

**B.E. INFORMATION TECHNOLOGY THIRD YEAR SECOND SEMESTER – 2022
MULTIMEDIA CODING AND COMMUNICATIONS**

Use Separate Answer scripts for each PART

Full marks: 75

PART – I

CO2:

Attempt any two (2) questions.

2x10=20

- Suppose, there is a rectangular binary matrix and you have to encode this matrix using run-length coding. For each row, there is independent execution of the method. There is a restriction on the bits to represent the counter value, say, k bits. Give an outline of the algorithm and then encode the following the matrix using your algorithm with k=3.

0	0	0	1	1	1	1	0	0	0	0	0	0
1	1	1	1	1	1	0	0	1	1	1	1	0
0	0	0	0	0	0	0	0	1	1	1	1	0
1	1	0	0	0	0	0	0	0	0	0	0	1
0	1	1	1	0	0	0	1	1	1	0	0	0
0	0	0	1	1	1	1	1	0	0	0	1	0

- Describe the adaptive Huffman coding method (mainly the tree updating method and bit allocation strategy) and then encode the string "b b t r u b t z" and returns the output binary string.
- With the assumption that the initial dictionary for LZW coding is available to both encoder and decoder. The initial dictionary is given below.

String	code
a	1
b	2
c	3
d	4

Encode the string "a a b a b a c b a a c b a a d a a" using the encoder of LZW and also decode the string from encoded data.

CO3:

Attempt Q1 and any one (1) from the rest.

7+8=15

- Describe the EZW algorithm.
- Encode the following matrix using EZW algorithm.

26	6	13	10
-7	7	6	4
4	-4	4	-3
2	-2	-2	0

- Suppose, a 4x4 block is encoded by EZW coding method where the initial threshold was $T_0=32$ and the output of the encoder is given below:

P1	PNTTPT	S1	101
P2	ZTNPTTTT	S2	10011
P3	ZZZTTPPNPPNTTNNT	S3	0011001111000

Using decoding method of EZW recomputed the matrix.

CO4:

7

1. Attempt any one (1) question.

- a. Consider the block given below. Encode the block using BTC method and then compute the MSE between the original block and reconstructed block.

2	19	12	15
2	11	11	9
2	3	12	15
2	3	4	14

- b. Describe the post quantization steps of the JPEG compression technique. Use diagram wherever it is required.

2. Attempt any three (3) questions.

3x7=21

- Write down the DCT expression from an $8 \times 8 \times 8$ block.
- What is motion compensated video coding? Discuss the concept with a block diagram.
- Present the three step motion search method with proper diagram.
- How can we reduce the search time of a motion estimation method?
- One advance feature of H.264 video standard is the integer transform. Give the 4×4 integer transform matrix, which is used in H.264 video standard.

3. Attempt any two (2) questions.

2x7=14

- a. Use closed loop predictive coding scheme to encode 1D signal, where the predicted value of the current one is the average of the previous two signal values and quantization factor is 3, i.e., difference is divided by 3. Use this scheme and encode the following signal.

42	34	26	20	23	20	18	20	22	24
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- Describe the frequency masking and temporal masking of the sound and how these help to compress an audio signal?
- The signal encoded by MPEG-1 layer I can also be decoded by MPG-1 layer-II. How is it possible?

CO1: Explain the basics of multimedia and **illustrate** its various components. (K2)

CO2: Explain, differentiate and analyze various lossless compression techniques of multimedia and **apply** them to solve problems. (K4)

CO3: Explain and analyze different related lossy compression techniques of multimedia and **apply** them to solve problems. (K4)

CO4: Illustrate various standards (such as JPEG, MPEG/ H.26x, and MP3) of coding and compression of i) image, ii) video, and iii) audio. (K3)

CO5: Describe different architectural aspects of multimedia and communication. (K2)

BACHELOR OF ENGINEERING IN INFORMATION TECHNOLOGY
3rd YEAR 2nd SEMESTER EXAMINATION, 2022

MULTIMEDIA CODING AND COMMUNICATIONS

PART - II

Time: 3 Hrs. (Including Part I)

Full Marks: 25

Use a separate manuscript to write the answer for Groups 1 and 2

Group 1: CO1

(10)

1. Write the difference between any two of the following:

(2 x 2 = 4)

- A. Sample and Quantization
- B. Nyquist Rate and Sampling Rate
- C. Multimedia vs Hypermedia

2. Any one of the following:

6

- A. What is Aliasing, explain with a suitable diagram. What do you mean by synthetic sound?
- B. What is a Color Look-Up Table? Why is it needed and how is it used?

Group 2: CO5

(15)

3. Answer any Three of the following.

(3 x 5 = 15)

- A. What is multiplexing? Explain different types of multiplexing.
- B. Write some characteristics of multimedia data. What do you mean by multimedia over IP?
- C. Explain Network Protocol Structure for Internet Telephony.
- D. Write a short note on "Multimedia over ATM Networks".