Your Roll No...............

Sr. No. of Question Paper : 2218   IC

Unique Paper Code   : 32511608

Name of the Paper   : Communication Electronics

Name of the Course   : **B.Sc. (Hons.) Electronics**

Semester   : VI

Duration : 3 Hours   Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Attempt **five** questions in all, including Question No. **1** which is compulsory.

3. Use of Scientific Calculator is allowed.

1. (a) What is the bandwidth requirement for transmission of : (i) Human voice (ii) Music signal and (iii) Video signal? (3)

   (b) A 1000 kHz carrier is simultaneously amplitude modulated with 500 Hz, 900 Hz and 10 kHz audio sine waves. Draw the frequency spectrum for this signal. (3)

P.T.O.

(c) Of the various advantages of FM over AM, identify and discuss those due to intrinsic qualities of frequency modulation. (3)

(d) Differentiate between Pulse Width Modulation and Pulse Position Modulation. (3)

(e) What is the significance of regenerative repeaters in PCM systems? (3)

2. (a) Explain with the block diagram an electronic communication system. What is the frequency range of UHF and mention its applications? (6)

(b) Define signal to noise ratio and noise figure of a receiver. What is the noise factor and noise figure for an ideal receiver? (5)

(c) Calculate the noise voltage at the input of a Television RF amplifier, using a device that has a 200Ω equivalent noise resistance and a 300Ω input resistor. The bandwidth of the amplifier is 6 MHz and the temperature is 17°c. (4)

3. (a) State three important reasons why modulation is necessary for transmitting message signals. Explain the generation of AM using a square law modulator? (6)

(b) Explain the phase shift method for generation of SSB signal. (5)

(c) An antenna has an impedance of 40Ω. An unmodulated AM signal produces a current of 4.8 A. The modulation is 90 percent. Calculate (i) the carrier power, (ii) the total power, and (iii) the sideband power. (4)

4. (a) Describe frequency and phase modulation, giving mechanical analogies for each. Using block diagram, explain how can FM be generated using Phase Modulator. (6)

(b) Explain the significance of pre-emphasis and de-emphasis circuits in Frequency modulation. (5)

(c) Determine the peak frequency deviation and modulation index for an FM signal with a frequency sensitivity of 5 kHz/V, and a modulating signal $V_m(t) = 2 \cos(2\pi\ 2000t)$. (4)

5. (a) State and prove the Sampling theorem. Using diagrams only, illustrate the difference between instantaneous, natural, and flat top sampling. (6)

(b) What do you understand by Time Division Multiplexing? Explain cross talk in a PAM-TDM system. (5)

P.T.O.

(c) For a PAM transmission of voice signal having maximum frequency, $f_m = 3100$ Hz, calculate the transmission bandwidth if sampling frequency, fs = 8 KHz and pulse width, $\tau = 0.1T_s$. (4)

6. (a) 'A sampled signal cannot be called a digital signal' Justify. What additional processes are required for converting it into a PCM signal? Give the necessary block diagram. What is the difference between uniform and non-uniform quantization in PCM systems. (6)

(b) What is companding? Give the formulae and the graph of the A-Law and μ-Law. (5)

(c) Encode the data stream' 11010010 into RZ, BRZ, NRZ and split phase Manchester code. (4)

7. (a) Give the block diagram of digital transmission and reception system. (6)

(b) For an FSK system explain the relation between
   (i) Bits per second, baud and bandwidth.
   (ii) Mark and space frequencies.
   Also find the relation for peak frequency deviation. (5)

(c) For a BPSK modulator with the carrier frequency of 70 MHz and an input bit rate of 10 Mbps. Determine the maximum and minimum upper and lower side frequencies. (4)

(800)