Total No. of Questions – [4]

Total No. of Printed Pages 03

G.R. No.	

U218-133(T1)

OCTOBER 2018/ IN-SEM (T1)

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

COURSE NAME: Signals & Systems

COURSE CODE: ETUA21173

(PATTERN 2017)

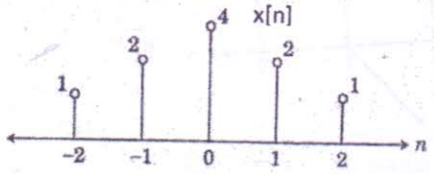
Time: [**1 Hour**]

[Max. Marks: **30**]

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2 and Q.3 OR Q.4.**
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) Sequence x[n] has non-zero values shown in figure below, sketch the sequences y[n], z[n], w[n]. **6 marks**



(*i*) $$y[n] = \begin{cases} x\left[\frac{n}{2} - 1\right] & \text{for } n \text{ even} \\ 0 & \text{for } n \text{ odd} \end{cases}$$

(*ii*) $z[n] = x[n] + y[n]$

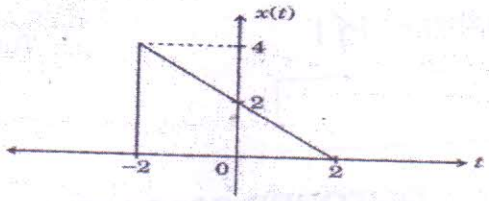
(*iii*) $w[n] = x[n] \cdot y[n]$.

b) Evaluate the following properties of impulse function for given signal x(t) shown in figure below. **6 marks**

$$\int_{-\infty}^{+\infty} x(t)\,\delta(t)\,dt$$

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

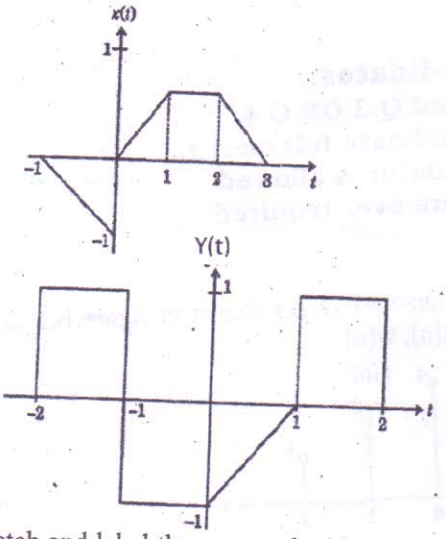
$$\int_{-\infty}^{+\infty} x(t)\,\delta(4t)\,dt$$



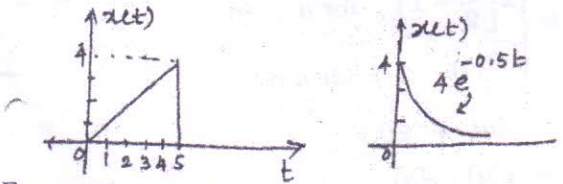
c) Inspect whether the following signals are periodic; if they are periodic, calculate the fundamental period. **4 marks**
$x(t)=5\cos(5t+30)+18\sin(6t+20)$

OR

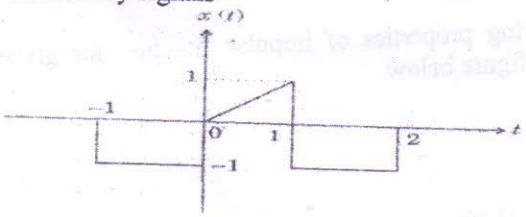
Q.2) a) Sketch the signal $z(t)=x(t-1)\,y(-t)$ where x(t) and y(t) are shown in figure below. **6 marks**



b) Sketch and label the even and odd components of the signals shown in Figure. **6 marks**



c) Express the waveform shown in Fig. below mathematically using elementary signals **4 marks**



Q.3) a) Identify whether following system is static or dynamic. **6 marks**

$y(t) = \int_0^{t+2} x(\tau)d\tau$

where x(t) is input to the system

if x(t) = u(t)-u(t-2)

sketch corresponding output y(t)

b) Distinguish whether the following systems are: **4 marks**

(1) static / Dynamic

(2) causal/non-causal

(3) linear/nonlinear

(4) Time invariant/variant

$y(t) = x(t+10) + x^2(t)$

c) Explain the meaning of causality? Identify whether the following system is causal or not. **4 marks**

$(i) y(t) = \int_{-\infty}^{2t} x(\tau)d\tau$

OR

Q.4) a) Distinguish whether the following systems are: **6 marks**

(1) stable / Unstable

(2) causal/non-causal

(3) linear/nonlinear

(4) Time invariant/variant

$y[n] = \frac{1}{3}\{x[n] + x[n-1] + x[n-2]\}$

b) When you will call the system as static? Identify whether the following systems are dynamic or not. **4 marks**

(i) $y(t)=x(t-2)$

(ii) $y[n] = x[2n]$

(iii) $y(t)= x^2(t)$

c) State superposition principal. Identify whether the following system is linear or not. **4 marks**

$dy/dt + 3ty(t) = t^2x(t)$