CCE5102 Information Theory and Coding

Tutorial 1

Source Coding

1. Given a source with four elements having a probability

A	0.45
B	0.4
C	0.1
D	0.05

(i) Find a suitable Huffman code? Work out the entropy of the code.
(ii) Encode the string C B A A B D B B A A
(iii) Repeat using an Arithmetic Code
(iv) Contrast the two schemes in terms of the number of bits required
(v) Show how decoding takes place in both cases, decoding the coded examples.
(vi) Contrast again the decoding processes and mention the advantages of each type.

2. Describe one dictionary method based on the LZ algorithm for encoding and decoding a stream of data.

For the LZW algorithm use the phrase 'The cat sat on the mat' to build up a dictionary. State assumptions made.

Compare this to an adaptive Huffman generation of the same phrase.

3. Is adaptive Huffman coding better than ordinary Huffman coding? Give reasons for your answer.
Set up an adaptive Huffman coding tree for "She sells sea shells"

4. Describe various techniques used in coding data, such as variable sized codes, run length encoding, etc comparing their efficiency, adaptability, complexity and reliability.

5. The capacity of a BSC is given by

$C = 1 + p\log p + q \log q$ where $q = 1-p$

If $p= 10^{-2}$, and k =223, what is the smallest code length n for reliable information transmission?