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**Question Paper Code: 53086**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Third Semester

Information Technology

15UIT306 - ANALOG AND DIGITAL COMMUNICATION

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. An FM signal with modulation index  $m_f$  is passed through a frequency tripler. The modulation index of the output signal will be  
(a)  $m_f$                       (b)  $3m_f$                       (c)  $9m_f$                       (d)  $1/3m_f$
2. If we correlate the received signal with any one of the two orthogonal function, the obtained inner product will be  
(a) In phase                      (b) Quadrature                      (c) Zero                      (d) Cannot be determined
3. The expression for bandwidth BW of a PCM system, where  $v$  is the number of bits per sample and  $f_m$  is the modulating frequency, is given by  
(a)  $BW \geq v f_m$                       (b)  $BW < v f_m$                       (c)  $BW > 2 v f_m$                       (d)  $BW > 1/2 v f_m$
4. Multiplexing combines signals from several sources to achieve  
(a) Data rate management                      (b) Interleaving  
(c) TDM efficiency                      (d) bandwidth efficiency
5. Forward error correction is possible when number of errors is  
(a) Zero                      (b) Small                      (c) Large                      (d) Infinite

PART - B (5 x 3 = 15 Marks)

6. What are the advantages of single sideband transmission?
7. Bring Out the difference between DPSK and BPSK.
8. What is an eye pattern?
9. Define Multiple Access and what are the major types of Multiple Accesses?
10. Why cyclic codes are extremely well suited for error detection?

PART - C (5 x 16 = 80 Marks)

11. (a) (i) Derive the amplitude modulated wave equation and explain each term with the help of the frequency spectrum. (8)
- (ii) Explain the principle of operation of envelope detector with necessary diagram. (8)

Or

- (b) (i) With the help of block diagram, explain the operation of super heterodyne radio receiver. (8)
  - (ii) Explain how FM can be generated from PM. (8)
12. (a) Explain the QPSK modulation scheme with suitable transmitter and receiver block diagram. Also derive the average probability of error in the presence of AWGN. (16)

Or

- (b) Draw the block diagram of FSK receiver and explain the operation. Determine (i) peak frequency deviation. (ii) Minimum bandwidth. (iii) Baud for FSK signal with a mark frequency of 49khz, space frequency of 51 khz and input bit rate of 2kbps. (16)
- 13.(a) (i) Draw the block diagram of a PCM transmitter and explain the function of each block. (6)
  - (ii) What are the types of sampling? Explain the operation of the sample and hold circuit. (10)

Or

- (b) Draw the block diagram and describe the operation of delta modulator. What are its advantages and disadvantages compared to a PCM system. (16)

14. (a) (i) Give the advantages associated with spreading a signal spectrum. (8)
- (ii) Explain FH-CDMA acquisition and tracking with neat sketches. (8)

Or

- (b) (i) Compare TDMA, FDMA & CDMA techniques. (8)
- (ii) What is Pseudo noise sequence? What are the properties of Pseudo noise sequences? (8)
15. (a) Draw the code tree of a Convolutional code of code rate  $r=1/2$  and Constraint length of  $K=3$  starting from the state table and state diagram for an encoder which is commonly used. (16)

Or

- (b) Describe the steps involved in the generation of linear block codes. Define and explain properties of syndrome. (16)

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