

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-2008**II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS
ANALOG COMMUNICATIONS
(ELECTRONICS & COMMUNICATION ENGINEERING)****AUG/SEP-2008****MARK-3 HOUR
MARK-80****ANSWER ANY FIVE QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.****MARKS [16*5=80]**

1. (a) Draw the one cycle of AM wave and calculate the modulation index of it in terms of V_{max} and V_{min} voltages.

(b) A modulating signal consists of a symmetrical triangular wave having zero dc component and peak to peak voltage of 12V. It is used to amplitude modulate a carrier of peak voltage 10V. Calculate the modulation index and the ratio of the side lengths L_1/L_2 of the corresponding trapezoidal pattern.

(c) The rms antenna current of an AM transmitter is 10 A when un-modulated and 12 A when sinusoidally modulated. Calculate the modulation index.
2. (a) Explain the DSB-SC generation by balanced modulator using diodes.

(b) The modulating signal in an AM-SC system is a multiple-tone signal given by $m(t) = A_1 \cos \omega_1 t + A_2 \cos \omega_2 t + A_3 \cos \omega_3 t$. The signal $m(t)$ modulates a carrier $A_c \cos \omega_c t$. Plot the single-sided spectrum and find the bandwidth of the modulated signal. Assume that $\omega_3 > \omega_2 > \omega_1$ and $A_1 > A_2 > A_3$.
3. (a) Why VSB system is widely used for TV broadcasting - Explain?

(b) An AM transmitter of 1KW power is fully modulated. Calculate the power transmitted if it is transmitted as SSB.

(c) Calculate the filter requirement to convert DSB signal to SSB signal, given that the two side bands are separated by 200HZ. The suppressed carrier is 29 MHz.
4. (a) Give the procedure to determine the effective bandwidth of an FM signal.

(b) Which method of FM signal generation is the preferred choice, when the stability of the carrier frequency is of major concern? Discuss about the method in detail.
5. (a) Find the output SNR in a PM system for tone modulation.

(b) A phase modulation (PM) system, with the modulated wave defined by $S(t) = A_c \cos [2\pi f_c t + k_p m(t)]$ where k_p is a constant and $m(t)$ is the message signal. The additive noise $n(t)$ at the phase detector input is $n(t) = n_I(t) \cos(2\pi f_c t) - n_Q(t) \sin 2\pi f_c t$ Assuming that the carrier-to-noise ratio at the detector input is high compared with unity, determine i. the output signal-to-noise ratio and ii. the figure of merit of the system.
6. (a) Classify radio transmitters in detail.
(b) Compare low level modulation and high level modulation of radio transmitters.
7. (a) Describe the circuit of an FET amplitude limiter, and with the aid of the transfer characteristic explain the operation of the circuit.
(b) What can be done to improve the overall limiting performance of an FM receiver? Explain the operation of the double limiter and also AGC in addition to a limiter.
8. (a) What is the fundamental difference between pulse modulation, on the one hand, and frequency and amplitude modulation on the other?
(b) What is pulse width modulation? What other names does it have? How is it demodulated?