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No.

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DEI1347

## Digital Communication Systems (New) (1280)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet 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. Assume suitable data if necessary, giving reasons.
5. Figures to the right indicate full marks.

### UNIT - I

1. Attempt any two.

- a) What is significance of random variables and random processes in communication ? Discuss mean moment, variance for different continuous and discrete variables. 10
- b) Define the Fourier transform for periodic signals & explain its significance. 10
- c) State and prove following properties of Fourier Transforms.  
  - i) Differentiation in time domain.
  - ii) Integration in time domain.
  - iii) Convolution in time domain. 10

### UNIT - II

2. Attempt any two.

- a) State sampling theorem in frequency domain. Draw and explain the spectrum of sampled signal for  
  - i)  $F_S = 2B$
  - ii)  $F_S < 2B$
  - iii)  $F_S > 2B$ .

Where B is the maximum frequency of the signal and  $F_S$  is sampling frequency. 10

- b) Compare PCM, Delta modulation and adaptive delta modulation. Write expression for normalized power of quantization error in PCM. 10
- c) Explain delta modulation in detail with suitable diagram. Explain ADM and compare its performance with DM. 10

### UNIT - III

3. Attempt any two.

- a) What are the desirable properties of line codes ? Compare RZ & NRZ line coding formats on the basis of above properties along with their merits & demerits. 10
- b) Why synchronization is needed in digital communication ? Explain in detail working principle of Early-late Gate synchronizer. 10
- c) Explain in detail the use of scrambler & unscrambler in digital communication system. Explain its operation with suitable example. 10

### UNIT - IV

4. Attempt any two.

- a) Explain Quadrature phase shift keying technique of digital C.W. modulation . Elaborate your answer with suitable expression, signal space and spectral representation. How QPSK signal is generated and received ? 10
- b) Explain generation & reception of BFSK signal with suitable block diagram. Sketch necessary waveforms, signal space representation and frequency spectrum of BFSK signals. 10
- c) Explain and comparison of multiuser access. 10
  - i) TDMA
  - ii) FDMA
  - iii) CDMA.

### UNIT - V

5. Attempt any two.

- a) Explain Shannon's fundamental theorem for information transmission on a noisy channel. 10

- b) The parity check matrix of a particular (7, 4) Linear block code is given by

$$[H] = \left[ \begin{array}{cccc|ccc} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{array} \right]$$

- i) Find the generator matrix (6)
  - ii) List all the code vectors.
  - iii) What is the minimum distance between code vector.
  - iv) How many errors can be detected ? How many errors can be corrected ?
- c) Explain FEC (Forward Error Correction) and ARQ (Automatic Repeat Request) system.

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