Registration No. :

Total number of printed pages – 3

B. Tech

PCEE 4304 (New)

Sixth Semester (Back) Examination – 2013
COMMUNICATION ENGINEERING
BRANCH : ELECTRICAL

QUESTION CODE : B232

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 ×10

    (a) Is it possible to find fourier series for a non-periodic signal ? Defend your answer.

    (b) What are energy and power signals ? Is ramp signal an energy or power signal ? Justify.

    (c) What is the maximum frequency deviation allowed for FM radio communication and why ?

    (d) What is aliasing effect with respect to Nyquist criteria of sampling ? How do you remove aliasing effect ?

    (e) Differentiate between PAM, PWM and PPM.

    (f) What do you understand by signal formatting ? What are the major components associated with formatting ?

    (g) What is the need for modulation and how do you define modulation ?

    (h) Why FM is preferred over AM in analog communication ?

    (i) What is delta modulation ? Mention its limitations.

    (j) In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by what factor ?
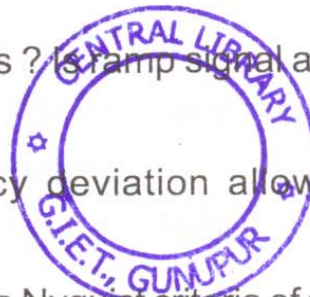
P.T.O.

2. (a) Find the fourier transform of the given signal. 5

$$x(t) = \begin{cases} 5 & ; & -2 \le t \le 2 \\ 0 & ; & \text{otherwise} \end{cases}$$

(b) If $x_1(t)$ and $x_2(t)$ are periodic signals with period T_1 and T_2 respectively under what conditions, the sum of these two signals be periodic and what will be the period ? 5

3. (a) The fourier transform of input and output of a linear time invariant system are $e^{-j\pi\omega}$ and $\dfrac{e^{-j2\pi\omega}}{1+j\omega}$ respectively. What is its impulse response ? 5

(b) Draw block schematic representation of electrical communication system and explain the functions of each block. 5

4. (a) What do you understand by coherent detection of AM signal? What will be the output of a non coherent detector, if input to the same is an SSB-SC signal ? 5

(b) Derive the expression of AM signal, its modulation index and its power associated with sidebands and carrier. Also, express the total power in terms of modulation index and carrier power. 5

5. (a) What do you mean by vestigial sideband (VSB) modulation ? Draw the complete band diagram for VSB transmission. Why video is amplitude modulated and sound is frequency modulated ? Is it not possible to use same modulation for both audio and video ? 5

(b) An FM modulator has a frequency sensitivity constant of 4.8π, modulating frequency $f_m = 6KHz$ and a carrier of 500KHz with 5V amplitude. Determine the bandwidth required for the transmitter using Carson's rule. Also find out β and maximum frequency deviation. 5

6. (a) Derive the expression for signal to noise ratio of PCM system. 5

(b) A certain eight bit uniform quantization PCM system can accommodate a signal ranging from −1V to +1V. The rms value of the signal is 0.5V. Evaluate the signal to quantization noise ratio and express it in decibels. 5

7. (a) What are line codes ? Describe the different types of line codes . 5

(b) What is Companding ? Why is it used ? Explain different types of companding techniques used in digital modulation techniques. 5

8. Write short notes on any two of the following : 5×2

(a) Super Heterodyne receiver for AM

(b) Armstrong Detector for FM signal

(c) DPCM

(d) TDM of PCM signal

———————