# E 264

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

Third Semester

Information Technology

IF 244 — PRINCIPLES OF COMMUNICATION

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define trigonometric Fourier series representation of a periodic signal.

2. State the relationship between the spectral density and autocorrelation of a wide sense stationary random process.

3. Define AM and draw its spectrum.

4. What do you understand by narrow band FM?

5. State sampling theorem for low pass band limited signal.

6. State Nyquist criterion for zero ISI.

7. What is the error probability of a binary FSK system?

8. Compare binary PSK with QPSK.

9. What do you mean by direct sequence spread spectrum technique?

10. What do you mean by minimum distance of a linear block code?

PART B — ($5 \times 16 = 80$ marks)

11. (i) Draw the periodic impulse train with period $T_s$ sec and find its Fourier transform. (8)

(ii) A wide sense stationary random process has an autocorrelation function $R_{xx}(\tau) = Ae^{-2|\tau|}$, where $A$ is constant. Find its power spectrum $S_{xx}(w)$. (8)

12. (a) (i) A complex modulating waveform consisting of a sine wave of amplitude 3 V peak and frequency 1 kHz and a cosine wave of amplitude 5 V peak and frequency 3 kHz amplitude modulates a 500 kHz and 10 V peak carrier voltage. Determine and plot the spectrum of the modulated wave and determine the average power when the modulated wave is fed into 50 Ω load. (8)

(ii) Explain the working principle of square law modulator. Mention its merits and demerits. (8)

Or

(b) (i) Describe with neat diagrams the method of generation of direct FM signal. (8)

(ii) With neat block diagram, explain the operation of indirect FM transmitter. (8)

13. (a) Explain delta modulation in detail with suitable diagram and also discuss quantization noise in delta modulation.

Or

(b) What do you mean by matched filter? Derive an expression for impulse response of the matched filter.

14. (a) Draw signal constellation diagram of binary PSK and derive the probability of error of coherent binary PSK.

Or

(b) What do you mean by Minimum Shift Keying? Draw and explain the block diagram MSK transmitter and receiver.

15. (a) Derive the expression for the processing gain and jamming margin in spread spectrum system.

Or

(b) The generator matrix for a (7, 3) systematic binary linear block code is given by

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

(i) Determine the parity check matrix for this code. (4)

(ii) What is the minimum distance of the code? (2)

(iii) Construct encoder and syndrome calculation circuit. (10)

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