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**BTECH**  
**(SEM VI) THEORY EXAMINATION 2023-24**  
**DATA COMPRESSION**

**TIME: 3 HRS****M.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                                                   | Marks | CO |
|-----|-------------------------------------------------------------|-------|----|
| (a) | What is Data Compression? Why it is needed?                 | 02    | 1  |
| (b) | Define compression ratio.                                   | 02    | 1  |
| (c) | Explain the Huffman Algorithm                               | 02    | 2  |
| (d) | Discuss audio Compression.                                  | 02    | 2  |
| (e) | Explain CALIC.                                              | 02    | 3  |
| (f) | Define the term PPM.                                        | 02    | 3  |
| (g) | Define distortion.                                          | 02    | 4  |
| (h) | What do you understand by Quantization? Describe its types. | 02    | 4  |
| (i) | Write advantages of Tree structured vector quantization.    | 02    | 5  |
| (j) | Explain scalar quantization                                 | 02    | 5  |

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

|     |                                                                                                                                                                                                                                                                                                                                                                                                    |    |   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
| (a) | 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}                                                                                                                                                                                                        | 10 | 1 |
| (b) | Explain rice coding and it's implementation.                                                                                                                                                                                                                                                                                                                                                       | 10 | 2 |
| (c) | A sequence is encoded using LZW algorithm and the initial dictionary shown in the table.<br><br><div style="display: flex; justify-content: space-between;"> <div> Index    Entry<br/> 1        a<br/> 2        b<br/> 3        r<br/> 4        t </div> <div> The output of LZW encoder is the following sequence:<br/> 3 I 4 6 8 4 2 I 2 5 10 6 11 13 6<br/> Decode this sequence. </div> </div> | 10 | 3 |
| (d) | What do you understand by adaptive quantization? Explain the various approaches to adapting the quantizer parameters.                                                                                                                                                                                                                                                                              | 10 | 4 |
| (e) | Explain the steps of the Linde-Buzo-Gray algorithm.                                                                                                                                                                                                                                                                                                                                                | 10 | 5 |

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

|     |                                                                                                                     |    |   |
|-----|---------------------------------------------------------------------------------------------------------------------|----|---|
| (a) | Explain modeling and coding with the help of examples. What do you understand by prefix code explain by an example? | 10 | 1 |
| (b) | Discuss various Data Compression models in detail.                                                                  | 10 | 1 |



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Subject Code: KCS064

Roll No:

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

|     |                                                                                                                                                                                                                                           |    |   |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
| (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 . Find the Huffman code and average code length. | 10 | 2 |
| (b) | Design Golomb code for m=5 and n=6,7,8,9,10.                                                                                                                                                                                              | 10 | 2 |

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

|     |                                                 |    |   |
|-----|-------------------------------------------------|----|---|
| (a) | Discuss BWT with the help of an example.        | 10 | 3 |
| (b) | Compare and explain LZ77, LZ78 and LZW schemes. | 10 | 3 |

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

|     |                                                                                                                                                                   |    |   |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
| (a) | Describe the steps involved in Basic Algorithm for Prediction with Partial Match (PPM).                                                                           | 10 | 4 |
| (b) | What do you understand by Uniform quantizer? How uniform quantization of a uniformly distributed sources and uniform quantization of non-uniform sources is done? | 10 | 4 |

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

|     |                                                                         |    |   |
|-----|-------------------------------------------------------------------------|----|---|
| (a) | Describe the advantages of vector quantization over scalar Quantization | 10 | 5 |
| (b) | Explain Structure vector quantization and Pyramid vector quantization.  | 10 | 5 |