B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00704   **Term-End Examination**

June, 2017

BIEL-014 : ANALOG COMMUNICATION

Time : 3 hours　　　　　　　　*Maximum Marks : 70*

Note : *Answer* **five** *questions in all. Missing data, if any, may be suitably assumed. Use of scientific calculator is permitted.*

1. For a continuous random variable X, the density function is shown in Figure 1. Find :　　14

    (a)　k

    (b)　$P(-10 \le X \le 10)$

    (c)　$P(X \ge 10)$

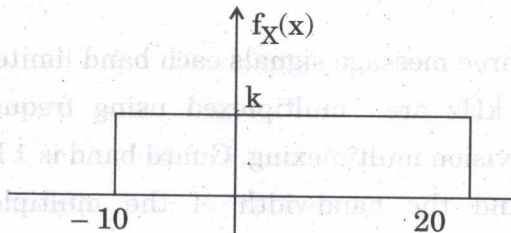   (d)　Plot distribution function $F_X(x)$

Figure 1

2. Explain the phase discriminator method used for generation of SSB-SC signal. Support your answer with neatly labelled circuit and waveforms. Also include mathematical expressions. *14*

3. (a) Draw and explain the block diagram of AM superheterodyne receiver. 7

   (b) Discuss Pre-emphasis and De-emphasis circuits with suitable diagrams. 7

4. (a) Describe the indirect method used for generating FM signal with the support of mathematical expression. 7

   (b) An FM signal is given by

   $$S(t) = 10 \cos (2\pi \times 10^6 t + 8 \sin 4\pi \times 10^3 t).$$

   Find : 7

   (i) Maximum possible frequency deviation Δf

   (ii) Bandwidth and power of the FM signal

5. (a) Three message signals each band limited to 5 kHz are multiplexed using frequency division multiplexing. Guard band is 1 kHz. Find the bandwidth of the multiplexed signal, if modulation schemes used are AM, DSB and SSB respectively. 5

(b) For the square law modulator shown in Figure 2, square law device is characterised by $V_o = V_i + 0.1\ V_i^2$. Passband of BPF extends from 800 Hz to 1200 Hz. Find the power and bandwidth of the resulting AM signal.   7
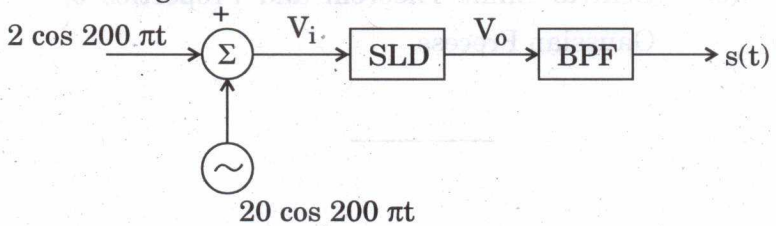

Figure 2

(c) Define Thermal noise.   2

6. (a) Define the concept of under, critical and over modulation in AM.   7

(b) Explain the following characteristics of a radio receiver :   7

(i) Selectivity

(ii) Sensitivity

(iii) Fidelity

(iv) Noise temperature and equivalent noise temperature

7. (a) Draw and explain FM-stereo multiplexing.   7

(b) Discuss the concept of Costas loop.   7

8. Write short notes on any ***two*** of the following : $2\times7=14$

    (a)   Envelope Detector

    (b)   Noise in a DSB Receiver

    (c)   Central Limit Theorem and Properties of Gaussian Process

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