

**IV B.Tech I Semester Supplementary Examinations,
November/December 2005
COMMUNICATION THEORY
(Electronics & Communicaton Engineering)**

Time: 3 hours**Max Marks: 80**

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Draw the circuit diagram of balanced modulator & explain its operation. [8]
 (b) A multitone modulating signal $f(t)$ consisting of three frequency components given by $f(t) = V_1 \cos W_1 t + V_2 \cos W_2 t + V_3 \cos W_3 t$ where $W_3 > W_2 > W_1$ & $V_1 > V_2 > V_3$.
 The signal $f(t)$ modulates a carrier $V_C(t) = V_C \cos W_C t$.
 i. Derive the expression for AM wave.
 ii. Draw a single side spectrum & find the bandwidth of AM Wave.
 iii. Total modulated power. [3+3+2]
2. (a) Draw the circuit diagram of ring modulator & explain its operation.
 (b) Prove that $m_t = \sqrt{m_1^2 + m_2^2 + \dots + m_n^2}$. [8+8]
3. (a) Explain the effect of frequency & phase errors in synchronous detection of DSB-SC wave.
 (b) A carrier wave of frequency 20KHz is amplitude modulated by a modulating signal $f(t) = \cos 2\pi \times 10^3 t + \cos 4\pi \times 10^3 t$. Find the expression for the corresponding SSB-SC-AM signal. [8+8]
4. (a) Compare VSB & SSB waves.
 (b) Derive the expression for FM wave & PM wave if modulating signal is $A_m \sin W_m t$ & carrier is $A_c \cos W_c t$. [6+10]
5. (a) Draw the block diagram of NBPM system & explain its operation.
 (b) Draw the circuit diagram of Reactance modulator and explain its operation. [8+8]
6. An angle modulated wave is described by an equation
 $\phi(t) = 10 \cos (2 \times 10^6 \pi t + 10 \cos 2000 \pi t)$
 Find
 (a) The power of modulated signal
 (b) Maximum frequency deviation
 (c) Maximum phase deviation
 (d) The bandwidth of the signal. [4×4]
7. (a) Derive the equation for noise figure for AM wave for small & large noise case.

(b) Compare DSB-SC, SSB-SC & AM wave noise performance. [8+8]

8. Write short notes on:

(a) Pre-emphasis & de-emphasis

(b) Envelope detector. [8+8]

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