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15EC741

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
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.   List the five basic types of communication network that are used to provide multimedia services. Explain with a neat diagram i) Telephone network   ii) Integrated services digital network. **(10 Marks)**
    b.   Explain the operational modes of multi point conferencing with neat diagrams. **(06 Marks)**

OR

2   a.   Explain the working principle of circuit-mode and packet-mode of operation of multimedia networks with a neat diagram. List out salient features of each type of network. **(08 Marks)**
    b.   Derive the maximum block size that should be used over a channel which has BER probability of 10^{-4} if the probability of a block containing an error and being discarded is to be 10^{-1}. **(02 Marks)**
    c.   Explain with neat diagrams, the interactive television application for both cable and satellite network. **(06 Marks)**

Module-2

3   a.   Explain the principle of operation of PCM speech CODEC with a block diagram. Also explain compression and expander. **(10 Marks)**
    b.   Derive the bit rate and memory requirements to store each frame that result from the digitization of a 525-line system assuming a 4:2:2 format. Also find the total memory required to store a 1.5 hour movie/video. **(03 Marks)**
    c.   Define aspect ratio of display screen. **(03 Marks)**

OR

4   a.   Explain different types of text in detail. **(06 Marks)**
    b.   Explain interlaced scanning principle with a diagram. **(06 Marks)**
    c.   Assuming the bandwidth of a speech signal is from 50Hz through to 10kHz and that of a music signal is from 15Hz through to 20KHZ, derive the bit rate that is generated by the digitization procedure in each case assuming the Nyquist sampling rate is used with 12 bits per sample for the speech signal and 16 bits per sample for the music signal. Derive the memory required to store a 10 minute passage of stereophonic music. **(04 Marks)**

Module-3

5   a.   A message comprising of a string of characters with probabilities e = 0.3, n = 0.3, t = 0.2, w = 0.1, • = 0.1 is to be encoded. The message is "went •". Compute the arithmetic code word. **(08 Marks)**
    b.   Explain CPU management and memory management in multimedia operating systems. **(08 Marks)**

OR

6 a. Messages comprising seven different characters A through G, are to be transferred over a data link. Analysis has shown that the relative frequency of occurrence of each character is:
A = 0.10, B = 0.25, C = 0.05, D = 0.32, E = 0.01, F = 0.07, G = 0.2
  i) Derive the entropy of the messages.
  ii) Use static Huffman coding to derive a set of suitable codewords and construct the corresponding Huffman code tree.
  iii) Derive the average number of bits per codeword for your codeword set. **(06 Marks)**
b. Explain the principle of LZW compression. **(04 Marks)**
c. Explain the main features of distributed multimedia system. **(06 Marks)**

Module-4

7 a. Explain linear predictive coding encoder and decoder with neat schematic. **(08 Marks)**
b. A digitized video is to be compressed using the MPEG-1 standard. Assuming a frame sequence of IBBPBBPBBPBBI…. And average compression ratios of 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. **(08 Marks)**

OR

8 a. Explain DPCM encoder and decoder with a neat diagram. **(10 Marks)**
b. Define group of pictures and prediction span. Explain different frame types. **(06 Marks)**

Module-5

9 a. Explain scalable rate control with a neat block diagram. **(10 Marks)**
b. Explain briefly about layered vide coding. **(06 Marks)**

OR

10 a. Discuss briefly about integrated packet networks. **(08 Marks)**
b. Explain briefly about errors and losses in ATM. **(08 Marks)**

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