E 276

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2003.

Fifth Semester

Computer Science and Engineering

EC 351 — ANALOG, DIGITAL AND DATA COMMUNICATION

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A transmitter supplies 8 kW to the antenna when unmodulated. Determine the total power radiated when modulated to 70%.

2. State the sampling theorem for band limited low pass signal.

3. State Shannon's fundamental theorem of information theory.

4. Define Hamming Code.

5. What do you mean by inter modulation noise?

6. What do you mean by simplex transmission?

7. For the given digital data 0100110001, draw the NRZ and Manchester encoding formats.

8. Compare ASK and FSK.

9. What do you mean by stop–and–wait ARQ?

10. How many voice channels are combined to form standard super group? What is the frequency band for this group?

PART B — (5 × 16 = 80 marks)

11. (i) Explain Go–back–N and selective–reject error control strategies.   (5 + 5)

    (ii) What is the difference between TDM and FDM? Describe the principle of TDM system with neat block diagram.   (6)

12. (a) (i) Derive the amplitude modulated wave equation and explain each term with the help of frequency spectrum. (8)

(ii) Explain the principle of operation of envelope detector with necessary diagrams. (8)

Or

(b) (i) Explain the method of generating narrow band FM signal. (8)

(ii) What are the types of pulse modulation systems? Explain each briefly. (8)

13. (a) (i) Let X be a discrete random variable taking values $x_1, x_2, \cdots x_M$ with probabilities $p_1, p_2, \cdots p_M$. Define entropy $H(X)$ and information rate R. If X takes four values x_1, x_2, x_3 and x_4 with probabilities $1/8, 3/8, 3/8$ and $1/8$, what is the information rate R if the source rate is 100 symbols/sec.? (8)

(ii) Define channel capacity and derive channel capacity for binary symmetric channel. (8)

Or

(b) (i) Consider (6, 3) linear block code with generator matrix

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

(1) Find the parity check matrix H

(2) Determine the code word corresponding to the message $u = (1 \quad 0 \quad 1)$.

(3) What is the minimum distance of the code? (3 + 2 + 3)

(ii) Explain convolutional encoder with an example. (8)

14. (a) (i) Explain the following transmission impairments in the data transmission

(1) Attenuation distortion

(2) Delay distortion. (5 + 5)

(ii) Explain the physical description and use of any one type of transmission medium. (6)

Or

(b) (i) Explain synchronous and asynchronous data transmission techniques. (10)

(ii) Explain the important characteristics of interface to transmission medium. (6)

2 **E 276**

15. (a) (i) With neat block diagram, explain coherent binary FSK transmitter and receiver. (8)

(ii) Draw the constellation diagram for QPSK signalling scheme. And for the following binary sequence sketch the waveforms for the

(1) in–phase and quadrature components and

(2) QPSK signal

1100100010. (2 + 3 + 3)

Or

(b) (i) Draw the block diagram of PCM transmitter and receiver and explain functions of each. (10)

(ii) Explain the noise in delta modulation. (6)