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17EC741

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Multimedia Communication

Time: 3 hrs.

Max. Marks: 100

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) Data Networks
   (ii) Integrated Services Digital Network   **(10 Marks)**
   b. Explain the principle of operation of packet switched network with neat diagrams. **(07 Marks)**
   c. 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 hence being discarded is to be 10^{-1}.   **(03 Marks)**

OR

2 a. Explain with neat diagrams, Movie on Demand and Near Movie on Demand (MOD/N-MOD) application.   **(08 Marks)**
   b. Explain the operational modes of multipoint conferencing with neat diagrams.   **(06 Marks)**
   c. Determine the propagation delay associated with the following communication channels:
   (i)   A connection through a private telephone network of 1 km
   (ii) A connection through a PSTN of 200 km
   (iii) A connection over a satellite channel of 50,000 km
   Assume velocity of propagation of a signal in the case of (i) and (ii) is 2×10^8 m/sec and in the case of (iii) is 3×10^8 m/sec.   **(06 Marks)**

Module-2

3 a. Explain the principle of operation of PCM speech CODEC with a block diagram. Also explain compressor and expander.   **(08 Marks)**
   b. Explain Interlaced Scanning principle with a diagram.   **(06 Marks)**
   c. Derive the bit rate and the 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.   **(06 Marks)**

OR

4 a. With the aid of diagram, explain the following:
   (i)   Aspect ratio of display screen
   (ii) Raster scan
   (iii) 4:2:2   **(08 Marks)**
   b. Explain different types of text in detail.   **(06 Marks)**
   c. Assuming the bandwidth of a speech signal is from 50 Hz through to 10 kHz and that of a music signal is from 15 Hz through to 20 kHz, derive the bitrate 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.   **(06 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. With the aid of diagrams, explain JPEG encoder. **(08 Marks)**

  c. Explain CPU management in multimedia operating system. **(04 Marks)**

OR

6 a. A message and its probability of occurrence of each character is as follows:
   A and B = 0.25, C and D = 0.14, E, F, G and H = 0.055.
   (i)   Use Shannon's formula to derive the minimum average number of bits per character.
   (ii) Construct the Huffman code tree and derive a suitable set of code word. **(08 Marks)**

  b. Explain the principle of LZW compression. **(06 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 I BBP BBP BBP BBI... 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 NJSC and PAL formats. **(08 Marks)**

  c. Explain different frame types. **(04 Marks)**

OR

8 a. Explain DPCM encoder and decoder with a neat diagram. **(10 Marks)**

  b. What do you understand by the terms:
   (i) Group of pictures   (ii) Prediction span   (iii) Motion compensation
   (iv) Motion estimation   (v) Temporal masking **(10 Marks)**

Module-5

9 a. Explain scalable rate control with a neat block diagram. **(10 Marks)**

  b. Explain video streaming architecture with a neat diagram. **(10 Marks)**

OR

10 a. Discuss briefly about Integrated Packet Networks. **(10 Marks)**

  b. Explain briefly about errors and losses in ATM. **(10 Marks)**

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