

B.Tech Sem – IV(2007 Course) (Electronics) / (E & TC Engg.) :
WINTER - 2018
SUBJECT : SIGNALS AND SYSTEMS

Day : Saturday
Date : 17/11/2018

W-2018-2762

Time : 02.30 PM TO 05.30 PM
Max. Marks : 80

N. B. :

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of remaining attempt **ANY TWO** questions from Section – I and Section – II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in the **SEPARATE** answer books.
- 4) Use of non-programmable calculator is **ALLOWED**.
- 5) Draw neat and labeled diagram **WHEREVER** necessary.
- 6) Assume suitable data if necessary.

SECTION - I

- Q. 1 a)** Compare energy and power signals. **(05)**
- b)** Describe the properties of linear convolution. **(05)**
- c)** Define Fourier transform. Explain convolution property of Fourier Transform. **(04)**
- Q. 2 a)** Draw the waveforms of following functions: **(07)**
- i)** $x_1(t) = u(-t - 2)$ **iii)** $x_3(t) = 2u(t) + u(t - 2)$
- ii)** $x_2(t) = u(t + 3)$ **iv)** $x_4(t) = u(-t) + r(t)$
- b)** State the condition for periodicity of a discrete time signal. Prove that exponential signal $x(t) = e^{-at}$ is a non-periodic signal. **(06)**
- Q. 3 a)** Find Linear convolution of the following sequences using tabulation methods: **(07)**
- $x_1(n) = \{2, 1, 2, 1, 2, 1, 2\}$
- ↑
- $x_2(n) = \{1, 1, 1, 1, 1, 1, 1\}$
- ↑
- b)** Distinguish between: **(06)**
- i)** Linear and Nonlinear systems
- ii)** Time variant and Time invariant systems
- Q. 4 a)** Obtain the Fourier Transform of: **(07)**
- i)** $x(t) = e^{-at} u(t)$ **ii)** $e^{at} u(-t)$
- b)** State and explain any two properties of Laplace transform. **(06)**

P. T. O.

SECTION - II

- Q. 5**
- a) What is aliasing? How to overcome it? (05)
- b) Explain continuous and discrete random variables. (05)
- c) Briefly explain statistical averages mean, standard deviation and variance. (04)
- Q. 6**
- a) Compute auto correlation of (07)
- $x_n = \{2, 3, 4, 2\}$
- ↑
- b) Explain the properties of auto correlation. (06)
- Q. 7**
- a) Define cumulative distribution function of random variable. Explain its properties. (07)
- b) A box contains 5 White, 3 Red and 2 Black Balls. Three balls are drawn in succession. Find the probability that the balls will be of different colours. (06)
- Q. 8**
- a) Describe in detail: (07)
- i) Gaussian probability Model
- ii) Binomial Probability Model
- iii) Poisson's Probability Model
- b) Define and explain the following: (06)
- i) Ergodic process
- ii) Stationary process
- iii) Ensemble averages

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