BMS College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January 2018 Semester End Make Up Examinations

Course: Communication Theory-1
Course Code: 16EC5DCCT1

Duration: 3 hrs
Max Marks: 100
Date: 08.01.2018

Instructions: Answer five full questions choosing one from each unit

UNIT 1

1 a With illustration discuss the various properties of PDF.   10

   b A tuned RLC circuit resonates at 100MHz by a capacitor of 20pF.The Q factor of   10
      the circuit is 40 and the temperature is 17 degree with bandwidth 10 KHz ,calculate
      the effective noise voltage.

UNIT 2

2 a Discuss and Analyze the working principle of diode square law modulator for   10
      generating AM signal. Write down the relevant equations, waveforms and
      spectrum for modulated, carrier and sideband components.

   b A Carrier of 5v rms with frequency of 1MHz and modulating signal of 2v rms   10
      with frequency of 1 KHz are applied to a circuit whose characteristics is
      $I=5+V+0.05V^2$.Compute the modulation index and frequencies of total output**.**

OR

3 a Analyze a diode detector for demodulating a modulated signal with carrier and two   10
      side bands and design it for a carrier frequency of 100 KHz and message frequency
      of 4 KHz and |m(t)| « Amplitude of the carrier

   b Analyze the working of a diode circuit for generating a modulated wave with only   10
      two sidebands. Draw the spectrum and provide design specification of band pass
      filter to extract desired wave.

UNIT 3

4 a Suggest a suitable amplitude modulation technique to transmit a message signal   10
      which contains significant components at extremely low frequencies such as
      television signals and provide specification of filter transfer function H(f) of a
      sideband shaping filter to extract the desired modulated wave considering coherent
      detector output.

   b Consider a two stage SSB modulator with message 0.3KHz to 3.4KHz and the two   10
      carrier frequencies are f_{c_1} =50KHz and f_{c_2} =450KHz.Evaluate the following a)
      Spectrum of the signal at two stage b) filter specifications.

UNIT 4

5   a An angle modulated signal is described by $S(t)=5\cos[2\pi(10^6)t+3\sin(2000)\pi t]$.   10
Find the following (i) power in the modulated signal (ii) frequency deviation(iii) Phase deviation (iv)approximate transmission bandwidth.

     b By deriving the necessary expression, show that a narrow band angle modulated   10
signal and an AM signal have similar forms. Draw the phasor diagrams for both the cases.

OR

6   a Analyze the working of PLL as an FM demodulator with relevant block diagram and   10
expressions.

     b Show that the bandwidth of WBFM is infinity and specify the amplitude of carrier   10
and sidebands.

UNIT 5

7   a State and prove sampling theorem for low pass signals. Define aliasing effect with   10
the measures undertaken to prevent it.

     b   Given signal $x(t)=10\cos(2000\ \pi t)\cos(10000\ \pi t)$ is sampled at its Nyquist rate,   10
i.)Draw the spectrum of signal and its sampled version. ii.) State and comment on
the frequency   components that appear at the output of a reconstruction filter

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