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

Question Paper Code : 21457

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015

Fifth Semester

Electrical and Electronics Engineering

EC 2311/EE 54/10144 EE 501 — COMMUNICATION ENGINEERING

(Regulations 2008/2010)

(Common to PTEC 2311 – Communication Engineering for B.E. (Part-Time) Fifth Semester – Electrical and Electronics Engineering – (Regulations 2009))

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Assume that a carrier 50 sin $9800\pi t$ is modulated using a single tone message $m(t) = 15\cos 600\ \pi t$. Plot the spectrum of

   (a) AM

   (b) DSB-SC.

2. Mention the differences between the Narrow band FM and Wide band FM.

3. Explain why a single channel PPM system requires a synchronizing signal, whereas PAM and PWM do not.

4. What is slope overload in Delta Modulation? Mention the techniques to overcome this.

5. An analog signal is band limited to BHz, sampled at the Nyquist rate, and the samples are quantized into 4 levels. The quantization levels Q_1, Q_2, Q_3 and Q_4 (messages) are assumed independent and occur with probabilities $P_1 = P_4 = 1/8$ and $P_2 = P_3 = 3/8$. Find the information rate.

6. Draw the NRZ and RZ signaling format of Binary sequences 11001.

7. What is direct sequence spread spectrum technique?

8. Draw the block diagram of pseudo random sequence generator.

9. Mention the different types of satellite orbits.

10. What are the losses associated with optical link?

PART B — (5 × 16 = 80 marks)

11. (a) (i) With a neat diagram derive the expressions for frequency spectrum of AM wave. (10)

(ii) Calculate the power relationship between the AM, DSB-SC, SSB-SC. Mention its % of power saving. (6)

Or

(b) (i) Using a suitable mathematical analysis, show that FM modulation produces infinite sidebands. Also derive an expression for the frequency modulated output and its spectrum. (12)

(ii) What is the relationship between FM and PM? (4)

12. (a) (i) Sketch the flat topped PAM waveform that results from sampling a 1 KHz sine wave at a 4 KHz rate. What is its drawback? (8)

(ii) With a suitable block diagram explain the operation of Delta modulation. (8)

Or

(b) (i) A 1.5 MHz information signal with a dynamic range of 64 mV is sampled, quantized and encoded using a direct binary code. The quantization is linear with 512 levels. Determine maximum possible bit deviation and amplitude of one quantization. (6)

(ii) With a necessary block diagram explain the QPSK transmitter. (10)

13. (a) Write short notes on :

(i) Average information and entropy (6)

(ii) Capacity of a Gaussian channel (6)

(iii) Bandwidth — S/N tradeoff. (4)

Or

(b) With the necessary diagrams explain the coding and decoding of block codes. (16)

14. (a) (i) Explain in detail about typical FDMA system. (8)

(ii) 500 users employ FDMA to transmit 1000 bit packets of data. The channel bandwidth is 100 MHz and QPSK is used at each of the 500 carrier frequencies employed. What is the maximum bandwidth allocated to each user? What is the bit rate employed by each user and how long does it take it to transmit a packet. (8)

Or

(b) Describe in detail about the use of spread spectrum with code division multiple access. (16)

15. (a) (i) What are the major applications of satellite communication? (6)

(ii) Briefly describe the functional characteristics of an uplink, a transponder and a down link model for a satellite system. (10)

Or

(b) With a neat sketch explain the following :

(i) Light sources (8)

(ii) Light detectors. (8)