Code: 15A04303 **R15**

B.Tech II Year I Semester (R15) Regular Examinations November/December 2016

SIGNALS & SYSTEMS

(Common to ECE and EIE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define Unit impulse and Unit Step Signals.
(b) Sketch the following signals: x(t) = r(-t+2).
(c) Write short notes on Dirichlet conditions for Fourier transform.
(d) How the aliasing process is eliminated?
(e) What is meant by impulse response of any system?
(f) What do you mean by distortion less transmission through a system?
(g) If x(n) = a|n|,0 < a < 1, find the DTFT of x(n).
(h) Determine the DTFT of a DT signal.
(i) Determine the Laplace transform of δ(t) and u(t).
(j) Obtain the relationship between DTFT and Z transform.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Write the various operations on signals.
(b) Check whether the following system is static or dynamic and also causal or non-causal system: x(n) =2n.

OR

3 (a) Determine whether the following system are time invariant or not. $y(t) = tx(t)$.
(b) Explain about the properties of continuous time Fourier series.

UNIT – II

4 (a) State and prove Time shifting property and modulation property of CTFT.
(b) Determine and sketch the Fourier transform of the following signals:
(i) $x(t) = 10\ Sin\ 2\pi\ f_0 t$ (ii) $x(t) = rect\left(\frac{t}{\tau}\right)$.

OR

5 (a) Find the Fourier transform of $x(t) = \begin{cases} cos\pi t; -\frac{1}{2} \le t \le \frac{1}{2} \\ 0; \quad otherwise \end{cases}$.
(b) State and prove linearity property of CTFT.

UNIT – III

6 Let the system function of an LTI system be $^1/_{(jw+2)}$. What is the output of the system for the input $(0.8)^t u(t)$?

OR

7 A stable LTI system is characterized by the differential equation $\frac{d^2\,y(t)}{dt^2} + 5\frac{d\ \ y(t)}{dt} + 4y(t) = \frac{d\,x(t)}{dt}$. Find the frequency response & Impulse response.

UNIT – IV

8 State and prove any five properties of DTFT.

OR

9 An LTI discrete system is specified by the equation:
$y[n] - 0.5y[n-1] = x[n]$. Find $H(\Omega)$, the frequency response of the system. Also determine the (zero state) response $y[n]$, if the input $x[n] = (0.8)^n u[n]$.

UNIT – V

10 Find the Inverse Laplace Transform of $G(s) = \frac{S}{(S+3)(S^2+4S+5)}$ for all possible ROC.

OR

11 Find the inverse Z Transform of X(z) = 1/(1-0.5z^{-1} + 0.5z^{-2}) for ROC |Z| >1.

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