Paper code - U 219-133 (BE-F&FS)

Total No. of Questions - [8]

Total No. of Printed Pages :2

G.R. No.

DECEMBER 2019/ENDSEM -Backlog Exam

S. Y. B. TECH. (E&TC) (SEMESTER - I)

COURSE NAME: Signals and Systems

COURSE CODE: ETUA21173

(PATTERN 2017)

Time: [2 Hours]

[Max. Marks: 50]

(*) Instructions to candidates:

1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8

2) Figures to the right indicate full marks.

3) Use of scientific calculator is allowed

4) Use suitable data where ever required

Q.1) a) Find whether given signal is energy or power, find its appropriate value x(t) = u(t) [6 marks]

OR

b) Perform following operations and sketch the resultant signals [6]

[6 marks]

 $x(t) = \delta(t+1) - \delta(t-1)$ $y(t) = \int_{-\infty}^{t} x(t) dt$

 $z(t) = \sin 100t \cdot x(t)$

Q.2) a) Classify whether the given CT system is

[6 marks]

i) causal/ non-causal

ii) stable / unstable

iii) Time variant / Time invariant

 $y(t) = \int_{-\infty}^{t} x(t) dt$

OR

b) Classify whether the given CT system is

[6 marks]

i) linear / non-linear

ii) static / dynamic

iii) Find impulse response of given system,

 $z[n] = \sum_{k=-\infty}^{n} x[n]$

Q.3) a) Perform convolution of the following signals

[6 marks]

x(t) = u(t) and $h(t) = e^{-at} u(t)$

OR

b) Find the output of the LTI system having Impulse response $h[n] = \{1, 1, 1, 1\}$ and input x[n] = u[n]

[6 marks]

Q.4) a) Using appropriate properties find Fourier Transform of [4 marks] $x(t) = e^{-2t} u(t-5)$ OR b) Evaluate FT of $x(t) = rect(\frac{t}{r})$ [4 marks] Q. 5) a) Find Initial and Final Value of the signal having LT [6 marks] i) $X(s) = \frac{1}{s}$ ii) X(s) = 1b) Find LT and ROC of $x(t) = -e^{-at} u(-t)$ [4 marks] c) State and Prove shift in frequency property of LT [4 marks] Q.6) a) Find Inverse Laplace Transform of the given signal $X(s) = \frac{s^2 + 2s - 2}{s(s+2)(s-3)}$ for ROC Re[s] > 3[6 marks] b) State and Prove time domain convolution property [4 marks] c) Find LT and ROC of x(t) = r(t)[4 marks] Q.7) a) Prove that Autocorrelation function and ESD forms a FT pair [6 marks] b) Find and verify the PSD of the signal $x(t) = 5 \sin(100\pi t)$ [4 marks] c) Sketch the correlogram of following $x(t) = \sin(\pi t)$ and $y(t) = \cos(\pi t)$ [4 marks] OR Q.8) a) Find Autocorrelation of the function $x(t) = A e^{-at} u(t)$ [6 marks] b) Prove and discuss properties of ESD [4 marks]

c) Find the ESD at the output of the system having input $x(t) = e^{-at} u(t)$ and

[4 marks]

H(w) = 4 rect (w/10)