B.TECH DEGREE EXAMINATIONS: DEC 2014

(Regulation 2013)

Third Semester

INFORMATION TECHNOLOGY

U13ECT314**:** Principles of Communication

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Which of the following is present in both TRF receiver and super-heterodyne receiver?

    a) Detector   b) Mixer

    c) IF amplifier   d) Local oscillator

2. ………. is the bandwidth of AM wave if a 400 KHz carrier is modulated with 3, 5, and 8 KHz simultaneously.

3. Which of the following is an indirect way of generating FM?

    a) Armstrong modulator   b) Varactor diode modulator

    c) Reactance FET modulator   d) Reactance bipolar transistor

4. In the FM wave described by equation $v = 15 \sin (4 \times 10^8 \, t + 3 \sin 1100 \, t)$, the maximum frequency deviation is ……………..

5. If carrier is modulated by a digital bit stream having one of the possible phases of 0°, 90°, 180°, and 270°, then modulation is called

    a) BPSK   b) QPSK

    c) MSK   d) DPSK

6. The minimum bandwidth for a BPSK modulator with a carrier frequency of 40 MHz and an input bit rate of 500 kbps ……………..

7. 24 telephone channels, each band limited to 3.4 kHz are to be time division multiplexed using PCM. If sampling frequency is 10 kHz and number of quantization levels is 128, the required bandwidth of PCM is

    a) 1.68 MHz   b) 240 kHz

    c) 81.6 kHz   d) 323.67 MHz

8. In PCM, if the number of quantization levels is increased from 4 to 64, then the bandwidth requirement will approximately be increased ………. times.

9. In spread spectrum technique

   a) a modulated signal is modulated again b) a modulated signal is modulated twice again

   c) the power of a modulated signal is increased d) the noise component of a modulated signal is decreased

10. ………… is the technique that expands the bandwidth of a signal by replacing each data bit with n bits.

PART B (10 x 2 = 20 Marks)
(Not more than 40 words)

11. What is the need for Modulation?

12. An unmodulated carrier is modulated simultaneously by three modulating signals with coefficients of modulation $m_1 = 0.2$, $m_2 = 0.4$, $m_3 = 0.5$. Determine the total coefficient of modulation.

13. What are the two methods of producing an FM wave?

14. Determine the modulation index of a FM system with a maximum frequency deviation of 75 KHz and maximum modulating frequency of 10 KHz.

15. What is a constellation diagram? Draw the constellation diagram and phasor diagram for BPSK.

16. Draw the waveform for the binary data sequence 101100 modulated using

    a. FSK   b. ASK

17. Distinguish between Delta modulation and differential pulse code modulation.

18. What is the principle of ADM?

19. What are the applications of Spread spectrum modulation?

20. List and define the properties of PN sequence.

PART C (5 x 14 = 70 Marks)
(Not more than 400 words)

Q.No. 21 is Compulsory

21. Explain the operation of a super heterodyne receiver with a suitable block diagram

22. a) (i) Derive the mathematical expression for FM signal and draw the frequency   (10)
        spectrum of FM Wave.

(ii) A frequency modulated voltage wave is given by the equation: (4)
e=12 cos (6 x 10^8 t + sin 1250 t). Find (i) carrier frequency (ii) signal frequency (iii) modulation index (iv) maximum frequency deviation (v) power dissipated by the FM wave in 10-ohm resistor.

(OR)

b) (i) Describe the principle of operation of Armstrong FM transmitter system with a neat block diagram. (10)

(ii) Compare FM over AM. What are the applications of FM signal? (4)

23. a) Draw and discuss the operation of DPSK Transmitter, Receiver with its merits and demerits.

(OR)

b) Discuss the, modulation and demodulation block diagrams, constellation diagram of QPSK with appropriate expressions in detail.

24. a) With a neat block diagram, waveform and expression, explain the operation of Pulse Code Modulation (PCM).

(OR)

b) With neat block diagram, explain in detail about Delta Modulation and the types of quantization errors occurring in it.

25. a) With neat sketches, describe the Direct sequence spread spectrum with coherent BPSK transmission and reception.

(OR)

b) With suitable block diagrams, discuss the structure of transmitter and receiver of frequency hopped spread spectrum system and explain the operation of FHSS with any one example.

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