Reg. No. | | | | | | | | | |

Question Paper Code : 17999

B.E. / B.TECH. DEGREE EXAMINATION, NOVEMBER / DECEMBER 2021

Third Semester

Common to B.E. – Computer Science and Engineering & B.Tech. – Information Technology

19IT303 – PRINCIPLES OF COMMUNICATION

(Regulations: Mepco – R2019)

Duration: 3 Hours Max. : 100 Marks

Answer ALL Questions

BTL, CO

PART A – (10 × 2 = 20 Marks)

A, CO1 1. The maximum shift in frequency is 3 kHz and the minimum and maximum deviation in frequency of the actual signal are 149.97 MHz and 150.03 MHz. What is the carrier frequency? Justify your answer.

A) 150 MHz B) 153 MHz C) 140 MHz D) 100 MHz

R, CO1 2. In a frequency modulation signal, the power _____ as the modulation index increases. Justify your answer.

A) Remains constant B) Increases

C) Decreases D) Become 0

U,CO3 3. Define droop. What causes it?

A, CO2 4. Determine the alias frequency for a 14 kHz sample rate and an analog input frequency of 8 kHz.

A,CO3 5. "PSK is superior than the ASK and FSK", Justify this statement.

U,CO3 6. Compare QPSK modulator and QAM modulator.

A,CO4 7. A pseudo noise sequence is generated using a linear feedback shift register of length m = 5. The PN sequence period is _____. Justify your answer.

A) 31 B) 32 C) 5 D) None of the above

U,CO4 8. The maximum length sequence produced by a linear feedback shift register of length n = 6 is _____. Justify your answer.

A) 5 B) 11 C) 31 D) 63

U, CO5 9. What is the purpose of cladding in an optical fiber?

U, CO5 10. The area of coverage of a satellite radio beam is called its _____. Justify your answer.

A) Beam width B) Circular polarization

C) Footprint D) Identity

PART B – (5 × 16 = 80 Marks)

U, CO1 11. a) i. Write short notes on angle modulated waves. (8 Marks)

U, CO1 11. a) ii. Explain in detail the operation of High Level AM Transmitter with neat diagrams. (8 Marks)

OR

A, CO1 11. b) i. When the modulating frequency in an FM system is 400 Hz and the modulation voltage is 2.4 V, the modulation index is 60. Calculate the maximum deviation. What is the modulation index when the modulating frequency is reduced to 250 Hz and the modulating voltage is simultaneously raised to 3.2 V? (8 Marks)

U,CO1 11. b) ii. State the purpose of Superheterodyne receiver in the communication system. Discuss about the elements in AM Superheterodyne receiver. (8 Marks)

A, CO2 12. a) i. Discuss about the test setup and waveform for ternary signal in the eye pattern. (8 Marks)

U, CO2 12. a) ii. A 12-bit linear PCM code is digitally compressed into eight bits. The resolution = 0.5 V. Determine the following for an analog input voltage of 1.465 V:

A) 12-bit linear PCM code

B) 8-bit compressed ode

C) Decoded 12-bit code

D) Decoded voltage (8 Marks)

OR

U, CO2 12. b) i. Illustrate the operation of delta modulation transmitter with suitable diagrams. (8 Marks)

A, CO2 12. b) ii. For the following eight bit compressed codes, determine the expanded 12-bit code:

Eight bit code
1100 1010
1010 1111
1111 0000
1101 1101

(8 Marks)

A, CO3 13. a) i. For an 8-PSK system, operating with an information bit rate of 24 kbps, determine:

A) Baud

B) Minimum bandwidth

C) Bandwidth efficiency

For 16-PSK transmission system with a 10 kHz bandwidth, determine the maximum bit rate. (8 Marks)

A, CO3 13. a) ii. Illustrate the working principle of BPSK transmitter with a suitable diagram. (8 Marks)

OR

A, CO3 13. b) i. Determine the bandwidth efficiency for the following modulators:

A) QPSK, fb = 10 Mbps

B) 8-PSK, fb = 21 Mbps

C) 16-QAM, fb = 20 Mbp (8 Marks)

U, CO3 13. b) ii. Explain the principle of operation of 8-QAM system with a neat block diagram. (8 Marks)

U, CO4 14. a) i. State how bandwidth sharing is achieved in FHSS, when compared to FDM. (8 Marks)

U, CO4 14. a) ii. With a suitable example, demonstrate how spectrum spreading has been achieved in Direct Sequence-Spread Spectrum modulation system. (8 Marks)

OR

U, CO4 14. b) i. Compare TDMA, FDMA, SDMA and CDMA techniques. (8 Marks)

A, CO4 14. b) ii. A pseudo noise sequence is generated using a feedback shift register of length m = 7. The chip rate is 10^7 chips per second. Find the following parameters:

A) Length of the PN sequence

B) Chip duration of the PN sequence

C) PN sequence period (8 Marks)

U, CO5 15. a) i. List and describe the primary characteristics of light detectors. Contrast the advantages and disadvantages of ILDs and LEDs. (10 Marks)

A, CO5 15. a) ii. For an earth station transmitter with an antenna output power of 40 dBw (10,000w), a back-off ratio is 6 dB, a total branching loss is 2 dB the feeder loss is 4 dB and a transmit antenna gain of 4 dB. Determine the actual radiated power and the EIRP. (6 Marks)

OR

U, CO5 15. b) i. Explain Kepler's laws and how they relate to satellite communications. (10 Marks)

A, CO5 15. b) ii. Calculate the number of nodes supported by a step index fiber of 100 μm core diameter and reflective indices of the core and cladding given as 1.485 & 1.465 respectively. The peak wave length of the light source used is 820 nm. (6 Marks)