USN | | | | | | | | | | |

10EC030

M.Tech. Degree Examination, June/July 2011

Digital Signal Compression

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. What are different types of mathematical models that are used in estimating the entropy of the source? Explain it. **(08 Marks)**

b. What is differential entropy? Show that the differential entropy of a Gaussian random variable is directly proportional to its variance? **(12 Marks)**

2 a. Explain the working of a uniform midrise quantiser. Also explain with graphs, the qunatisation error, overload and granular regions for a 3 bit uniform qunatiser. **(10 Marks)**

b. Discuss the working of G.726 with necessary equations. **(06 Marks)**

c. How differential encoding technique can be implemented for encoding images? **(04 Marks)**

3 a. Explain a delta modulation scheme with necessary equations and graphs. **(10 Marks)**

b. With a suitable example, explain the transform, qunatisation and coding used in JPEG image compression. **(10 Marks)**

4 a. With a block diagram and waveforms, explain the basic subband coding algorithm. **(10 Marks)**

b. With block diagrams, explain the concept of polyphase decomposition. **(10 Marks)**

5 a. Starting with Haar scaling function $\phi(t)$, obtain the MRA equation. Also plot sample function f(t) and its approximations. **(10 Marks)**

b. Discuss SPIHT and JPEG 2000 algorithms. **(10 Marks)**

6 a. Write a short note on LPC-10 and CELP. **(10 Marks)**

b. Discuss with an example, the fractal image compression technique. **(10 Marks)**

7 a. How motion compensation is achieved in video compression? Explain with an example. **(10 Marks)**

b. Discuss H.261 algorithm, with a block diagram. **(10 Marks)**

8 a. Design a Huffmann code for a source that puts out letters from an alphabet $A = \{a_1, a_2, a_3, a_4, a_5\}$ with $p(a_1) = p(a_3) = 0.2$, $p(a_2) = 0.4$. $p(a_4) = p(a_5) = 0.1$. **(04 Marks)**

b. Briefly discuss adaptive Huffmann coding algorithm. **(06 Marks)**

c. Define the random variable X(ai) = i. Suppose we wish to encode the sequence 1 3 2 1, from the probability model.

$Fx(K) = 0$, $K \leq 0$ $Fx(1) = 0.8$, $Fx(2) = 0.82$, $Fx(3) = 1$;
$Fx(K) = 1$, $K > 3$.

Calculate the tag for the sequence. **(06 Marks)**

d. Explain in brief, LZ77 technique. **(04 Marks)**

* * * * *