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## 6th Semester Regular / Back Examination 2015-16
## COMMUNICATION ENGINEERING
### BRANCH: EEE
**Time: 3 Hours**
**Max Marks: 70**
**Q.CODE: W192**

### 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) Is the following signal energy – type or power – type?

$$X(n) = \sin(\frac{\pi}{6} n)$$

b) What is Shannon's Theorem of channel capacity?

c) A carrier is amplitude modulated by two sine waves of different frequency up to 40% and 30%. Find the overall modulation index of the resulting modulated signal.

d) What is Inter Symbol Interference in a communication channel?

e) A 10 MHz carrier is frequency modulated by a sinusoidal signal so that the frequency deviation is 50 KHz. Calculate the modulation index and bandwidth if the message signal frequency is 500KHz.

f) Why does the FM radio station perform better than AM station, even though they radiate at same total power.

g) What is slope overload error in Delta Modulation system?

h) Calculate the bandwidth of PCM system, having 128 quantization levels and sampling frequency as 20 KHz.

i) What is Line code? Mention two examples.

j) A cascaded amplifier having three identical stages; each of the stage has gain of 5 and a noise figure of 6. Determine the overall Noise Figure of the amplifier.

**Q2** a) What is auto-correlation? Show that power spectral density and the correlation function of a periodic waveform are a fourier transform pair. **(5)**

b) Prove the Convolution property of the Fourier Transform. **(5)**

**Q3** a) Draw and explain a diode demodulator circuit and find an expression for optimum value of the time constant. **(5)**

b) An AM signal is generated by modulating the carrier $f_c$ = 600KHz by the signal $m(t) = \sin 2000\pi t + 5\cos 4000\pi t$. The amplitude modulated signal is $s(t) = 100[1+m(t)]\cos 2\pi f_c t$ is fed to a 50 Ω load. **(5)**

i) Find the average power in the carrier and in the sidebands.

ii) What is the modulation index?

**Q4** Explain with suitable diagram Super-Heterodyne Receiver and mention its advantages over Tuned Radio Frequency Receiver. Why is it called super-heterodyne? Why is the Local Oscillator frequency is kept higher? **(10)**

**Q5** a) What is Vestigial Sideband Modulation and how it is used in television transmission system? **(5)**

b) Discuss with the help of diagram generation of DSB-SC AM using Ring modulator method. **(5)**

**Q6** a) What is Quantization error? Prove that the mean-square quantization error of a quantized signal is $S^2/12$ where S is the step size and error is within $\pm S/2$. **(5)**

b) Explain with suitable diagram Adaptive Delta Modulation. **(5)**

**Q7** a) A band limited signal of frequency 3KHz is transmitted using Delta Modulation system. The pulse repetition rate is 10,000pulses/second and the step size is 20 mV. Determine the maximum permissible amplitude of the band limited signal so that the slope overload can be avoided. **(5)**

b) Compare the performance of binary and S-ary systems. **(5)**

**Q8** Write short notes on any two: **(5 x 2)**
a) Eye pattern
b) Comparison of NBFM and WBFM
c) Phase Locked Loop
d) Flat Top Sampling