used for designing FIR filters. **10**

B.E (EXTC) VII Rev. 30/11/13
Elective - Introduction to VLSI Design

20-11-13-DTP7-RM-5

Con. 9157-13. **LJ-14005**

(Revised Course)

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

N.B. : (1) Question No. **1** is **compulsory.**

(2) Solve any **four** from remaining **six** questions.

(3) Assume suitable data if required.

Data : $\frac{KT}{q}$ =26 mv, ni = 1.45 x 10^{10} cm^{-3}, $\in o$ = 8.85 x 10^{-14} F/cm, $\in si = 11.7 \times \in o$,

$\in ox = 3.9 \times eo$, q = 1.6 x 10^{-19}C

1. Solve any **five** :- **20**

(a) What are the advantages of dynamic logic over static CMOS logic.

(b) Implement three input NOR gate using standard CMOS logic.

(c) In NMOS transistor W = 10 μm, L = 1μm, μn = 500 $\frac{cm^2}{v.sec}$, cox = 5 x 10^{-8} F/cm^2.

If VDS = 5v, VGS = 3V and threshold voltage is 1V. Find drain current IDS.

(d) Draw the energy band diagram of MOS capacitor along with its cross-section in accumlation, depletion, and inversion region.

(e) Explain the importance of Hardware Description Language like VHDL/Verilog in VLSI Design.

(f) What are the different sources of power dissipation in VLSI Circuits.

2. (a) Explain the process of CMOS invertor fabrication with the help of neat sketches along with mask required. **12**

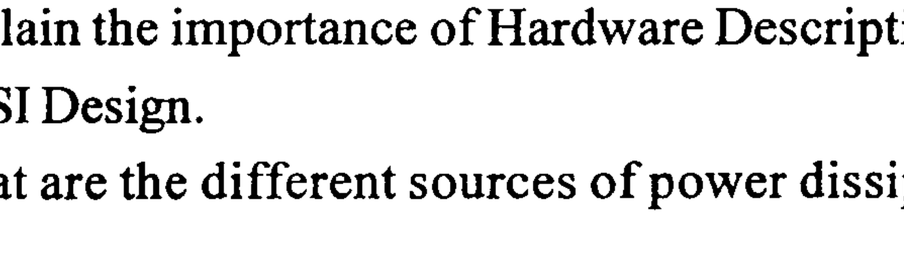
(b) Draw the layout of 2 input CMOS NAND gate using λ (lambda) rules. **8**

3. (a) Draw circuit diagram of six transistor SRAM cell and explain its reading and writing operation with respective timing diagrams. **10**

(b) Explain the working of CMOS invertor with help of voltage transfer characteristics. **10**

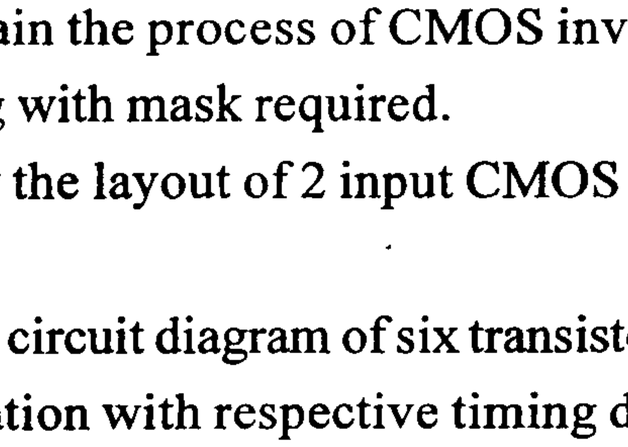
4. (a) Find output voltage in each case as shown below :- **10**

(i)



VDD = 5V, VTo = 1 V, Neglect body bias effect.

(ii)



VDD = 5V, VTo = 1V, Neglect body bias effect.

[TURN OVER

(b) Draw 4 bit x 4 bit NOR based ROM array to store the following data in respective memory location. **10**

Memory Address	Data
1 0 0 0	0 1 0 1
0 1 0 0	0 0 1 1
0 0 1 0	1 0 0 1
0 0 0 1	0 1 1 0

Also draw the layout of the same.

5. (a) Draw 4 bit decade counter using D-FF. Draw respective timing diagram and write VHDL/Verliog description for the same. **10**

(b) Calculate the threshold voltage VTO at VSB = 0, for a polysilicon gate n-channel MOS transistor, with following parameters :- **10**

Substrate doping NA = 10^{16} cm^{-3}

Polysilicon gate doping density ND = 2 x 10^{20} cm^{-3}

Gate oxide thickness tox = 500 A^0 and

Oxide - interface fixed charge density NOX = 4 x 10^{10} cm^{-2}.

6. (a) What is crosstalk ? Why it is necessary to consider issues related to crosstalk in integrated circuits. What are methods to minimize cross talk in integrated circuits? **10**

(b) Draw and explain the working of Array Multiplier in detail. **10**

7. Write short notes on any **four** :- **20**

(i) Interconnect Scaling.

(ii) Input and output circuits.

(iii) Transient response of CMOS Invertor.

(iv) Clock distribution issues in VLSI.

(v) Design of six-transistor SRAM cell.

14-11-13-DTP6-MU-16

Data Compression & Encryption
BE EXTC SEM VII 30/11/13

Con. 8446-13. **LJ-14002**

(Revised Course)

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

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

1. (a) How are DPCM and ADPCM used for audio compression ? **5**
(b) What is the difference between Shannon Fano coding and Huffman coding? **5**
(c) Discuss the major steps in S-box design. **5**
(d) What are digital signatures and how are they used? **5**

2. (a) A source A = {w, x, y, z) has probabilities { 0.15, 0.1, 0.7, 0.05} respectively. Generate and decipher the tag for the sequence [x, y, z, w, z] using arithmetic code. **10**
(b) Explain how triple DES works with two and three keys. **10**

3. (a) Take an alphabet string and code it using LZ 78. What are the limitations and how can they be overcome with LZW ? **10**
(b) Classify the different types of attacks and explain them with examples. **10**

4. (a) How is the frequency domain coding useful in audio compression? **10**
(b) Discuss the various principles involved in private and public key cryptography. **10**

5. (a) Explain one lossless technique of image compression. **10**
(b) What are message authentication and Hash functions and how are they used? **10**

6. (a) What are the various steps involved in video compression? **10**
(b) Explain the various certificate based and Biometric authentication methods. **10**

7. Write short notes on (any **two**):– **20**
(a) JPEG 2000.
(b) Chinese Remainder Theorem.
(c) Digital Immune Systems.
(d) Success Electronic Payment Systems.
