(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2492 **Roll No.** | | | | | | | | | | |

B.Tech.

(SEM. VI) EVEN THEORY EXAMINATION 2012-13

ANALOG AND DIGITAL COMMUNICATION

Time : 3 Hours *Total Marks : 100*

Note :– (1) Attempt **all** questions.

(2) Assume the missing data if any.

(3) Marks are indicated at the end of each question.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) For the baseband signal m(t) = 2 cos 1000t + cos 2000t ; Sketch the spectrum of m(t).

(b) Evaluate the Fourier transform of the following time function : $s(t) = e^{-at} U(t)$.

(c) State and prove central limit theorem.

(d) Explain why it is not possible for a signal that is strictly limited to a band of frequencies to be simultaneously limited to a finite time duration and vice-versa.

(e) The spectral range of a bandpass signal extends from 10.0 MHz to 10.04 MHz. Find the minimum sampling rate.

(f) Calculate the capacity of a Gaussian channel with a bandwidth of 1 MHz and S/N ratio of 20 dB.

2. Attempt any **two** parts of the following : **(10×2=20)**

(a) Find the Fourier transform of signal *f (t)* when :

(i) $f(t) = 1 \ for \ |t| \le t_0$
$= 0 \ for \ |t| > t_0$

(ii) $f(t) = \delta(t)$, a unit impulse function.

(b) The signal $v(t) = (1 + m \cos w_m t) \cos w_c t$ is detected using a diode envelop detector. Sketch the detector output when m = 2.

(c) Discuss the role of Equalizer. Also explain the role of normalized equalization.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) The function given below represents which type of signal ?

$f(t) = \cos(w_c t) + 0.3 \cos(2\pi f_m t) \sin(2\pi f_m t)$

Sketch its phasor diagram at t = 0.

(b) Differentiate between the Delta Modulation technique and Adaptive Delta Modulation technique. Explain the importance of Companding technique.

(c) Define the following : Quantizing process, Quantization error and Noise Figure.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) Show that the Noise figure of a two-stage cascade network is $F_{12} = F_1 + \frac{F_2 - 1}{G_1}$ where symbols have their usual meaning.

(b) Draw the block diagram of an SSB-SC transmitter employing sideband suppression filter and explain.

(c) An AM amplifier provides an output of 106 W at 100 % modulation. The internal loss is 20 W :

(i) What is un-modulated carrier power ?

(ii) What is the side band power ?

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) Define and describe pulse position modulation, and explain with waveforms how it is derived from PWM.

(b) Define multiplexing. Explain with a block diagram the process of FDM.

(c) Write down the modulation waveform for transmitting binary information over base band channels, for the following modulation schemes : ASK, PSK, FSK and DPSK.