Second Semester M.Tech. Degree Examination, Dec.2016/Jan.2017
Multimedia Communication

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. What is the aim of the Broadcast Television Networks? With the help of diagrams, explain how additional services are provided on the Broadcast Television Networks. **(08 Marks)**
   b. Explain the terms continuous media and block-mode media, with examples. **(06 Marks)**
   c. Determine the propagation delay associated with the following communication channels:
      i)   A connection through a private telephone network of 10km: Assume velocity of propagation of signal is 2×10^8 m/s.
      ii) A connection through a PSTN of 400 km; assume the velocity of propagation of a signal is 2×10^8 m/s.
      iii) A connection through a satellite channel of 36,000 km, assume velocity of propagation of a signal is 3×10^8 m/s. **(06 Marks)**

2 a. Derive the time to transmit the following digitized images at 56 Kbps and 1.5 Mbps.
      i) A $1024 \times 768 \times 24$ VGA Compatible image.
      ii) A $1280 \times 1024 \times 24$ SVGA Compatible image. **(04 Marks)**
   b. List the sampling rate, number of bits/sample and total bit rate of the CD-digital audio (CD-DA) standard. Assuming CD-DA standard is being used, derive the storage capacity of a CD-ROM to store a 30-minute multimedia title. **(04 Marks)**
   c. Explain 4:2:0 digitization formats. **(06 Marks)**
   d. Derive the bit rate and the memory requirements to store each frame that result from the digitization of 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)**

3 a. Messages comprising eight different characters 'A' through 'H' are to be transmitted over a data link. Analysis has shown that the relative frequency of occurrence of each character is,
      A = 0.25   B = 0.25   C = 0.14   D = 0.14   E = 0.055   F = 0.055   G = 0.055
      H = 0.055.
      i)   Derive the entropy of messages.
      ii) Use static Huffman coding to derive a suitable set of codeword's.
      iii) Derive the average number of bits per code word using Huffman's coding. **(07 Marks)**
   b. The LZ algorithm is to be used to compress a text file prior to its transmission. IF the average number of characters per3 code word is '5' and the dictionary used contains 16,000 words, derive the average compression ratio that C's achieved relative to using 7-bit ASCII codeword's. **(03 Marks)**
   c. Draw the JPEG encoder schematic and describe briefly the role of image/block preparation and forward DCT stages. **(10 Marks)**

4 a. With the help of an encoder and decoder schematic, explain the principles of adaptive differential PCM (ADPCM). **(10 Marks)**
   b. Discuss the concepts underlying perceptual coding. **(10 Marks)**

5 a. Define the terms Motion Estimation, Motion Compensation, Group of Pictures (GOP) span and prediction span. **(04 Marks)**

    b. Explain the video compression standard used for video application over wireless and PSTN along with its application. **(06 Marks)**

    c. What are the schemes in H.263 standard that aim minimizing the effects of errors in neighboring GOBs. **(03 Marks)**

    d. A digitized video is compressed using MPEG-1 standard. Assume a frame sequence of IBBPBBPBBPBBI....... and average compression rate of 12:1 (I), 18:1 (P) and 50:1 (B). Calculate:
        i)   Prediction span
        ii)   GOP span
        iii) The average bit rate generated by the encoder for PAL frame. **(07 Marks)**

6 a. List the additional functionalities provided by MPEG-4 audio version 2. **(07 Marks)**

    b. Explain MPEG-4 generalized scalability with a block diagram. **(08 Marks)**

    c. Explain briefly with a diagram, RTP-packet-to-SL packet mapping. **(05 Marks)**

7 a. Describe four-layer synchronization reference model of an multimedia applications with a diagrams. **(10 Marks)**

    b. Explain the real time process with examples. **(04 Marks)**

    c. Describe the Earliest Deadline First algorithm (EDF). **(06 Marks)**

8 a. Describe Resource Reservation Protocol (RSVP) with a diagram. **(10 Marks)**

    b. Explain with a diagram, the typical configuration for providing DTH internet delivery. **(10 Marks)**

* * * * *