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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Test 2 EXAMINATION-2016

BTech IV Semester

COURSE CODE 10B11EC413
COURSE NAME Analogue Communication
COURSE CREDIT 4

Max. Time. 1 Hr 30 Min

Max Marks 25

1.

$$\omega(t) = 2\pi + 2\sin(2\pi t)$$

and the transmitted signal is

$$A \cos[\theta(t)]$$

where

$$\theta(t) = \int \omega(t) dt$$

find the expression proportional to $m(t)$ if the signal is a (a) FM signal (b) PM signal (3 Marks)

2. Draw a block diagram of a FM modulator using a phase modulator. Write all the pertinent equations at every arrow of the block diagram. (3 Marks)
3. A AM DSB signal with carrier is fed into a system shown in Figure 1. Obtain the values of $a(t)$, $b(t)$, $c(t)$, and $d(t)$. The carrier amplitude $A \gg m(t)$ (7 Marks)

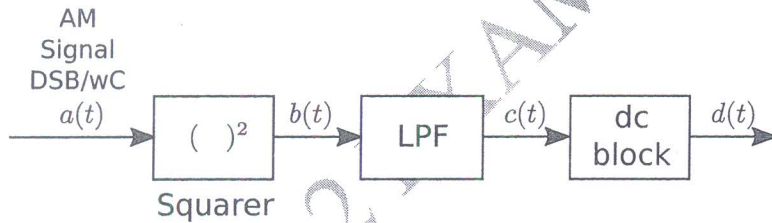


Figure 1: Figure for Problem 3

4. If the Hilbert transform of a signal, $m(t)$ is $m_h(t)$, then show that the Hilbert transform of $m_h(t)$ is $-m(t)$. Show that the energies of $m(t)$ and $m_h(t)$ are equal. Also show that

$$\int_{-\infty}^{\infty} m(t)m_h(t)dt = 0 \quad (5 \text{ Marks})$$

5. An FM signal is

$$s(t) = A \cos[\omega_c t + 0.1 \sin(2000\pi t)]$$

Find (a) The power of the modulated signal, (b) The frequency deviation Δf (c) The phase deviation $\Delta\phi$, and (d) Estimate the bandwidth of the signal. (4 Marks)

6. For a VCO with characteristic given by

$$f = 10^4 + 2 \times 10^3 v_{in} \quad (\text{Hz})$$

where v_{in} is in volts. Find the expression for the instantaneous frequency in the range $-5 \leq t \leq 5$ for

$$m(t) = \begin{cases} 0 & t < 0 \\ 1 & 0 \leq t \leq 1 \\ 0 & t > 1 \end{cases}$$

where $m(t)$ is in volts and t is in seconds. (3 Marks)

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