Paper Code: EC-502

Roll No. | | | | | | | | | | |

B.Tech.
(SEM V) ODD SEMESTER THEORY EXAMINATION, 2015-16

Principle of Communications

Time: 3 Hours *Maximum Marks:100*

Note: *Attempt all questions. Each Question carries equal Marks.*

Q.1 Attempt any four question 5x4=20

(a) With Define Modulation and give its need in communication systems
(b) Derive the expression when a single tone modulating signal modulates a sinusoidal carrier for AM-SC,SSB-SC and AM.

(c) An Amplitude modulated amplifier has a radio frequency output of 50W at 100 % modulation. Theinternal loss in the modulator is 10W:
  (i) What is the un-modulated carrier power?
  (ii) What power output is required from the modulator?
  (iii) If the percentage modulation is reduced to 75% how much output is needed from the modulator.

(d) Show that the figure of merit ϒ for an AM system using synchronous detection is identical to the envelop detection.
(e) Discuss and derive the noise present in Amplitude Modulated systems.
(f) How can you measure modulation index in CRO? What is over modulation and how it can be detected?

Q.2 Attemptany four Questions: 5x4=20

(a) With the help of diagram explain the working of either balanced slope detector or Foster seeley Discriminator.
(b) With the help of suitable diagram Discuss FM Modulation using Varactor diode
(c) A Semiconductor junction diode is used to modulate the frequency of an oscillator. The junction capacitance is the total tuning capacitance of the oscillator tank circuit. When a d.c. bias voltage of 15 V is applied to the diode, the oscillator frequency generated is 5 MHz. If a single tone modulating voltage 4sin 1240t modulates the carrier calculate the percentage second harmonic distortion and the frequency modulation index.
(d) Discuss Noise in angle Modulated systems.
(e) Explain the following terms :
  Capture effect
  Threshold effect in FM
(f) Justify the statement that, "A differentiator circuit behaves like an FM slope detection".

Q.3 Attemptany two question: 10x2=20

(a) Why flat-top sampling is preferred over natural sampling? What is the role of holding circuit in pulse modulation system?

(b) Deduce the expression for the transmission bandwidth and quantization noise in PCM?
24 telephone channels, each bandwidth limited to 3.4 kHz, are to be time division multiplexed by using PCM. Calculate the bandwidth of the PCM system for 128 quantization levels and an 8 kHz sampling frequency.

(c) Draw the waveform and calculate the power spectral densities of transmitted data using following format.
   (i) Unipolar NRZ
   (ii) Polar RZ
   (iii) Split phase Manchester format
   (iv) Bipolar NRZ

Q.4 Attempt any two questions 10x2=20

(a) Explain Delta modulation in detail with suitable diagram and narrate its limitations. Discuss the working od ADM system.

(b) Derive Output Signal to Quantization Noise Ratio S/N_q in delta Modulation.Discuss the effects of Noise in Amplitude Modulation systems.

(c) The first stage of two stage RF amplifier has an output resistance of 20 kΩ and a voltage gain of 10.Tha input resistance and the noise resistance is 500Ω and 2kΩ, respectively.The second stage has an output resistance of 500 kΩ,a voltage gain of 20,an input resistance of 80kΩ and noise resistance of 10 kΩ.Compute equivalent noise resistance of the two stage amplifier and its noise figure. The amplifier is driven by a generator whose output impedance is 40Ω.

Q.5 Attempt any two questions: 5*4=20

(a) Discuss the effect of Noises in BaseBand system and DSB-SC AM. Discuss. Determine the transmission loss for a 10 Km and a 20 Km coaxial cable ,if the loss per Km is 2 dB at the frequency operation.

(b) How PLL is useful in FM demodulation?What do you understand by Noise Triangle?

(c) What do you understand by Pre-emphasis and De-emphasis filtering? Explain? Design an FM system that achieves an SNR at the receiver equal 40 dB and requires the minimum amount of transmitter power. The bandwidth of the channel is 120 kHz; the message bandwidth is 10kHz; the average to peak power ratio for the message is ½ and the one sided noise power spectral density is $N_0 = 10^{-8}$ W/Hz .What is the required transmitter power if the signal is attenuated by 40 dB in transmission through the channel?