CBCS SCHEME

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15EC741

Seventh Semester B.E. Degree Examination, June/July 2023
Multimedia Communication

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Derive the maximum block size that should be used over a channel which has a mean BER probability of 10^{-4} if the probability of a block containing an error and hence being discarded is to be 10^{-1}. **(02 Marks)**

b. List and explain 4 types of conferencing. **(08 Marks)**

c. Make a difference between different communication modes. **(06 Marks)**

OR

2 a. Compare connection oriented and connectionless services. **(06 Marks)**

b. Determine the propagation delay associated with the following communication channels:
i) A connection through a private telephone network of 1km.
ii) A connection through a PSTN of 200km.
iii) A connection over a satellite channel of 50,000km.
Assume that the velocity of propagation of a signal in the case of (i) and (ii) is $2 \times 10^8 ms^{-1}$ and in the case of (iii) $3 \times 10^8 ms^{-1}$. **(06 Marks)**

c. Mention the QoS parameters of packet switches network. **(04 Marks)**

Module-2

3 a. An analog signal has a dynamic range of 40dB. Determine the magnitude of the quantization noise relative to the minimum signal amplitude if the quantizer uses (i) 6 bits (ii) 10 bits. **(06 Marks)**

b. What do you mean by aliasing? Explain how it can be overcome. **(06 Marks)**

c. Mention some examples of display resolution and memory requirements. **(04 Marks)**

OR

4 a. Derive the time to transmit the following digitized images at both 64Kbps and 1.5Mbps.
i) a $640 \times 480 \times 8$ VGA – compatible image
ii) a $1024 \times 768 \times 24$ SVGA – compatible image. **(08 Marks)**

b. With neat block diagram, explain PCM principles. **(08 Marks)**

Module-3

5 a. A statistical encoding algorithm is being considered for the transmission of a large number of long text files over a public network. Analysis of the file contents has shown that each file comprises only the six different characters M, F, Y, N O and 1 each of which occurs with a relative frequency of occurrence of 0.25, 0.25, 0.125, 0.125, 0.125 and 0.125 respectively. If the encoding algorithm under consideration uses the following set of codewords.
M = 10, F = 11, Y = 010, N = 011, 0 = 000, 1 = 001.
Compute
i) The average number of bits per codeword with the algorithm.
ii) The entropy of the source.
iii) The minimum number of bits required assuming fixed length codewords. **(06 Marks)**

b. Write the flow chart for modified-modified READ coding procedure? Explain. **(10 Marks)**

OR

6 Consider a message over alphabet {a, c, t, g} with probabilities {0.5, 0.3, 0.05, 0.15}.
Compute
i) Calculate the entropy. **(03 Marks)**
ii) Draw the Huffman tree and encode the message "CAT". **(05 Marks)**
iii) Encode the message "CAT" using arithmetic coding. **(04 Marks)**
iv) Decode the value 0.972 and identify the message sent using arithmetic encoding. **(04 Marks)**

Module-4

7 a. A digitized video is to be compressed using the MPEG-1 standard. Assuming a frame sequence of: IBBPBBPBBPBBI..... and average compression ratio 10:1 (I), 20:1 (P) and 50:1 (B), derive the average bit rate that is generated by the encoder for both the NTSC and PAL digitization formats. **(10 Marks)**

b. With neat block diagram, explain the principles of DPCM encoder and decoder. **(06 Marks)**

OR

8 a. Suppose we use a predictor as follows:
$\hat{f}_n = \text{trunc}\,(C\hat{f}_{n-1} + \hat{f}_{n-2})/2),\ e_n = f_n - \hat{f}_n$
Also, suppose we adopt the quantizer equation
$\tilde{e} = Q[e_n] = 16\ \text{trunc}\,((255 + e_n)/16) - 256 + 16.$
If the i/p signal has values as follows 20, 35, 42, 50, 80, 98, 116, 136, 163, 175, 201, 236, 250, then find the following using DPCM.
i) Predicted signal.
ii) Error signal.
iii) Quantized error signal.
iv) Reconstructed signal. **(10 Marks)**

b. With neat block diagram, explain perceptual coder schematics for MPEG and Dolby AC-1. **(06 Marks)**

Module-5

9 a. Differentiate between NTI and CTI. **(08 Marks)**

b. List and explain possibly required and not required parameters of packet voice. **(08 Marks)**

OR

10 a. Explain 2 different application variants of packet video. **(08 Marks)**

b. With neat block diagram, explain video streaming architecture. **(08 Marks)**

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