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J 3189

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Fourth Semester

Computer Science and Engineering

EC 1291 — ANALOG AND DIGITAL COMMUNICATION

(Regulation 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the main problems in TRF receivers? How are these problems overcome by super-heterodyne receiver?

2. What are the advantages of SSB-SC modulation?

3. What are direct and indirect frequency modulation?

4. The required bandwidth for FM transmission depends upon the modulation index- Justify.

5. What are the two types of noises present in Delta modulation system?

6. Explain why the quantization noise cannot be removed completely in PCM. How do you reduce this noise?

7. State Shannon's theorem on information capacity of a channel.

8. What is the advantages of PSK over FSK?

9. What are slow frequency hopping and fast frequency hopping?

10. Define processing Gain in spread spectrum system.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw a AM modulator circuit which generates DSBFC AM and explain the operation with suitable sketches. (8)

(ii) For an AM DSBFC with a peak unmodulated carrier voltage $V_c = 12V$, and modulation coefficient $m = 1$ with load resistance $R_L = 12\Omega$, determine the

(1) carrier power and the upper and lower side band power (P_C, P_{USB}, P_{LSB}). (4)

(2) total power of the modulated wave. (2)

(3) draw the power spectrum. (2)

Or

(b) Draw the block diagram of superheterodyne receiver and explain the function of each block. What are its advantages over TRF receiver? (16)

12. (a) Draw the circuit of

(i) varactor diode FM modulator and

(ii) reactance modulator, and explain the generation of FM. (2 × 8 = 16)

Or

(b) Draw the circuit diagram of Foster-Seeley discriminator and explain its operation. (16)

13. (i) Draw the block diagram of PCM system and explain the functions of each block. (8)

(ii) What is the need for companding? Explain analog and digital companding. (8)

Or

(b) (i) Draw the block diagram of adaptive delta modulator and explain its operation. How is this ADM better than DM? (8)

(ii) What is ISI? Explain how ISI can be measured using eye pattern method. (8)

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14.   (a)   Draw the block diagram of FSK transmitter and receiver and explain the operation. How is the required bandwidth calculated for FSK?   (16)

Or

     (b)   Draw the block diagram of QPSK transmitter and receiver and explain the operation. Also draw its phasor diagram and compare QPSK with simple BPSK in terms of bandwidth requirements.   (16)

15.   (a)   (i)   What are the properties of P-N sequence random numbers? Draw the direct sequence spread spectrum system which employes BPSK and explain the operation.   (12)

         (ii)   Distinguish between FDMA and TDMA.   (4)

Or

     (b)   What are fast frequency hopping and slow frequency hopping? Explain both with suitable diagrams.   (8 + 8 = 16)