C

Question Paper Code: 53806

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

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

<center>PART – B (5 x 3= 15 Marks)</center>

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 ½ with generator polynomial: $g^{(1)}(D) = 1 + D + D^2$ and $g^{(2)}(D) = 1$.   CO5- R

<center>PART – C (5 x 16= 80 Marks)</center>

11. (a) Derive the expression for instantaneous voltage of AM wave. Draw the AM wave and explain the power distribution.   CO1- App   (16)

<center>Or</center>

   (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)

<center>Or</center>

   (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)

<center>Or</center>

   (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)

<center>2</center>

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

15. (a) Construct a rate ½ 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)

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