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Code No. : 32311

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. (E.C.E.) III Year II-Semester Main Examinations, May-2017**

**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. Differentiate between DM and ADM.
2. Describe the laws of companding.
3. Find the maximum entropy of a keyboard consisting of 110 keys.
4. Justify the need for source coding.
5. List the different types of errors that occur during transmission.
6. Bring out significance and procedure to construct a standard array.
7. Compare and contrast PSK and QPSK.
8. Briefly discuss the steps involved in optimum receiver design.
9. What is Jamming Margin? State its significance.
10. Differentiate between fast and slow frequency hopping.

**Part-B (5 × 10 = 50 Marks)**

11. a) Explain the working of a DPCM system with the help of suitable block diagram and necessary pre-requisites. What is the advantage of DPCM over PCM system. [6]  
b) A 2 KHz sinusoidal message signal is applied as input to a PCM system with 256 Quantization levels. Find the signal to quantization noise ratio (SNR<sub>Q</sub>) in dB. [4]
12. a) Illustrate the Huffman source coding procedure for a source that emits '8' symbols with probabilities given as 0.3, 0.2, 0.12, 0.12, 0.08, 0.08, 0.08 and 0.02. Determine the coding efficiency and redundancy. [5]  
b) Derive the expression for channel capacity of Binary symmetric channel. [5]
13. a) Consider a (7,4) linear code whose generator matrix [6]  
$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

Find all the code vectors of this code.  
Also, find parity check matrix, minimum weight and minimum distance of the code.

  
b) Draw the encoder structure of a rate 1/2 Convolutional coder with  $g_1 = (101)$  and  $g_2 = (011)$ . Find the codeword for an input 011. What is the constraint length of this code? [4]
14. a) Derive an expression for probability of error for coherent ASK signaling scheme. [5]  
b) With the help of block diagram, explain DPSK modulation and demodulation. [5]

Contd... 2

- 15. a) Explain the working of Direct Sequence Spread spectrum system with necessary mathematical analysis. [5]
- b) Discuss how FHSS signal is tracked using Early-Late Gate. [5]
- 16. a) Explain the working of a PCM system with neat block diagram. [6]
- b) Consider an AWGN channel with 4KHz bandwidth having noise power spectral density of  $(N_0/2) = 10^{-12}$  W/Hz. The signal power required at the receiver is 0.1mW. Calculate the capacity of the channel. [4]
- 17. Answer any two of the following:
  - a) Linear Block Codes Vs Convolutional codes [5]
  - b) Minimum Shift Keying [5]
  - c) PN sequence generation using LFSR (1, 3) and properties [5]



*P-203*