USN | | | | | | | | | | |

06EC53

Fifth Semester B.E. Degree Examination, June/July 2014
Analog Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Give the mathematical equations and plots for distribution function and probability density function for a uniformly distributed random-variable X, over the interval (a, b). **(08 Marks)**

b. List the properties of a Gaussian process. **(08 Marks)**

c. Define mathematically mean and auto correlation function. **(04 Marks)**

2 a. Discuss the standard-AM using its frequency domain description. **(08 Marks)**

b. Explain the generation of DSBSC-modulated wave using ring-modulator. **(08 Marks)**

c. Prove that for the standard-AM, the ratio of sideband-power to the total power in the AM-wave is $\frac{\mu^2}{2+\mu^2}$. **(04 Marks)**

3 a. Define Hilbert-transform, and write the properties of Hilbert-transform. **(08 Marks)**

b. Derive the expression for SSB-modulated wave Su(t), using its time domain description. **(08 Marks)**

c. In brief explain demodulation of SSB-modulated wave. **(04 Marks)**

4 a. Explain the generation of VSB-modulated wave using its frequency domain description. **(08 Marks)**

b. Compare different AM-techniques. **(08 Marks)**

c. Draw the block-diagram of super heterodyne receiver. **(04 Marks)**

PART – B

5 a. Explain the generation of FM-wave using direct-method. **(10 Marks)**

b. Design an FM-transmitter based on indirect method to transmit audio signals containing frequencies 100Hz to 15kHz. The NBPM is supplied with a carrier frequency of $f_1 = 0.1$ MHz and mixer with frequency of $f_2 = 9.5$MHz by an individual crystal controlled oscillator. The desired FM-signal at the transmitter output is to have $f_c = 100$MHz and a minimum frequency deviation $\Delta f = 75$kHz. **(10 Marks)**

6 a. Explain detection of FM-wave using linear model of the PLL. **(10 Marks)**

b. Discuss the nonlinear effects in FM-systems. **(10 Marks)**

7 a. Define the following terms: i) Noise ; ii) Noise-figure; iii) Noise-equivalent temperature; iv) Thermal-noise; v) White-noise. **(10 Marks)**

b. Discuss the cascade connection of two-port networks to evaluate over-all noise-figure and equivalent noise temperature. **(10 Marks)**

8 a. Prove that the figure of merit is unity for a DSBSC-receiver. **(10 Marks)**

b. Write short notes on: i) Pre-emphasis; ii) De-emphasis. **(10 Marks)**

* * * * *