ICE-4205 MC CT Marks: 12.5 40 minutes

1. Which one is better compression technique in your opinion (i) Dynamic Huffman coding (ii) Static Huffman coding? Explain your answer. 2
2. Illustrate how GIF compress images? How Lempel-Ziv-Welch is employed by GIF? 4
3. Explain the basic principle of Arithmetic coding. 3
4. Which step/steps of JPEG makes it a lossy image compression technique? Why? 2.5
5. What is the purpose of DCT in JPEG? 1

Noakhali Science and Technology University
Department of Information and Communication Engineering
Term Final Examination-2023
Year: 4, Term: 2, Session: 2018-2019
Course Code: ICE-4205, Time: 4 Hours
Course Title: Multimedia Communication, Marks: 70

Answer any seven (07) of the following questions **Marks**

1. (a). Justify the name 'multimedia'. Discuss the pros and cons of multimedia communication. 03
   (b). Identify the application domain and explain the operation of the Audio bridge, Voice mail server in speech-only interpersonal communications with the aid of proper diagram. 04
   (c). Differentiate between MOD and N-MOD? 03

2. (a). What is the main function of mail server? 02
   (b). Describe the principal operation of a fax machine and why modems are required. What is the meaning of the term "PC fax"? 05
   (c). Determine the propagation delay associated with the following communication channels and assume that the velocity of propagation of signal is 3×10^8 m/s: 03
   (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.

3. (a). With the aid of a diagram, explain the meaning and function of ISDN. Hence introduce Digital Subscriber Line, Basic Rate Access and Primary Rate Access relating to ISDN. 05
   (b). Illustrate and explain the basic principles and components behind computer-supported cooperative working (CSCW). Include in your explanation the role of the following: 05
   (i) Shared Whiteboard,
   (ii) Whiteboard Program,
   (iii) Change-Notification,
   (iv) Update Control.

4. (a). Compare between entropy encoding and source encoding. 02
   (b). Explain lossless and lossy compression with example. 02
   (c). 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 A, B, C, D, E, and F 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: 06
   A = 10, B = 11, C = 010, D = 011, E =000, F = 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.

5.	(a).	Make a comparison between the Local Exchange and Private Branch Exchange with diagram.	03
	(b).	State and explain the tree main properties of color source that the eye makes of. Hence explain the meaning of the terms "Luminance", "Chrominance", and "Color Difference". How the magnitude of each primary color present in the source is derived from these?	05
	(c).	Derive the bit rate and memory requirements to store each frame that result from the digitization of 625 line system assuming a 4:2:2 format.	02
6.	(a).	Explain why, for digital TV transmission, the three digitized signals used are the luminance and two color difference signals rather than the RGB signals. Why are a number of different digitization formats used?	04
	(b).	Describe the following digitization formats with diagram: (i) 4:4:0 (ii) 4:2:2 (iii) 4:1:4 (iv) 4:1:0 For each format, state the temporal resolution and the sampling rate used for the luminance and the two color difference signals. Give an example application of each format.	06
7.	(a).	Explain the meaning of the following terms relating to text compression algorithms: (i) static coding, (ii) dynamic/adaptive coding (iii) prefix property.	04
	(b).	A series of messages is to be transferred between two computers over a PSTN. The messages comprise just the characters A through H. Analysis has shown that the probability (relative frequency 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 Use Shannon's formula to derive the minimum average number of bits per character.	06
8.	(a).	Discuss the meaning of the 'Prefix Property'. When and how to use this property in compression algorithms?	03
	(b).	Demonstrate AC and DC Coefficient from Forward DCT expression. Why are all values of input matrix important for each entry of transformed matrix in JPEG encoder?	03
	(c).	The LZ algorithm is to be used to compress a text file prior to its transmission. If the average number of characters per word is 10, and the dictionary used contains 32768 words, derive the average compression ratio that is achieved relative to using 7-bit ASCII codewords.	04
9.	(a).	Draw and discuss the meaning of the term "Temporal Masking"? What are the implications of exploiting this effect?	04
	(b).	Mention the functions of frame sequences called P-Frame, B-Frame and I-Frame. Write the reasons for their use.	04
	(c).	Write a short note on "MP@ML".	02

Noakhali Science and Technology University
Department of Information and Communication Engineering
Term Final Examination -2022

Course Code: ICE-4205 Course Title: Multimedia Communication
Session: 2017-2018 4th Year 2nd Semester

Time: 4 Hours

Total Marks: 70
Answer any seven (07) from the following questions.

