Sem-VI - CBSGS/EXTC/Digital Communication/May-16.

**QP Code : 31640**

**(3 Hours)** **[Total Marks : 80**

N.B.
1] Question no.1 is **compulsory**
2] Attempt any **three** questions out of remaining **five** questions
3] Assumptions made should be **clearly** stated
4] Illustrate answers with **sketches** wherever **required**

| | | | |
|---|---|---|---|
| Q.1 | | Attempt any **four** | |
| | a | Describe the Shanon-Hartley capacity theorem. | 5 |
| | b | Consider a binary data sequence 10101010.Draw the waveforms for the given binary data sequence, using unipolar RZ and split phase Manchester. | 5 |
| | c | State two criteria which a spread-spectrum communication system must satisfy. Justify that the spread-spectrum signals are transparent to the interfering signals, and vice-versa. | 5 |
| | d | Explain the Coherent and non coherent digital modulation techniques. | 5 |
| | e | Define code rate, code efficiency. systematic and non systematic in the context of linear block code. | 5 |
| | | | |
| Q.2 | | | |
| | a | Consider the five source symbols of a discrete memoryless source and their respective probabilities as 0.4, 0.2, 0.2, 0.1, and 0.1.<br>i) Create a Huffman Tree for Huffman source coding technique to find the codeword and length of codewords for each source symbol.<br>ii) Determine the average codeword length of the specified discrete memoryless source.<br>iii) Comment on the results obtained | 10 |
| | b | Describe in convolution code, Time domain approach, and Transform-domain approach to determine encoder output. | 10 |
| | | | |
| Q.3 | | | |
| | a | Justify that the probability of error in matched filter does not depend on the shape of input signal. Derive the relevant expression. | 10 |
| | b | For a Quadrature Phase Shift Keying (QPSK), Explain the modulator, demodulator, Bandwidth and advantages. | 10 |
| | | | |
| Q.4 | | | |
| | a | Describe coherent detection method of binary FSK signals. Also draw power spectra for BFSK modulated signal. | 10 |
| | b | In a digital communication system, the bit rate of a bipolar NRZ data sequence is 1 Mbps and carrier frequency of transmission is 100MHz. Determine the symbol rate of transmission and the bandwidth requirement of the communications channel for<br>i) 8-ary PSK system<br>ii) 16-ary PSK system. | 10 |
| Q.5 | | | |
| | a | The Generator matrix of (6, 3) systematic block code is given below:<br>$G = \begin{bmatrix} 100011 \\ 010101 \\ 001110 \end{bmatrix}$<br>Find the code Vectors, parity check matrix, and the error syndrome. | 10 |

| | | | |
|---|---|---|---|
| | b | A (7, 4) cyclic code is described by a generator polynomial $g(x)=x^3+x+1$<br>i) Find out the generator matrix<br>ii) Parity checks matrix.<br>iii) Draw the syndrome calculator and explain how received message is corrected? | 10 |
| Q.6 | | **Attempt the following (any two).** | |
| | a | Write short note on Intersymbol interference (ISI) and . | 10 |
| | b | Explain with the help of block diagrams and waveforms, the following techniques of spread spectrum communication. (a) Direct sequence (b) Frequency hopping. | 10 |
| | c | What are different decoding methods of convolutional codes? Explain any one in detail. | 10 |

T.E / Sem-VI / E&TC / ~~District~~ Discrete Time Signal Processing / May 2016
(CBSGS)

**QP Code : 31652**

(3 Hours) [ Total Marks :80

**N.B.** : (1) Question no. **1** is **compulsory.**
(2) Solve any **three** questions from remaining **five questions.**
(3) In all **four** questions to be attempted.
(4) **Figures** to the **right** indicate **full** marks.

1. (a) Explain multirate signal processing with applications. 20
(b) If h(n) = {1, 2, 3,4 } is impulse response of FIR Filter, Realize the filter in direct form.
(c) State and prove Parseval's Theorem.
(d) State advantage and disadvantage of digital filters.

2. (a) (i) x(n) = {1, 2, 3, 4} find DFT of x(n) 10
(ii) Using results obtained in part (i) and otherwise find DFT of following sequences
a(n = { 4, 1, 2, 3} b(n) = {2, 3, 4, 1} c(n) = {3, 4, 1, 2}
d(n) = {4, 6, 4, 6}
(b) A digital filter is describe by the following differential equation 10
y(n) = 0.9 y(n-1) + bx(n)
(i) Determine **b** such that |**H** (0)|= 1
(ii) Determine the frequency at which $|H(w)| = \frac{1}{\sqrt{2}}$
(iii) Identify the filter type based on the passband.

