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Total Number of Pages: 2

B.Tech
PCEC4302

5th Semester Regular / Back Examination 2016-17
ANALOG COMMUNICATION TECHNIQUES

BRANCH: ECE, ETC

Time: 3 Hours

Max Marks: 70

Q.CODE: Y239

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) Find the spectrum of $g(t) = \cos(2\pi f_c t)$.
- b) Draw the power spectral density and autocorrelation function of White noise.
- c) What is a band pass signal and draw its amplitude spectrum.
- d) What is noise? Differentiate between shot noise and thermal noise.
- e) State and prove the time scaling property of Fourier Transform.
- f) Calculate the Bandwidth of a frequency modulated wave $V_{FM}(t) = 10\cos(2\pi \times 10^8 t + 20\cos 2\pi \times 10^3 t)$.
- g) Write two properties of probability density function.
- h) Calculate the power saving in a DSBSC system with modulated at 80%.
- i) Find out the frequency spectrum of AM wave.
- j) Explain figure of merit.

Q2 a) Explain Amplitude Modulation. (5)

- b) Find out the Fourier Transform of a rectangular pulse of duration T and amplitude A which is given below. Also plot the amplitude spectrum. (5)**

$$\text{rect}(t) = A \quad -T/2 < t < T/2 \\ = 0 \quad |t| > T/2$$

Q3 a) Explain the operation of a super heterodyne AM receiver with neat block diagram representation. (5)

- b) What is narrow band noise and discuss its properties. (5)**

Q4 a) Briefly discuss the phase discrimination method of generating an SSB wave. (5)

- b) An AM wave has a total transmitted power of 5KW when modulated at 90%. What is the power in SSB wave if it is to have the same power as in the two side band. (5)**

Q5 a) An angle modulated signal with carrier frequency $\omega_c = 2\pi \times 10^6$ is described by the equation $S(t) = 10\cos(\omega_c t + 0.1\sin 2000\pi t)$. Find the power of the modulated signal, frequency deviation Δf and also estimate the bandwidth of $S(t)$. **(5)**

b) Derive the expression for power of a modulated AM wave in terms of carrier power. **(5)**

Q6 a) Explain the pulse width modulation. **(5)**

b) Differentiate between pre-emphasis and de-emphasis. **(5)**

Q7 Derive the SNR for an AM receiver using coherent detection with DSBSC modulation and also calculate the figure of merit. **(10)**

Q8 Write short answer on any TWO: (5 x 2)

a) Frequency Division Multiplexing

b) Threshold Effect in AM

c) Pulse Position Modulation

d) NBFM