

**B.Tech Sem – IV(2007 Course) (Electronics) / (E & TC Engg.) :**  
**SUMMER - 2019**

**SUBJECT: SIGNALS & SYSTEMS**

**Day:** Saturday  
**Date:** 01/06/2019

**S-2019-3027**

**Time:** 10.00 AM TO 01.00 PM  
**Max. Marks: 80**

**N.B.**

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of the remaining attempt any **TWO** Questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answer to both the sections should be written in **SAME** Answer book.
- 4) Draw neat and labeled diagram **WHEREVER** necessary.
- 5) Assume suitable data if necessary.

**SECTION-I**

- Q.1**
- a) Explain periodic and non-periodic signals with the help of examples. **(05)**
  - b) Differentiate between time variant and time invariant systems. **(05)**
  - c) State and explain any two properties of Fourier transform. **(04)**
- Q.2**
- a) Draw the waveforms for the following signals **(07)**
    - i)  $x_1(t) = 2 u(t-1)$
    - ii)  $x_2(t) = -2 u(t+2)$
    - iii)  $x_3(t) = u(2-t)$
    - iv)  $x_4(t) = u(-t-2)$
  - b) Draw and explain standard signals. **(06)**
- Q.3**
- a) Compute linear convolution of the following signals. **(07)**  
 $x(n) = \{ 2, 2, 1, 3 \}$ ;  $h(n) = \{ 3, 1, 2 \}$   
 $\uparrow$   $\uparrow$
  - b) State and explain properties of linear convolution. **(06)**
- Q.4**
- a) Determine the Laplace transform and ROC for the signal  $x(t) = e^{-at} u(t)$ . **(07)**
  - b) Obtain the Fourier transforms of the signals **(06)**
    - i)  $e^{-at} u(t)$
    - ii)  $e^{at} u(-t)$

**SECTION-II**

- Q.5**
- a) Define cross correlation of periodic signals and explain its properties. **(05)**
  - b) Explain the properties of probability. **(05)**
  - c) Define the following terms w.r.t. Random variables **(04)**
    - i) Mean value
    - ii) Standard deviation
    - iii) Variance
- Q.6**
- a) Obtain the cross correlations of the following sequences. **(07)**  
 $x_1(n) = \{ 2, 3, 4 \}$  &  $x_2(n) = \{ 1, 2, 3 \}$

**P.T.O.**

**b)** Write the properties of auto correlation and prove that autocorrelation  $R_{xx}(\tau)$  & energy spectral density  $\psi_x(f)$  form Fourier Transform pair. **(06)**

**Q.7 a)** Define probability density function (PDF). Explain its properties. **(07)**

**b)** Distinguish between discrete random variables and continuous random variables. **(06)**

**Q.8 a)** Explain the properties of Gaussian PDF. **(07)**

**b)** Explain the following **(06)**  
i) Stationary process  
ii) Ergodic process  
iii) Gaussian process

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