3. (a) If x(n) = {1 2 3 4 5 6 7 8}, Find X(K) using DITFFT. Compare computational complexity of above algorithm with DFT. 10
(b) Show the mapping from S plane to Z plane using Impulse Invariant Method and explain its limitation. Using this method, determine H(Z) if 10

$$H(s) = \frac{3}{(s+2)(s+3)} \text{ if } T = 0.1 \text{ sec}$$

4. (a) Design a Linear Phase FIR Low Pass filter of Length 7 and cut off frequency 1 rad/sec using rectangular window. 10
(b) If x(n) = {1, 2, 3, 2} and h(n) = {1, 0, 2, 0} 10
(i) Find circular convolution using time domain method.
(ii) Find linear convolution using circular convolution.

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5. (a) Design a digital Butterworth filter for following specifications using Bilinear transformation technique 10

Attenuation in Pass band = 1.93dB,
Pass band Edge frequency = $0.2\pi$,
Attenuation in Stop band = 13.97dB,
Stop band Edge frequency = $0.6\pi$.

(b) With a suitable block diagram describe sub-band coding of speech signals. 10

6. Attempt the following :-

(a) Short note on dval tone multifreqrency detection using Goertzel's algorithm 8
(b) Compare FIR and IIR filters. 6
(c) Finite word length effect in digital filters. 6

Sem-VI-CCBSGS)/EXTC/Computer Commn & Telecom Networks/ May-16.

**Q.P. Code : 588502**

**(3 Hours)** **[Total Marks : 80**

**N.B. :** (1) Question **No.1** is **compulsory**.
(2) Solve **any Three** out of remaining questions.
(3) Assume suitable **data** wherever **required**.
(4) **Answers** to the questions should be **grouped** and **written** together.

1. (a) Draw sublayer of data link layer. Explain the role of each layer. **5**
   (b) Differentiate the host to host delivery provided by data link layer and network layer. **5**
   (c) What is socket address? Explain with example. Comment on socket programming. **5**
   (d) Compare between circuit switching and packet switching. **5**

2. (a) List the role of application layer and explain one application layer protocol. **10**
   (b) Classify unicast routing protocol. Explain exterior routing protocol in brief. **10**

3. (a) Compare between Ethernet LAN and IEEE 802.11 WLAN. **5**
   (b) What is DSL and HFC? Describe in brief. **5**
   (c) What is peer to peer communication? Describe decentralized peer to peer sharing. **10**

4. (a) What are the performance parameters of network? Explain in brief. **5**
   (b) Classify multiple access techniques. Explain CSMA/CA technique with backoff algorithm. **5**
   (c) Describe in details the physical transmission media for computer communication networks **10**

5. (a) What are the demerits of Distance Vector algorithm? How it is overcome? **10**
   (b) What is tunneling? Explain Automatic Tunneling and configuration tunneling in detail. **10**

6. Write short notes on (**any Two**) : **20**
   (a) Networking Devices
   (b) ATM
   (c) Congestion Control
   (c) IPv6

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/ EXTC / SEM-VI (CBSGS) / Television Engineering / MAY-2016

**Q.P. Code :** 588601

(3 Hours) **[ Total Marks : 80**

**N.B. :** 1. Question no.1 is compulsory.
2. Answer any three question out of remaining questions.
3. Assume suitable data if required.

1. (a) What are the advantages of digitization in television systems? 5
(b) Draw & illustrate the different levels of CVS and define them. 5
(c) Define aspect ratio & state standardized value of aspet ratio? Give reason for the choice. 5
(d) Define characteristics of colour: Luminance, Hue and Saturation. 5

2. (a) Draw & explain image orthicon camera tube in detail with advantages & disadvantages. 10
(b) Discuss features of the PAL system. Explain delay-line PAL method with neat diagram. 10

3. (a) Explain Chroma sub-sampling and its types in detail. 10
(b) Draw & explain block diagram of NTSC colour receiver. 10

4. (a) Explain D2-MAC packet format/signal and state characteristics of D2-MAC. 10
(b) Write a note on wide high definition television and its standards. 10

5. (a) Explain in brief direct to home television. 10
(b) Explain difference between component digital video & composite video. 10

6. Write short note on (any four) : 20
(a) MUSE system
(b) Merits and Demerits of LED display
(c) VSB correction.
(d) Frequency Interleaving
(e) Displays: Plasma, LCD & LED.

