

DT- 16.5-2016

(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 Prove that entropy of extremely unlikely messages is zero. 5
- b Compare offset QPSK and non-offset QPSK. 5
- c State two criteria which a spread-spectrum communication system must satisfy. 5  
Justify that the spread-spectrum signals are transparent to the interfering signals, and vice-versa.
- d Explain the Coherent and non-coherent digital modulation techniques. 5
- e Prove that syndrome depends on error patterns and not on transmitted code word. 5

Q.2

- a Consider the five source symbols of a discrete memoryless source and their respective probabilities as below. 10

| $S_i$    | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_5$ |
|----------|-------|-------|-------|-------|-------|
| $P(s_i)$ | 0.4   | 0.2   | 0.2   | 0.1   | 0.1   |

- i) Create a Huffman Tree for Huffman source coding technique to find the codeword and length of codewords for each source symbol.
- ii) Determine the average codeword length of the specified discrete memoryless source.
- iii) Comment on the results obtained
- 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 Explain the working of M-ary PSK Transmitter and receiver and plot spread spectrum and calculate the bandwidth. 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
  - i) 8-ary PSK system
  - ii) 16-ary PSK system.

**TURN OVER**

Q.5

- a Design a syndrome calculator for a (7, 4) Hamming code, generated by the generator polynomial  $g(x)=1+X^2+X^3$ , if the transmitted code word  $C=(0111001)$  and received word  $r=(0110001)$ . 10
- b A (7, 4) cyclic code is described by a generator polynomial 10
- $$g(x) = x^3 + x + 1$$
- i) Find out the generator matrix
- ii) Parity checks matrix.
- iii) Draw the syndromecalculator and explain how received message is corrected?

Q.6

**Attempt the following (any two).**

- a Write short note on Intersymbol interference (ISI) and Eye diagram. 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

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(3 hours)

[Total Marks: 80]

- N.B: 1) Question number **1** is **compulsory**  
 2) Solve any **three** questions out of the remaining **five** questions  
 3) In all four questions to be attempted.  
 4) **Figures** to the **right** indicate full marks

- Q.1 (a) Derive relationship between DFT and DTFT. (05)  
 (b) Compare: Impulse invariant technique and bilinear transformation technique. (05)  
 (c) Define phase delay and group Delay. (05)  
 (d) Explain interpolation process with frequency spectrum. (05)
- Q2) (a) Develop **Composite radix DITFFT** flow graph for  $N=6=2 \times 3$  (10)  
 (b) Analog filter Transfer function is  $H(s) = \frac{4}{(s+1)(s^2+4s+5)}$  obtain equivalent digital filter transfer function  $H(Z)$  using impulse invariant technique by taking  $T=0.5$  sec (10)
- Q.3 (a) State two important properties of DFT which are used to derive FFT. How Computational Complexity of DITFFT algorithm is determined from flow graph. Derive necessary formulas. (10)  
 (b)  $y(n) = 2x(n) + \frac{4}{5}x(n-1) + \frac{3}{2}x(n-2) + \frac{2}{3}x(n-3)$  (10)  
 Determine lattice realization.
- Q.4 (a) Using frequency sampling method, design FIR band pass filter for following specifications  
 Sampling frequency =8000Hz  
 Cut Off frequency  $=f_{c2}=3000$ Hz  
 Cut Off frequency  $=f_{c1}=1000$ Hz  
 Determine filter coefficients for  $N=7$  (10)  
 (b) Write short note on: Dual tone multi frequency detection (06)  
 (c) What is multi rate DSP? State its applications. (04)
- Q(5) (a) Design a Butterworth digital IIR filter using BLT by taking  $T = 0.1$ sec to satisfy following specifications (10)  
 $0.6 \leq |H(e^{j\omega})| \leq 1.0$   $0 \leq \omega \leq 0.35\pi$   
 $|H(e^{j\omega})| \leq 0.1$   $0.7\pi \leq \omega \leq \pi$

Turn Over

(b)  $x(n) = \{2, 3, 4, 5\}$  and  $y(n) = \{5, 2, 3, 4\}$  (10)

- (i) Find circular convolution using time domain method
- (ii) Find circular convolution using frequency domain method
- (iii) Compute linear convolution. Comment on your results.

Q6) (a) The transfer function for discrete time causal system is given by (10)

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

- (i) Find difference equation
  - (ii) Draw Direct Form-I and Direct form-II realization structure
  - (iii) Draw cascade and parallel realization
- (b) Explain the effects of coefficients quantization in FIR filters (05)
- (c) State Parseval's theorem. Verify it for  $x(n) = \{1, 2, 3, 4\}$  (05)
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TE EXT C | SEM-VI | CBSGS | DT-26/05/2017 Q. P. Code : 13294

( 3 Hours )

( Total Marks: 80

N.B. :

- (a) Question No.1 is compulsory.
- (b) Total 4 questions need to be solved.
- (c) Attempt any three questions from remaining five questions.
- (d) Assume suitable data wherever necessary, justify the same.

- 1.a Which is better, ADSL or cable? Justify your answer. [5]
- 1.b Explain the persistent strategies of CSMA. [5]
- 1.c Explain the fields that are related to Fragmentation and Reassembly of an IPv4 datagram. [5]
- 1.d Discuss Quality of Service (QoS) in terms of Flow characteristics. [5]
- 2.a Explain the concept of sending an E-mail using an appropriate Application layer protocol. [10]
- 2.b Explain with diagram the connection establishment and connection termination in TCP using Three- Way Handshaking. [10]
- 3.a Explain how BGP achieves Inter-Autonomous System Routing. [10]
- 3.b With an example explain the concept of building a routing table in Link state Routing. [10]
- 4.a What is Peer to Peer(P2P) File sharing. Differentiate between the centralized and decentralized P2P. [10]
- 4.b Explain various networking devices. [10]
- 5.a Draw the header of IPv6. Explain each field. [10]
- 5.b Explain in detail 802.11 Wireless LAN. [10]
- 6 Write a short notes on : [20]
  - (a) Flow control using TCP
  - (b) Wi Max
  - (c) MPLS
  - (d) DNS

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Q.P. Code :11990

[Time: 3 Hours]

[ Marks:80]

Please check whether you have got the right question paper.

- N.B:**
1. Questions number 1 is compulsory.
  2. Solve any three questions from the remaining
  3. Illustrate your answer with neat sketches

- Q.1** A Write characteristics of D2 MAC. 4  
 B How is charge image created in image orthicon? 4  
 C Briefly explain NTSC coder? 4  
 D What is the use of front porch and back porch in the composite video signal? 4  
 E What is the need of MUSE system? 4
- Q.2** A Why are color difference signals used in colors transmission? Why (G-Y) is not transmitted in color TV. Elaborate? 10  
 B Explain working of vidicon camera tube? 10
- Q.3** A A draw and explain working principle of LCD display. Compare and contrast LCD and LED televisions? 10  
 B Explain the concept of frequency interleaving. What is the need of interlaced scanning? 10
- Q.4** A Discuss composite video signal with respect to blanking level, pedestal height, active period and black and white level? 10  
 B What is the need of multiplexed analog component? Explain MAC signal? 10
- Q.5** A In relation to digital TV discuss? 10  
 1) Pixel array  
 2) Viewing angle and distance  
 3) Digitization  
 4) Frame rate and refresh rate
- Q.5** B What is need of chroma sub sampling? Explain types of chroma sub sampling? 10
- Q.6** Write short note on  
 1 Direct to home television 7  
 2 Plasma television 7  
 3 Compatibility and reverse compatibility? 6

