

B.Tech II Year - II Semester Examinations, April/May-2012
COMMUNICATION THEORY
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 80

Answer any five questions
All questions carry equal marks

- - -

- 1.a) What is modulation? Explain the need for modulation.
- b) For a modulating signal $\cos 800t$, determine the frequency components of AM-DSB, DSB-SC and SSB-SC signals when the carrier is $200 \cos 4000t$. Determine the power in the sideband and carrier in each case. [16]
- 2.a) Define modulation index of the AM system. Compare the merits and demerits of AM and FM systems.
- b) A commercial AM station is broadcasting with an average transmitted power of 10 kW. The modulation index is set at 0.707 for a sinusoidal message signal. Find the transmission power efficiency and the average power in the carrier component of the transmitted signal. [16]
- 3.a) Give the block diagram of SSB generation using phase shift method and explain.
- b) Explain what is meant by vestigial sideband transmission. What are its special characteristics and how can these be achieved in practice? Discuss the specific examples where VSB is used. [16]
- 4.a) What is meant by the following term in connection with frequency modulation
 - i) modulation index
 - ii) frequency deviation, and
 - iii) practical bandwidth.
- b) A carrier $A_c \cos \omega_c t$ is frequency modulated by a signal $A_m \cos \omega_m t$. The modulation index is m_f . Derive the expression for the modulated signal. Expand this expression to show the spectrum of the signal. [16]
- 5.a) Derive the relationship between phase and frequency modulation.
- b) Compare narrowband FM with AM.
- c) Draw the phasor diagram for FM signal and explain. [16]
- 6.a) Explain a method for generating FM signal using a FET reactance modulator.
- b) Determine the value of the capacitance reactance obtainable from a reactance modulator FET having g_m of 8 mA/V. The gate to source resistance is one-seventh of the reactance of the gate to drain. The frequency of operation is 5 MHz. [16]
- 7.a) Explain the operation of ratio detector with the help of a neat diagram.
- b) Compare DSB-SC and SSB-SC with respect to signal-to-noise ratio (SNR). [16]
- 8.a) Explain threshold effects in angle modulated system.
- b) Derive the output SNR for an SSB system using Coherent demodulation. [16]

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