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Question Paper Code : 51452

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Electronics and Communication Engineering

EC 2301/EC 51 – DIGITAL COMMUNICATION

(Regulations 2008)

**(Common to PTEC 2301 – Digital Communication for B.E. (Part-Time) Fourth Semester –
Electronics and Communication Engineering – Regulations 2009)**

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. State any four techniques to improve the BER of a communication system.
2. Define basis set.
3. An analog waveform with maximum frequency content of 3 kHz is to be transmitted over an M-ary PCM system, where $M = 16$. What is the minimum number of bits/sample that should be used in digitizing the analog waveform ? (The quantisation error is specified not to exceed $\pm 1\%$ of the peak-to-peak analog signal)
4. Differentiate the principles of temporal waveform coding and model-based coding.
5. Define Hamming distance and Hamming weight.
6. Define constraint length of a convolutional coder.
7. Mention two properties of matched filter.

8. What is the use of eye pattern ?
9. What are the drawbacks of binary PSK system ?
10. What is meant by coherent and non-coherent detection ?

PART – B (5 × 16 = 80 marks)

11. (a) (i) Explain Gram-Schmidt orthogonalisation procedure. (12)
- (ii) State and explain the dimensionality theorem. (4)

OR

- (b) (i) Explain the mathematical models of any three communication channels.
- (ii) Define the terms :
 - (1) Half-power bandwidth
 - (2) Noise-equivalent bandwidth
 - (3) Absolute bandwidth
 - (4) Bounded power spectral density.

12. (a) Explain a DPCM system. Derive the expression for slope overload noise of the system. Show that SNR of DPCM is better than that of PCM.

OR

- (b) (i) Explain subband coding. (8)
 - (ii) Compare the performance of various speech encoding methods. (8)
13. (a) Describe the steps involved in the generation of linear block codes. Define and explain the properties of syndrome. (16)

OR

- (b) (i) Explain how convolutional codes can be generated. Illustrate with an example. (8)
- (ii) For a convolutional encoder of constraint length 3 and rate $1/2$, obtain the encoded output for the input message 10011. (8)

14. (a) Derive the bit error probability of a matched filter.

OR

- (b) Explain the Nyquist first criterion for ISI elimination.

15. (a) (i) Derive the power spectral density of binary ASK signal. (6)
- (ii) Draw the block diagram of QPSK transmitter and receiver. Explain the function of various block. (10)

OR

- (b) (i) Draw the functional block diagram of modulator for QAM and explain its operation. (8)
- (ii) Derive the expression for error probability of QAM system. (8)