

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

M.Tech. Degree Examination, Dec.2013/Jan.2014
Multimedia Communication

Max. Marks:100

Time: 3 hrs.

Note: Answer any FIVE full questions.

- 1 a. Explain different types of communication network that are used to provide multimedia communication services. (10 Marks)
- b. Determine the propagation delay associated with the following communication channels:
 - (i) a connection through a private telephone network of 10 km.
 - (ii) a connection through a PSTN of 500 km.
 - (iii) a connection through a satellite channel of 75,000 km.
 Assume that the velocity of propagation of a signal in the case of (i) & (ii) is $2 \times 10^8 \text{ ms}^{-1}$ and in the case of (iii) $3 \times 10^8 \text{ ms}^{-1}$. (06 Marks)
- c. Differentiate between voice-operated switching mode and continuous-presence mode. (04 Marks)
- 2 a. Explain the network QoS associated with different types of network. (10 Marks)
- b. With the aid of a diagram, explain the meaning of the following terms relating two packet-switched network:
 - (i) packetization delay
 - (ii) mean packet transfer delay
 - (iii) jitter
 Describe, how the effects on a constant bit-rate stream of packetization delay and jitter can be overcome by buffering. (10 Marks)
- 3 a. State the types of text that are used to produce pages of documents. Explain any one of them. (07 Marks)
- b. With neat schematic, explain the different alternative methods for RGB signal generation. (09 Marks)
- c. Assuming the CD-DA standard is being used, derive
 - (i) the storage capacity of CD-ROM to store a 60 minute multi-media title.
 - (ii) the time to transmit a 30 second portion of the title using a transmission channel of bit-rate 1.5 Mbps. (04 Marks)
- 4 a. Derive the bit rate and the memory requirements to store each frame that result from the digitization of both 525-line and a 625-line system assuming a 4:2:2 format. Also, find the total-memory requirement to store a 2 hour movie/video. (08 Marks)
- b. Compare Huffman coding and Arithmetic coding, used for data compression. (04 Marks)
- c. Message comprising of 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: $A = 0.10$; $B = 0.125$; $C = 0.125$; $D = 0.05$; $E = 0.32$; $F = 0.01$; $G = 0.07$; $H = 0.2$
 - (i) Derive the entropy of the messages.
 - (ii) Use static Huffman coding to derive a suitable set of codewords.
 - (iii) Derive the average number of bits per codeword. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. $42+8 = 50$, will be treated as malpractice.

- 5 a. Explain the principle of operation of the LZW compression algorithm. How this is different from the LZ-algorithm. (07 Marks)
- b. Explain Basic and Dynamic mode of compression of image using GIF. (07 Marks)
- c. With the help of neat block diagram, describe the operation of a JPEG decoder. (06 Marks)
- 6 a. With the aid of encoder/decoder schematic, explain the principles of linear-predictive-coding technique. (10 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. (10 Marks)
- 7 a. With the aid of encoder/decoder schematics, explain the MPEG-4 coding principles. (10 Marks)
- b. Discuss the significant features of JPEG-2000. (05 Marks)
- c. Explain briefly the resource and process management techniques. (05 Marks)
- 8 a. Discuss the notion of synchronization in multimedia communication. (05 Marks)
- b. Explain the basic synchronization issues in multimedia systems. (05 Marks)
- c. Write short notes on any TWO:
(i) Error resilient video coding techniques.
(ii) RTCP
(iii) H.263 (10 Marks)