Subject Code: KCS064

PAPER ID-420521

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM VI) THEORY EXAMINATION 2021-22
DATA COMPRESSION

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2*10 = 20**

Qno	Questions	CO
(a)	Differentiate between Fidelity and quality.	1
(b)	How to calculate kth order Markov model of compression	1
(c)	What are the limitations of Huffman Coding? Explain.	2
(d)	Explain the difference between Huffman and adaptive Huffman coding technique.	2
(e)	Explain CALIC.	3
(f)	Define the term PPM.	3
(g)	What are the various distortion criteria?	4
(h)	What do you understand by Quantization? Describe its types.	4
(i)	Write advantages of Tree structured vector quantization.	5
(j)	Differentiate between scalar and vector quantization	5

SECTION B

2. Attempt any *three* of the following: **10*3 = 30**

Qno	Questions	CO
(a)	Prove that the average codeword length I of an optimal code for a source S is greater than or equal to entropy H(s).	1
(b)	For an alphabet A={a1,a2,a3,a4,a5} with probabilities P(a1) =0.15, P(a2) =0.04, P(a3)= 0.26,P(a4)=0.05 and P(a5)=0.50 (i) Calculate the entropy of this source (ii) Find a Huffman Code for this source. (iii) Find the average length of the code	2
(c)	Explain various types of dictionary-based coding techniques in detail.	3
(d)	Describe Adaptive Quantization in detail and how it is different from uniform Quantization technique.	4
(e)	What is Vector Quantization? Explain procedure for vector Quantization.	5

SECTION C

3. Attempt any *one* part of the following: **10*1 = 10**

Qno	Questions	CO
(a)	What is data compression and why we need it? Describe various models of data compression.	1
(b)	What do you mean by Uniquely Decodable code? Determine whether the following codes are uniquely decodable or not: (i) {0,01,11,111} (ii) {0,01,110,111} (iii) {1,10,110,111} (iv) {0,01,10}	1

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4. Attempt any *one* part of the following: 10 *1 = 10

Qno	Questions	CO
(a)	Draw the Huffman tree for the following symbols whose frequency occurrence in a message text is started along with their symbol below: A:15, B:6, C:7, D:12, E:25, F:4, G:6, H:10, I: 15 Decode the message 1110100010111011	2
(b)	Design 3-bit Tunstall code for a memory less source with the following alphabet: S= {A,B,C} with their P(A)=0.6, P(B)= 0.3 , P(C)= 0.1	2

5. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	A sequence is encoded using LZW algorithm and the initial dictionary shown in the table. Index | Entry 1 | a 2 | b 3 | r 4 | t The output of LZW encoder is the following sequence: 3 I 4 6 8 4 2 I 2 5 10 6 11 13 6 Decode this sequence. Discuss relative advantages of LZ77, LZ78 and LZW Compression schemes.	3
(b)	What is Facsimile Encoding? Explain Run-Length Coding technique used earlier for Facsimile. Describe BWT with the help of an example.	3

6. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Describe the steps involved in Basic Algorithm for Prediction with Partial Match (PPM).	4
(b)	What do you mean by Quantization? Describe Uniform quantization with its types in detail.	4

7. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Explain the steps of Lindo-Buzo-Gray algorithm.	5
(b)	Write short notes on any two : (I) Structure vector quantization (II) Pyramid vector quantization (III) Advantages of Vector quantization	5