Registration No :

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B.Tech
PEE7J004

7th Semester Regular / Back Examination 2019-20
COMMUNICATION ENGINEERING
BRANCH : ELECTRICAL
Max Marks : 100
Time : 3 Hours
Q.CODE : HRB111
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) What is the role of channel encoder and decoder in a digital communication system?

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 numbers of samples are required to exactly describe the signal $x(t) = 10\cos(6\pi t) + 4\sin(8\pi t)$?

d) If the modulation index of a frequency modulated signal is doubled, what would happen to the bandwidth of the signal?

e) What is the difference between flat-top sampling and natural sampling? Which one is preferred?

f) What is slope overload problem in delta modulation?

g) What is the difference between crosstalk and inter-symbol interference?

h) Why the performance of an FM radio station is better than an AM station, if radiating the same total power?

i) What is the difference between convolution and correlation?

j) A 10 KW carrier is sinosodially modulated by two carriers corresponding to a modulation index of 30% and 40% respectively. Find the total radiated power

Part- II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

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.

b) Explain the adaptive delta modulation technique? How does the adaptive modulation help in overcoming the problem in delta modulation technique?

c) Draw and explain in brief the Super Heterodyne Receiver.

d) Derive the output signal to quantization noise ratio of a pulse code modulated signal.

e) 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.

f) What is auto-correlation? Show that power spectral density and the correlation function of a periodic waveform is a Fourier transform pair.

g) In a binary PCM system, the output signal-to-quantizing-noise ratio is to be held to a minimum value of 40 dB. Determine the number of required levels and find the corresponding output signal to quantizing noise ratio.

h) An AM signal is generated by modulating the carrier fc = 600KHz by the signal m(t) = sin 2000πt + 5cos 4000πt. The amplitude modulated signal is s(t) = 100[1+m(t)]cos2πfct is fed to a 50 Ω load.
   i) Find the average power in the carrier and in the sidebands.
   ii) What is the modulation index?

i) Explain with block diagram the indirect method of FM generation.

j) Mention the different sources of noise in a communication system. What is the significance of White Gaussian noise in communication system?

k) Explain the principle and operation of envelop detector used for AM detection. Mention its advantages and disadvantages.

l) Find the Fourier transform of a double-sided exponential signal $e^{-B|t|}$ and draw the spectrum.

Part-III
Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A signal m(t), band limited to 3 KHz is sampled at a rate of 33.3334 % higher than Nyquist rate. The maximum acceptable error in the sample amplitude is 0.5% of the peak amplitude. The quantized samples are binary coded. Find the minimum bandwidth of a channel required to transmit the encoded binary signal. **(16)**

If 24 such signals are time division multiplexed, find the minimum transmission bandwidth required to transmit multiplexed signals.

Q4 Describe needs of modulation and discuss the elements of a communication system. **(16)**

Q5 Derive the spectrum for sinusoidally modulated AM wave and also derive the expression for the total average power. **(16)**

Q6 Discuss the principle of adaptive delta modulation with the help of neat block diagram. Compare delta modulation with adaptive delta modulation. **(16)**