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Total Number of Pages: 02

B.Tech
PCEE4304

6th Semester Regular / Back Examination 2016-17

COMMUNICATION ENGINEERING

BRANCH(S): CSE, IT, ITE

Time: 3 Hours

Max Marks: 70

Q.CODE: Z870

**Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.**

Q1 Answer the following questions: (2 x 10)

- a) Define bit rate and baud rate.
- b) Calculate the modulation index if a 10 V carrier is amplitude modulated by three different signals having amplitudes 1 V, 2V and 3V respectively.
- c) How many minimum number of samples are required to exactly describe the signal $x(t) = 10 \cos(6\pi t) + 4\sin(8\pi t)$?
- d) In a PCM system the code-word length is increased from 6 to 8 bits. What is the improvement in signal to noise ratio?
- e) What is the use of pilot carrier in SSB modulation?
- f) Distinguish between low level and high level modulation.
- g) Four independent messages have bandwidths of 50Hz, 100 Hz, 150 Hz and 200 Hz respectively. Each is sampled at Nyquist rate. All the samples are time division multiplexed and transmitted. What is the transmission rate in Hz.
- h) Draw the signal waveform for the bit stream [10110011] using NRZ and RZ coding technique.
- i) What do you mean by frequency selective fading in a communication channel?
- j) What do you mean by image frequency in a receiver and how it is rejected?

Q2 a) A cascaded amplifier has two stages. The first stage has a gain of 12 dB and noise figure of 2 dB. The second stage has again of 20 dB and a noise figure of 5 dB. Calculate the noise figure of the cascaded amplifier and the equivalent noise temperature. (5)

b) State and prove Parseval's Theorem. What is its physical significance? (5)

- Q3 a)** A carrier of 1 MHz with 400 W of its power is amplitude modulated with a sinusoidal signal of 2500Hz. The depth of modulation is 75%. Calculate the sideband frequencies, the bandwidth, the power in sidebands and the total power in the modulated wave. **(5)**
- b)** Explain the principle and operation of envelop detector used for AM detection. Mention its advantages and disadvantages. **(5)**
- Q4 a)** Explain with block diagram the indirect method of FM generation. **(5)**
- b)** What is threshold effect in FM? Describe a method for threshold improvement in FM discriminator. **(5)**
- Q5 a)** What is Vestigial sideband modulation? What are its advantages over DSB and SSB modulation? Mention its applications? **(5)**
- b)** Describe in brief the working of Super-heterodyne receiver. **(5)**
- Q6 a)** What do you mean by companding? What are the advantages of companded PCM over linear PCM for voice communication? **(5)**
- b)** A voice signal bandlimited to 5KHz is transmitted using Delta modulation system. The pulse repetition frequency is 50,000 pulses per second. The step size is 40 mV. Determine the maximum permissible voice signal amplitude to avoid slope overload error. **(5)**
- Q7** A signal has a bandwidth of 4.5 MHz .The signal is sampled, quantized and binary coded to obtain a PCM signal. **(10)**
- i) Determine the sampling rate, if the signal is to be sampled at a rate 20% higher than Nyquist rate.
 - ii) If the samples are quantized into 1024 levels, determine the number of binary pulses required to encode each signal.
 - iii) Determine the binary pulse rate (bits/sec) of the binary coded signal and the minimum bandwidth required to transmit this signal.
- Q8 Write short answer on any TWO:** **(5 x 2)**
- a) Delta modulation
 - b) Eye pattern
 - c) Phase locked loop
 - d) Noise performance in FM