



**Advanced Communication Systems  
(1040)**

**P. Pages : 2**

**Time : Three Hours**

**Max. Marks : 100**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
  2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
  3. Students should note, no supplement will be provided.
  4. Attempt **any five**. Each questions carries equal marks.
  5. Draw well label diagram and assume suitable data whenever necessary.
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1. a) A received signal have amplitude of  $\pm 2V$  held for a time  $T$ . The signal is corrupted by white Gaussian noise having power spectral density of  $10^{-4}$  volts<sup>2</sup>/Hz. If the signal is processed by integrate and dump receiver, what should be minimum time ' $T$ ' during which signal must be sustained so that the probability of error is not exceeding  $10^{-4}$ ?
  - b) What is linear and non-linear modulation methods. Explain at least one in both categories.
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2. a) Explain in detail :
    - i) Signal space representation and its significances.
    - ii) Memory less Modulation methods.
  - b) Draw and explain CPFSK method. Also explain transmitter and power spectrum.
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3. a) Determine the LZ code and also decode the same to get the original string. 1011011001011101001.
  - b) Consider the (31, 15) RS code.
    - i) How many bits are there in a symbol of the code?
    - ii) What is the block length in bits?

- iii) What is the minimum distance of the code?
  - iv) How many symbols in errors can be correct?
4. a) Explain for convolution code.
- i) State diagram,
  - ii) Code tree,
  - iii) Trellis diagram.
- b) Explain Viterbi decoding algorithm for the convolution code.
5. a) What is zero forcing algorithm, explain its significance.
- b) Draw and explain Adaptive Linear Equalization.
6. a) Explain the relation between eye pattern and channel characterization.
- b) What is RCF? Explain with mathematical expression of transfer function of RCF.
7. a) What is PN sequence? How to generate it explain with example. Also explain its properties.
- b) Explain in detail :
- i) FH-SS
  - ii) Slow Frequency Hopping.
8. a) Draw and explain DS-SS Transmitter and Receiver using BPSK.
- b) The direct sequence spread spectrum communication system has following parameters. Data sequence bit duration,  $T_b = 4.095\text{ms}$ , PN Chip duration,  $T_c = 1\mu\text{s}$ .  $E_b/N_0 = 10$  for average probability of error less than  $10^{-5}$ . Calculate processing gain and jamming margin.

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