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Question Paper Code: 53806

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

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. FM signal is better than AM signal because _____ CO1- R
 - (a) Less immune to noise
 - (b) Less adjacent channel interference
 - (c) Amplitude limiters are used to avoid amplitude variations
 - (d) All of the above
2. QPSK system uses a phase shift of _____ CO2- R
 - (a) π
 - (b) $\frac{\pi}{2}$
 - (c) $\frac{\pi}{4}$
 - (d) 2π
3. T1 carrier system is used _____ CO3- R
 - (a) For PCM voice transmission
 - (b) For delta modulation
 - (c) For frequency modulated signals
 - (d) None of the above
4. The wide band usage in CDMA helps in _____ CO4- R
 - (a) Increased immunity to interference
 - (b) Increased immunity to jamming
 - (c) Different spectrum allocation in different time slots
 - (d) Multiple user access

5. For a (7, 4) block code, 7 is the total number of bits and 4 is the number of _____ CO5- R
- (a) Information bits (b) Redundant bits
(c) Total bits- information bits (d) None of the above

PART – B (5 x 3= 15 Marks)

6. Calculate the modulation index and percent modulation if instantaneous voltage of modulating signal and carrier are $40 \sin \omega_m t$ and $50 \sin \omega_c t$ CO1- R
7. Draw the block diagram of a QAM transmitter. CO2- R
8. Compare ADM and DPCM. CO3- R
9. Show that the probability of error of QPSK is same as that of BPSK for 1 bit duration. CO4- R
10. Draw the block diagram of a convolutional encoder of rate $\frac{1}{2}$ with generator polynomial: $g^{(1)}(D) = 1 + D + D^2$ and $g^{(2)}(D) = 1$. CO5- R

PART – C (5 x 16= 80 Marks)

11. (a) Derive the expression for instantaneous voltage of AM wave. CO1- App (16)
Draw the AM wave and explain the power distribution.
- Or
- (b) Draw the block diagram of Armstrong indirect FM transmitter and describe its operation. Discuss the advantages and disadvantages of angle modulation. CO1- App (16)
12. (a) Draw the block diagram of QPSK modulator, demodulator and explain its operation with signal space diagram and suitable QPSK waveforms. CO2- App (16)
- Or
- (b) Compare the digital modulation techniques of ASK, FSK, and PSK in terms of its operation, signal space diagram, error probability, transmitter and receiver structures. CO2- App (16)
13. (a) Explain pulse code modulation with neat block diagram. CO3- Ana (16)
- Or
- (b) Explain Quantization process in detail and derive the expression for output signal to noise ratio of uniform quantizer. CO3- Ana (16)
14. (a) Explain with neat block diagram DS spread spectrum with coherent BPSK and derive its probability of error with jamming. CO4- U (16)

Or

- (b) Compare the features of TDMA and CDMA multiple access techniques used in wireless communication. CO4- U (16)

15. (a) Construct a rate $\frac{1}{2}$ convolutional encoder with constraint length 3 and generator sequences $g^{(1)} = (1\ 0\ 1)$, $g^{(2)} = (1\ 1\ 0)$ for the input $[1\ 0\ 0\ 1\ 1]$ and identify the output using trellis diagram, state diagram and state table. CO5- U (16)

Or

- (b) Derive the code polynomial in systematic form for a (15, 5) cyclic code with generator polynomial $g_1(X) = 1 + X + X^2 + X^5 + X^8 + X^{10}$, where the message polynomial is $m(X) = 1 + X^2 + X^4$. CO5- U (16)