1. (a) What is a multimedia? Explain the importance of medium in multimedia system. 3
(b) Explain why a pair of modems is required to transmit a digital signal over a PSTN. Show the location of the two modems with diagram when two digital devices communicate over a PSTN and the types of signal analog or digital that are used over each part of the access circuit. 5
(c) Differentiate between VOD and OTT? 2

2. (a) Define composite video signal. What are the components of this signal? What information they contain? 3
(b) Describe how video signal is broadcasted in PAL system. 3
(c) Derive the time to transmit the following digitized images at both 256 Kbps and 5 Mbps: 3
I) a 640 x 480 x 8 VGA-compatible image
II) 1024 x 768 x 24 SVGA-compatible image
(d) What is Pixel depth? 1

3. (a) Justify the necessity of multimedia data compression? What are lossy and lossless compressions? Explain with example. 3
(b) What is entropy of a source? How efficiency of a coding scheme can be measured? 2
(c) If in any application, multimedia data contains values that are very high but the differences of successive values are very low, which compression technique should be applied? Explain that technique with example. 2
(d) What is transform encoding? Explain the principle of this coding with appropriate example. 3

4. (a) Between Static and Dynamic Huffman encoding, which one is better in your opinion? Why? 2
(b) Show how the word 'common' will be send to receiver if we apply Dynamic Huffman encoding. 4
(c) Explain the process of arithmetic coding using the word "exam". Here, associated probabilities are: 4

$e = 0.3, a = 0.3, m = 0.2, x = 0.1, .(\text{period}) = 0.1$

5. (a) How is formatted text different from unformatted text? Hence describe the meaning of the term "text" and "document formatting commands". 2
(b) Explain why, for digital TV transmission, the three digitized signals used are the luminance and two-color difference signals rather than the RGB signals. Why are a number of different digitization formats used? 3
(c) Describe the following digitization formats with diagram: 5
(i) 4:2:2
(ii) 4:2:0
(iii) 4:1:1
(iv) 4:4:4
For each format, state the temporal resolution and the sampling rate used for the luminance and the two-color difference signals. Give an example application of each format.

6. (a) What is the main function of mail server? 2
(b) Describe the principal operation of a fax machine and why modems are required. What is the meaning of the term "PC fax"? 5
(c) Determine the propagation delay associated with the following communication channels and assume that the velocity of propagation of signal is 3×10^8 m/s : 3
(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.

7. (a) What is the cumulative error effect in DPCM? How this can be reduced? 1+4
(b) Explain how Perceptual encoding exploits different limitation of human ear to achieve audio compression. 5

8. (a) Show the compression and decompression process of MPEG perceptual audio encoder and decoder. 6
(b) Discussed about different frames used for video compression. Rank them based on the level of compression achieved by them. 4

Department of Information and Communication Engineering

Year 4, Term II Session: 2016-17

Course Code: ICE-4205 Course Title: Multimedia Communication

Time: 4 hours Total Marks: 70

[Answer any seven of the following nine Questions] **Marks**

1. a) Define 'Multimedia'. Illustrate the use of telephone networks to provide multimedia communication. 5
   b) Does the use of MCU in video conferencing reduce the required bandwidth? Explain. 3
   c) What is 'Multimedia mail'? Show the structure. 2

2. a) How can you relate Application QoS with Network QoS? Explain different Application QoS parameters. Is it possible to transmit constant bit rate over a packet switched neywork? If not, then why? If yes, then how? 7
   b) Differentiate between MOD and N-MOD with appropriate figures. 3

3. a) Compare Progressive scan with Interlaced scan. Which one is suitable for broadcasting when efficient use of bandwidth is required? 3
   b) Explain the purpose of different filters and compressor-expander in PCM encoder decoder. 4
   c) How color images are captured in digital camera? Illustrate different methods that are used. 3

4. a) Why luminance and chrominance signals are sent instead of RGB information while broadcasting TV signals? Explain the Baseband spectrum of color television signals in NTSC system. 4
   b) Draw the histogram of the following block from a grayscale image: 4

156	165	170	167	173
156	164	161	166	163
164	156	157	160	163
159	164	162	160	164
157	161	164	162	161

   c) Does additive color mixing produce more color than subtractive color mixing? 2

5. a) Suppose that you have to transmit a message comprising a string of characters with probabilities of: 4
   e = 0.3, s = 0.3, t = 0.2, b = 0.1, . (period) = 0.1
   Now apply arithmetic encoding to transmit the word "best".
   b) What is the difference between GIF basic mode and dynamic mode? Illustrate GIF dynamic mode in detail. 4
   c) What is the cumulative error effect in DPCM? How this can be reduced? 2

6. a) Give tree color models other than RGB/CMYK and explain the benefits of using the model by showing a practical application for each model. 4

b) Dithering is often used when converting greyscale images to monochrome. 4

i. What is the basic idea of dithering?

ii. For the given 2×2 dither matrix, briefly describe the ordered dithering algorithm

$$\begin{pmatrix} 0 & 2 \\ 3 & 1 \end{pmatrix}$$

c) Write any two animation softwares. 2

7. a) Why forward DCT is used in JPEG encoder? Explain the input and output from forward DCT stage. 4

b) Quantization phase of JPEG is lossy- is this true? Why? 2

c) Briefly describe the JPEG Entropy encoding phase. 4

8. a) Give the most common features of audio editing software. 3

b) How is image data stored in multimedia databases? 3

c) Convert the following RGB colors to YUV colors: 4

1) black RGB color (0,0,0)

2) White RGB color (1,1,1)

9. a) Answer the following questions about video frames with explanation: 2+2+1

i) Among I, P and B frames, which frame/frames propagate errors and which doesn't/don't?

ii) Among I, P and B frames, which frame has the highest level of compression?

iii) For a source sequence of frames IBBPBBPBBPBBI...., what will be the transmission sequence?

b) Illustrate Motion Estimation and compensation for both P and B frames. 5