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 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 [6 marks]
$h[n] = \{1, 1, 1, 1\}$ and input $x[n] = u[n]$

Q.4) a) Using appropriate properties find Fourier Transform of [4 marks]

$x(t) = e^{-2t}\, u(t-5)$

OR

b) Evaluate FT of $x(t) = \text{rect}(\frac{t}{T})$ [4 marks]

Q. 5) a) Find Initial and Final Value of the signal having LT [6 marks]

i) $X(s) = \frac{1}{s}$ ii) $X(s) = 1$

b) 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]

OR

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 $H(w) = 4\ \text{rect}(w/10)$ [4 marks]