Roll No. .....

24234

B. Tech 5th Sem. (ECE)

Examination – December, 2014

COMMUNICATION ENGINEERING

Paper : EE-301-F

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting ***one*** question from each Section. Question No. 1 is ***compulsory.*** All questions carry equal marks.

1. (a) Which is the significance of probability Density function ? 4

   (b) What do you mean by Error function ? 4

   (c) Define mutual information. 4

   (d) Define information rate. 4

   (e) What is the difference between Correlation and Convolution ? 4

SECTION – A

2. (a) Prove that autocorrelation function and power spectral density form a Fourier transform pair. 10

   (b) State and prove the parsevel's theorem for power signals. 10

3. (a) Prove that convolution in the time domain is equivalent to multiplication of their spectra in frequency domain. 10

   (b) Find the inverse Fourier transform of 10

   (i) sgn(w) (ii) U(w)

SECTION – B

4. (a) A Gaussian channel has 1 MHz bandwidth. Calculate the channel capacity if the signal power to noise power ratio is 10^5. Also find the maximum information. 10

   (b) For a fixed power and in the presence of white Gaussian noise, find the upper limit for the channel capacity as bandwidth approaches infinite. http://www.HaryanaPapers.com 10

5. (a) Differentiate between Noisy and Noiseless channel ? 8

   (b) Apply the Shannon - Fano coding procedure for the following message ensemble:

   $[x] = [x_1, x_2, x_3, x_4, x_5, x_6, x_7]$,

   $[P] = [0.4, 0.2, 0.12, 0.08, 0.08, 0.08, 0.04]$

Take M = 2. Calculate entropy of the source and coding efficiency. 12

SECTION – C

6. (a) Define cumulative distribution function. Explain different properties of cumulative distribution function. 10

(b) Define Mutually Exclusive Event. Also explain Venn diagram in detail. 10

7. (a) The probability density function is given as $f_x(X) = ae^{-a|x|}$, where X is a random variable whose, allowable values range from $x = -\infty$ to $x = +\infty$. 15

(i) Find relationship between a and b

(ii) CDF and

(iii) Probability of outcome lies between 1 and 2.

(b) Describe Bayes' theorem for probability. 5

SECTION – D

8. (a) State and explain Central Limit Theorem. 10

(b) Explain the difference between optimum filter and matched filter. Find out the expression for their transfer functions H (f). 10

9. (a) Define Ergodic process. 5

(b) Define strictly stationary random process. 5

(c) Define Wide sense stationary process. 5

(d) Explain the difference between ergodic process and stationary process. 5