

**B.E. DEGREE EXAMINATIONS: NOV/DEC 2012**

Fifth Semester

**ELECTRONICS AND COMMUNICATION ENGINEERING**

ECE126: Information Theory and Coding

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. A discrete memoryless channel is characterized by :
  - a)  $p(x/y)$
  - b)  $p(y/x)$
  - c)  $p(x)$
  - d)  $p(y)$
2. The entropy of a source is 1.882 bits / symbol. The entropy of the third order extension is :
  - a) 5.646
  - b) 1.882
  - c) 3.764
  - d) 3.542
3. A (7,4) Hamming code generates the following codeword at the transmitter: 1 1 0 1 0 0 0 . The received codeword is 0 1 0 1 0 0 1. The error pattern is:
  - a) 0 1 1 1 1 1 0
  - b) 1 0 0 0 0 0 0
  - c) 1 0 1 0 1 1 0
  - d) 1 0 0 0 0 0 1
4. A message vector [0] generates a codeword [0 0 0 0 0]. The code is :
  - a) (5,1) hamming code
  - b) (5,1) repetition code
  - c) 1/5 convolutional code
  - d) 1/5 turbo code
5. When a text compression algorithm uses patterns of length 2, it is :
  - a) digram coding
  - b) static dictionary
  - c) adaptive dictionary
  - d) LZ78 algorithm
6. In adaptive Huffman coding the weight of each internal node is :
  - a) sum of weights of offsprings
  - b) sum of weights of all its children
  - c) sum of weights of siblings
  - d) equal to its node number
7. Speech signal is :
  - a) stationary
  - b) nonstationary
  - c) wide sense stationary
  - d) uncorrelated
8. Dolby audio coding uses :
  - a) stereo channels
  - b) three audio channels
  - c) four audio channels
  - d) five audio channels



22. a) (i) Generate the (7,4) cyclic code with the generator polynomial  $x^3 + x + 1$ . (8)  
(ii) Describe the characteristics of BCH and RS codes. (6)

(OR)

- b) (i) With a simple example, explain how LDPC codes are encoded and decoded. (8)  
(ii) Describe maximum likelihood decoding of convolutional codes. (6)

23. a) (i) The adaptive Huffman encoder generates the following sequence : (10)  
000001010001000001100010110

Decode the sequence and illustrate the Huffman tree adaptation procedure.

- (ii) Justify that arithmetic coding is better than Huffman coding for long sequences. (4)

(OR)

- b) (i) Encode the sequence : *barrayarzbarzbyzbarrayarzbay* using LZW algorithm (7)  
with the initial dictionary given.

Index	Entry
1	a
2	b
3	r
4	y
5	z

- (ii) Decode the above and verify that it is the same as the input sequence. (7)

24. a) (i) Explain subband coding with necessary diagrams. (7)  
(ii) With an example show that subband coding of speech produces compression. (7)

(OR)

- b) (i) Explain linear predictive coding of speech. (10)  
(ii) How is the quality improved in CELP coders compared to LPC? (4)

25. a) (i) Describe the GIF and TIF file formats. (8)  
(ii) Compare JPEG and JPEG2000 standards. (6)

(OR)

- b) (i) Explain the principle of block based motion compensation. (7)  
(ii) What are the three types of frames in MPEG-1? How are they encoded and displayed? (7)

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