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Sem-VI (CBSGS) / EXTC / Operating Systems / May-16.

**Q.P. Code : 588702**

**( 3 Hours)** **[ Total Marks : 80**

**N.B.** : (1) Question **No.1** is **compulsory**.
(2) Attempt **any three** questions out of remaining **five** questions.
(3) Assume suitable data whenever required but justify the same.
(4) Assumption made should be clearly stated.

1. (a) Explain different file operations in brief. **5**
(b) What are the characteristics of Real Time OS? **5**
(c) What is system call? Explain any five system calls. **5**
(d) Differentiate between Deadlock avoidance & Deadlock prevention. **5**

2. (a) Explain process-thread state transition diagram in linux. **10**
(b) Explain clearly how UNIX performs file management using I-nodes. **10**

3. (a) Explain clearly paging and segmentation based memory management techniques using diagram. **10**
(b) What critical section of a process? Describe two solutions to achieve mutual Exclusion of critical sections in an OS. **10**

4. (a) Consider the following precess **10**

| Process | Arrival time | Service Time |
|---|---|---|
| $P_1$ | 0 | 8 |
| $P_2$ | 1 | 4 |
| $P_3$ | 2 | 9 |
| $P_4$ | 3 | 5 |

Solve the above given problem with shortest remaining time first by drawing gantt chart and also calculate the average waiting time, turnarourd time and throughput.
(b) Explain RAID with different levels. **10**

5. (a) Explain the working of EDF and RMA real time scheduling algorithms. **10**
(b) What is semaphore? Give an implementation of bounded buffer producer consumer problem using semaphore. **10**

6. (a) Define the meaning of a race condition? Use an Execution Sequence to illustrate your answer. **10**
(b) Explain different file allocation techniques in an OS. **10**

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Sem-VI(CBSGS)/EXTC/VLSI Design/May-16.

**Q.P. Code : 588801**

**(3 Hours)** **[Total Marks : 80**

**N.B. :** (1) Question **ONE** is **compulsory**.
(2) Solve **any THREE** out of remaining **questions**.
(3) Draw **neat** and **clean diagrams**.
(4) Assume **suitable data** if **required**.

1. Attempt **any FOUR** from the following : **20**
   (a) For NMOS resistive load inverter with $R_L$ = 50K find $V_{IL}$ and $V_{OL}$ if $V_{DD} = 5V$, $V_{TO} = 1\,V$, $K_n = 100\ \mu A/V^2$, neglect body bias effect and channel length modulation.
   (b) With help of appropriate circuit diagram and waveforms, explain charge sharing problem of dynamic logic. How to overcome the same.
   (c) Explain the significance of Level - 1 MOSFET model parameters.
   (d) Implement 4: 1 MUX using Transmission gate technology.
   (e) Explain advantages and disadvantages of Pass Transistor logic in VLSI Design.

2. (a) Explain working of CMOS Inverter with help of Voltage Transfer Characteristics and derive expression for $V_{IL}$ and $V_{IH}$. **10**
   (b) Implement 1 - bit full adder circuit using standard CMOS logic, dynamic logic and pseudo NMOS logic. **10**

3. (a) Draw six transistors SRAM cell and explain its read 0, read 1, write 0 and write 1 operation with the help of appropriate waveforms. **10**
   (b) What is Carry Look Ahead (CLA) adder. Write equations for carry bits of 5-bit CLA in terms of input bits only i.e carry generate and carry propagate and implement the same using domino logic. **10**

4. (a) For 2 input CMOS NAND gate find $V_{OL}$, $V_{OH}$, $V_{IH}$, and $V_{IL}$. Assume that both the inputs are switching simultaneously. Consider NMOS and PMOS with following parameters. $V_{DD} = 5V$, $V_{TOn} = 1\,V$, $K_n = 100\mu A/V^2$, $V_{TOp} = -1V$, $K_p = 25\mu A/V^2$. **10**
   (b) Give NMOS fabrication process flow with help of neat sketches of appropriate masks and cross section at each process steps. **10**

**TURN OVER**

5. (a) Implement 4x4 NAND based ROM array to store "1001", "0101", "1010" and "1100" in the memory. 5
   (b) Explain the effect of Interconnect scaling on various performance parameters of VLSI circuits. 10
   (c) Draw layout of 3 transistor (3-T) DRAM cell using lambda rules. 5

6. Write short notes on **any FOUR** : 20
   (a) Power Distribution schemes
   (b) Array Multiplier
   (c) Interconnect Delay Model
   (d) NAND Flash Memory
   (e) Column Decoders