

--	--	--	--	--	--	--	--	--	--

Sixth Semester B.E. Degree Examination, December 2012
Data Compression

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

- 1 a. How the compression algorithm can be evaluated? Explain. (06 Marks)
b. Derive the expression for average information. (10 Marks)
c. What is a model? Explain Markov model. (04 Marks)
- 2 a. Explain Huffman coding algorithm. For an alphabet $A = \{a_1, a_2, a_3, a_4, a_5\}$ with probabilities $P(a_1) = P(a_3) = 0.2$, $P(a_2) = 0.4$ and $P(a_4) = P(a_5) = 0.1$ compute i) Entropy ii) Average length of the code iii) Redundancy. (10 Marks)
b. Write a note on static dictionary and diagram coding. (05 Marks)
c. Write the CALIC algorithm. (05 Marks)
- 3 a. For two random variables x and y , show that $H(x/y) \leq H(x)$ with equality if x is independent of y . [Hint : $E[\log (f(x))] \leq \log \{E[f(x)]\}$ (Jensen's inequality) (05 Marks)
b. Find the auto correlation function in terms of the model coefficients and σ^2_E for an ARCD process. (05 Marks)
c. Explain the two main approaches to adapting the quantizer parameters. (10 Marks)
- 4 a. Explain the procedure for vector quantization. (06 Marks)
b. Explain the splitting technique for initializing the LBG algorithm. Training set vectors are given in Table Q4b(i) and initial set of output points in Table Q4(b)(ii). (10 Marks)

Height	72	65	59	64	65	57	72	44	62	60	56	70
Weight	180	120	119	150	162	88	175	41	114	110	91	172

Table Q4b(i)

Height	45	75	45	80
Weight	50	117	117	180

Table Q4(ii)

- c. Explain adaptive quantization in DPCM. (04 Marks)

PART – B

- 5 a. Explain the two properties of a linear system. (04 Marks)
b. Given the following input – output relationship $y_n = 0.6y_{n-1} + 0.5x_n + 0.2x_{n-1}$. Find the impulse response $\{h_n\}$. (06 Marks)
c. Write the algorithm that uses estimates of the variance is a recursive algorithm and also explain the zigzag scanning pattern for an 8×8 transform. (10 Marks)
- 6 a. Explain the basic subband coding algorithm. (10 Marks)
b. Write a note on application to speech coding G.722. (05 Marks)
c. Write a note on application to audio coding MPEG audio. (05 Marks)

- 7 a. Prove that $v_{j+1} = v_k \oplus w_k \oplus w_{k+1} \oplus \dots \oplus w_j$. (10 Marks)
- b. For the seven – level decomposition shown below in Fig. 7(b), obtain the bitstream generated by the EZW coder ii) Decode the bitstream generated in the previous step. Verify that you get the original coefficient values.

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

(10 Marks)

- 8 a. With block diagram, explain ITU – T recommendation H.261. (10 Marks)
- b. Explain the packet video. (10 Marks)

* * * * *