No. of Printed Pages : 3

BIEL-014

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

Term-End Examination

00646

June, 2016

BIEL-014 : ANALOG COMMUNICATION

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **five** questions. All questions carry equal marks. Missing data, if any, may be suitably assumed. Use of scientific calculator is permitted.*

1. A random variable has an exponential probability distribution function (pdf) given by $f(x) = ae^{-b|x|}$, where a and b are constants. Find
   (a) the relationship between 'a' and 'b',
   (b) the distribution function of 'x'. *7+7=14*

2. Explain the method used for generation of Double Side Band-Supressed Carrier (DSB-SC) signal-chopper type switching modulator. Support your answer with neatly labelled circuit and waveforms. Also, include mathematical expressions. *14*

3. Prove that if every frequency component of a signal f(t) is shifted by $\left(-\frac{\pi}{2}\right)$, then the resultant signal, $f_h(t)$ is the Hilbert Transform of f(t). Also list the important properties of Hilbert Transform. *10+4=14*

4. Explain the filter method and phase discrimination method for generation of Vestigial Side Band-Suppressed Carrier (VSB-SC) signal. *7+7=14*

5. Differentiate between Narrow band and Wide band Frequency Modulation. Explain the indirect method of FM generation (Armstrong method). *4+10=14*

6. Explain how Phase-Locked Loop can be used as an FM Demodulator. *14*

7. Define the term noise. What are the various sources of noise ? Prove that the noise figure and equivalent noise temperature of a cascaded amplifier is given by

$$F = F_1 + \frac{F_2 - 1}{G_{a_1}} + \ldots + \frac{F_n}{G_{a_1} G_{a_2} \ldots G_{a(n-1)}}$$

$$T_e = T_{e_1} + \frac{T_{e_2}}{G_{a_1}} + \ldots + \frac{T_{e_n}}{G_{a_1} G_{a_2} \ldots G_{a(n-1)}}. \quad \textit{2+4+8=14}$$

8. Write short notes on any ***two*** of the following : *2×7=14*

(a) Noise in SSB receiver

(b) Frequency Division Multiplexing

(c) Pre-emphasis and De-emphasis