

**B.E. / B.Tech (FullTime) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2011**  
**ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH**

**SIXTH SEMESTER**

**30**

**EC 382 – DIGITAL COMMUNICATION**

**(REGULATION 2004)**

Time: 3 Hours

Marks: 100

Answer ALL Questions

Part-A (10x2=20 Marks)

1. Draw the eye pattern.
2. Define bit synchronization.
3. What is meant by duobinary signaling?
4. What is the difference between QASK and QPSK?
5. What do you understand by a Entropy? Obtain the entropy of an unbiased binary source.
6. State Shannon's Channel Coding Theorem.
7. Explain the fundamental difference between block codes and convolutional codes.
8. State and explain the Hamming Bound for a (n,k) Linear Block Code, that can correct upto 't' errors per codeword.
9. List the properties of Pseudo Noise Sequence used in direct sequence spread spectrum system.
10. What are the different types of multiple access techniques?

Part-B (5x16=80 Marks)

11. Explain the properties of matched filter. (16)
- 12.(a) Derive an expression for bit error probability for quadrature PSK receiver and draw the block diagrams for the modulator and demodulator. (16)
- OR**
- 12.(b)(i) Explain the principle of FSK transmitter and receiver. (10)
- (ii) Write short note on spectrum and bandwidth of FSK. (6)

13.(a) A discrete memoryless source has an alphabet of seven symbols with probabilities for its output as described below:

Symbol	S <sub>0</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>5</sub>	S <sub>6</sub>
Probability	0.25	0.25	0.125	0.125	0.125	0.0625	0.0625

Compute the Huffman code for the source, moving a combined signal as high as possible. Determine the variance and efficiency of this code. (16)

**OR**

13.(b) Explain your understanding of Mutual Information and quantify it. List out its properties and obtain the channel capacity of a discrete memoryless binary symmetric channel by relating to the Mutual Information. (16)

14.(a) Explain the fundamental difference between ARQ codes and Block / Convolutional codes. Discuss any two methods for realizing ARQ transmission. (16)

OR

- 14.(b)(i) Consider a non-symmetric convolutional code with  $k = 1$  and  $g^{(1)} = \{1,0,1\}$  and  $g^{(2)} = \{1,1,1\}$ . Draw the encoder structure and the trellis diagram corresponding to this encoder. (8)
- (ii) What is the Code rate and the Constraint length for this encoding scheme. (4)
- (iii) Determine the encoder output corresponding to the data sequence  $\{1\ 0\ 1\ 0\ 1\ 0\ 1\}$ . (4)

15.(a) Explain the direct sequence spread spectrum modulation with coherent binary PSK with a neat block diagram and also derive the expression for the SNR at the output in terms of processing gain. (16)

OR

- 15.(b)(i) Write short notes on CDMA. (6)
- (ii) With neat diagrams and necessary equations, explain in detail about the slow frequency hopping and fast frequency hopping. (10)
-