

|  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. (ECE: CBCS) VI-Semester Advanced Supplementary Examination, July-2019**

**Digital Communication**

Time: 3 hours

Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

1. Define Granular Noise and Slope Overload Distortion.
2. Determine the signal to quantization noise ratio of an audio signal  $s(t) = 3 \cos(2\pi 500t)$  which is quantized using a 10 bit PCM.
3. Define Information and Entropy.
4. A voice grade channel of the telephone network has a bandwidth of 3.4 kHz. Calculate the capacity of the telephone channel for a signal to noise ratio of 30dB.
5. What are the advantages and disadvantages of Cyclic Codes?
6. What is meant by syndrome in linear block codes?
7. What is M-ary Signalling scheme? List the advantage of M-ary signaling scheme.
8. What is the need for MSK? Give its applications.
9. List the properties of PN sequence.
10. Define spread spectrum modulation. What is the need for spreading the code?

**Part-B (5 × 10 = 50 Marks)**

- 11.a) Describe the advantages of PCM over other digital techniques. [5]
- b) Illustrate delta modulation process with suitable diagrams and explain how do you calculate its quantization error? [5]
12. A DMS X has 4 symbols  $x_1, x_2, x_3, x_4$  with  $p(x_1)=1/2, p(x_2)=1/4, p(x_3)=1/8=p(x_4)$ .
  - a) Construct Shannon-Fano code and calculate coding efficiency. [5]
  - b) Construct Huffmann code and calculate coding efficiency. [5]
- 13.a) A convolution code is described by  $g_1 = [1 \ 0 \ 1], g_2 = [1 \ 1 \ 1]$ . Draw the encoder diagram and trellis diagram. [6]
- b) Construct code tree for the encoder mentioned above. [4]
- 14.a) What are different digital modulation techniques available? Compare them with regard to various performance parameters. [5]
- b) Draw the block diagram of DPSK modulator and explain how synchronization problem is avoided for its detection. [5]
- 15.a) Explain the transmitter and receiver sections of frequency hopping spread spectrum with a neat block diagram. [5]
- b) Compare the key characteristics of FHSS and DSSS systems. [5]

- 16.a) Compare Delta modulation and PCM technique in terms of: [5]  
 i) Signal to Noise ratio and ii) Bandwidth requirements.
- b) Classify various communication channels and describe each channel with an example [5]

17. Answer any two of the following:

- a) Consider (7, 4) linear block code where in the parity check bits are given by  $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$ . [5]  
 Construct generator and parity check matrix. Also determine the error detecting and error correcting capability of the code. Encode the data '1011', '1100', '0111'.
- b) Explain the working of FSK modulator and demodulator with a neat block diagram. [5]
- c) Write short notes on tracking and synchronization of spread spectrum signals. [5]

