

D 253

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2003.

Fourth Semester

Electrical and Electronics Engineering

EC 256 — COMMUNICATION ENGINEERING

(Common to Electronics and Instrumentation Engineering and Instrumentation and Control Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term “conversion conductance”.
2. What is AGC?
3. Give the expression for path loss “L” of satellite communication system in dB.
4. Define Pulse Amplitude Modulation.
5. Define Companding.
6. Define Time Division Multiplexing.
7. Give the expression for the capacity of a Gaussian Channel.
8. What is the function of a PLL?
9. What is Quadrature Phase Shift Keying (QPSK)?
10. Explain the term “Interlaced Scanning” as applicable to Television.

PART B — (5 × 16 = 80 marks)

11. Bandwidth of the input to a pulse code modulator is restricted to 4 kHz. The signal varies from  $-3.8$  V to  $3.8$  V and has the average power of 30 mW. The required signal to quantisation noise power ratio is 20 dB. The modulator produces binary OUTPUT. find

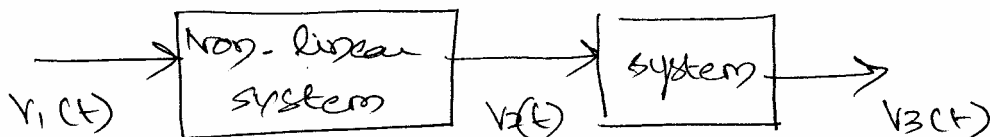
- (i) No. of bits required per sample.
  - (ii) OUTPUT of 30 such PCM codes are time multiplexed. What is the minimum required transmission bandwidth for the multiplexed signal?
12. (a) Determine the Bandwidth occupied by a sinusoidally frequency modulated carrier for which the modulation index is 2.4 and the maximum frequency deviation is 15 kHz.

Or

- (b) In a FM system the frequency deviation is 1 kHz/V. A sinusoidal modulating voltage of amplitude 15 V and frequency of 3 Hz applied. Find
- (i) the maximum frequency deviation
  - (ii) modulation index.
13. (a) A Telephone Transmitter using AM has un-modulated carrier output power of 20 kW and can be modulated to a maximum depth of 80% by a sinusoidal modulating voltage without causing overloading. Find the value to which unmodulated carrier power may be increased without resulting in overloading if the maximum permitted modulation index is restricted to 60%.

Or

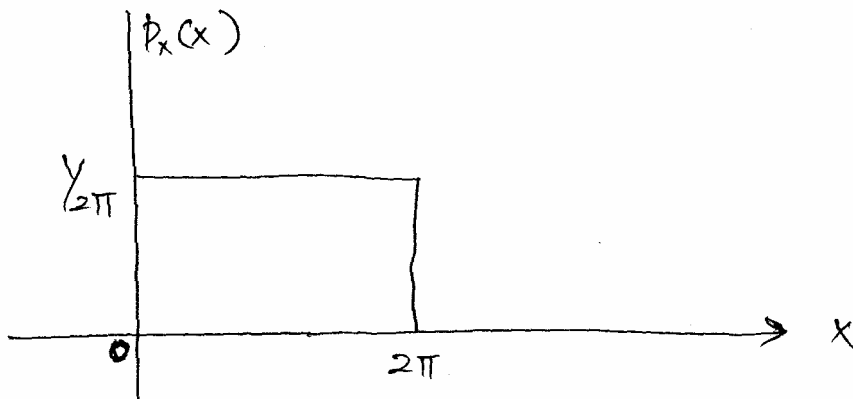
- (b) Determine the carrier swing, the maximum and minimum frequencies attained, and the modulation index of the FM signal generated by frequency modulation at 101.6 MHz carrier with an 8 kHz sine wave causing a frequency deviation of 40 kHz.
14. (a) Find an expression for the signal  $V_3(t)$  in figure for  $V_1(t) = 10 \cos(2000 \pi t) + 4 \sin(200 \pi t)$ .
- Assume that  $V_2(t) = V_1(t) + 0.1 V_1^2(t)$  and the BPF has an ideal unity gain with pass band from 800 Hz to 1200 Hz.



Or

- (b) For binary data transmission obtain the expressions and waveforms for ASK, FSK and PSK schemes.

15. (a) Here  $X$  is uniformly distributed as shown in fig. Find  $E(x)$ ,  $E(x^2)$ ,  $E(\cos x)$  and  $E(x - m_x)^2$ .



Or

- (b) Find the output signal to noise ratio of a matched filter where the signal is  $S(t) = A$ , for  $0 < t < T$ . The noise is white with power spectral density  $N_0/2$ .

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