TE-EXTC/ sem-VI/DC/ 01/12/2014

QP Code :15123

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question No. 1 is **compulsory**.
(2) Solve any **four** questions from the remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Make **suitable** assumptions wherever **required**.

1. (a) Explain Shannon-Hartley Theorem. 5
(b) Explain the necessity of source coding. 5
(c) Explain the necessity of equalization in communication. 5
(d) Differentiate between coherent and non-coherent reception. 5

2. (a) State and prove sampling theorem for low pass signals. Explain with an example, effect of aliasing on the reconstructed signal in time domain. 10
(b) Define entropy and information rate. Generate Shannon-Fano codes for six messages with probabilities 0.2, 0.1, 0.25, 0.15, 0.2, and 0.1 respectively. Calculate the entropy of the source that generates these messages. 10

3. (a) Explain the working of offset QPSK transmitter and receiver with relevant waveforms and signal space representation. 10
(b) Explain the working of Duo binary encoder with precoder. Discuss the merits of modified Duobinary encoder over basic Duo binary encoder. 10

4. (a) Derive the expression for error probability in BPSK system. 10
(b) State the desirable characteristics of line codes in digital communication. Sketch the following line codes for the data stream 1100101 10
(i) Polar NRZ
(ii) Polar RZ
(iii) Unipolar NRZ
(iv) RZ - AMI
(v) Manchester.

5. (a) Derive an expression for the error probability of matched filter. 10
   (b) Explain with the help of block diagram the working of M-ary FSK receiver. 10

6. (a) For a (7,4) cyclic code the generator polynomial is given by $g(x) = 1+x^2+x^3$. Sketch the encoder diagram using shift registers, adders and switches. Explain the working of encoder to generate cyclic code for the message (1100). 10
   (b) Explain syndrome decoding for cyclic codes with suitable example. 10

7. Write short notes on any **two** :– 20
   (a) Gram Schmidt procedure
   (b) Convolutional codes
   (c) Viterbi algorithm
   (d) Minimum shift keying modulation system.
