Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2018

Subject Code:2161603 **Date:27/11/2018**

Subject Name:Data Compression and data Retrival

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Define following terms: (i) Entropy of Source (ii) Compression Ratio (iii) Modeling	**03**
	(b)	Explain Different types of models in data compression.	**04**
	(c)	How to measure the performance of multiple Data Compression algorithms? Explain parameters to select one algorithm out of many.	**07**
Q.2	**(a)**	Define following terms: (i) Uniquly Decodable Code (ii) Prefix Code (iii) Instataneous Code	**03**
	(b)	An alphabet S ={ a1, a2, a3 ,a4 ,a5} symbols with probabilities as P(a1)= 0.4, P(a2)=0.3, P(a3)=0.2, P(a4)=0.09, and P(a5)=0.01, Find out Huffman code, source entropy, average length and compressoin ratio.	**04**
	(c)	Explain the Encoding process of Adaptive Huffman Algorithm.	**07**
		OR	
	(c)	How Extended Huffman reduces code average length Code? Prove using alphabet A={a1,a2,a3} with probability 0.95,0.03 and ,0.02 respectively.	**07**
Q.3	**(a)**	Explain Sampling and Quantization of an Audio Signal	**03**
	(b)	Differentiate following: (i). Lossy Compression vs. Lossless Compression (ii). Statistical vs. Dictionary based compression	**04**
	(c)	Consider a source containing 26 distinct symbols [A-Z]. Encode given sequence of symbols using Adaptive Huffman algorithm. **Symbol Sequence**: MUMMY	**07**
		OR	
Q.3	**(a)**	Compare Arithmetic Coding and Huffman Coding Algorithms for text compression.	**03**
	(b)	Given source with probabilities of symbols as P(A)=0.45 P(B)=0.25, P(C)=0.15, P(D)=0.15. Perform encoding of string "**BCADB**" using arithmetic coding and generate tag.	**04**
	(c)	Design a minimum variance Huffman code for a source that put out letter from an alphabet A={ a_1, a_2, a_3, a_4, a_5, a_6} with P(a_1)=P(a_2)=0.2, P(a_3)=0.25, P(a_4)=0.05, P(a_5)=0.15,P(a_6)=0.15.Find the entropy of the source, avg. length of the code and efficiency. Also comment on the difference between Huffman code and minimum variance Huffman code.	**07**

Q.4	**(a)**	Explain process generating triple in all three possible cases of LZ77 algorithm.	**03**
	(b)	Compare & contrast: (i) LZ78 and LZW Algorithms. (ii) Static Dictionary Based Algorithm vs. Dynamic Dictionary Based Algorithm	**04**
	(c)	Encode and Decode following sequence using LZW Coding technique. Sequence: **ABABABAB**	**07**
		OR	
Q.4	**(a)**	Compare Uniform Quantization with Non Uniform Quantization.	**03**
	(b)	Using given probabilities P(A)=0.2, P(B)=0.2, P(C)=0.2, P(D)=0.4. Decode tag **0.14496** for atleast five symbols.	**04**
	(c)	Explain LZ78 encoding procedure with suitable example.	**07**
Q.5	**(a)**	Find the storage size of Gray scale video clip of 20 second duration with 640x480 resolution @ 30 FPS.	**03**
	(b)	Explain Vector Space model for XML Retrieval.	**04**
	(c)	Explain Prediction with partial match method.	**07**
		OR	
Q.5	**(a)**	Explain significance of discrete cosine transform (DCT) in JPEG Compression .	**03**
	(b)	What is significance of Quantization and Zigzag Coding in JPEG Compression?	**04**
	(c)	Draw and Explain Block diagram for Baseline JPEG Algorithm.	**07**

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