Enrolment No. 21453010

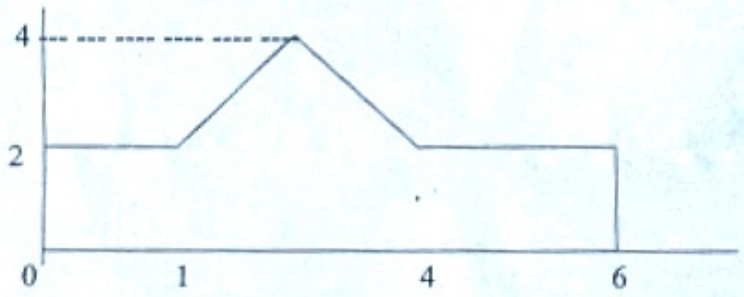
S4(UEE03B14) BRANCH: EE

B.TECH 3RD SEMESTER, MID-TERM EXAMINATION 2022
NAME OF SUBJECT: SIGNALS AND SYSTEMS
CODE NO:-UEE03B14

Full Marks: 20 **Time: 1 Hrs**

(A) Answer any **ten [10]** of the following questions: **1X10=10**

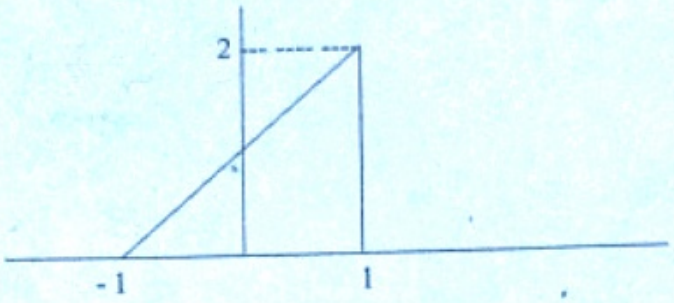
1. Define **even** and **odd** signals. If any arbitrary real signal is $x(t)$, calculate the **even part** and **the odd part** of the signal.
2. Define with proper mathematics, **conjugate symmetric** and **conjugate skew symmetric** signals.
3. Define **energy signal** and **power signal** with appropriate examples. Comment on **periodic signals** whether they are **energy or power signals** and **why**?
4. Find **energy** of the following signal **(Show all of your work)**–



5. Given, $x(n) = \{4, 3, 2, \underset{\uparrow}{1}, 2, 3, 4\}$, Perform **linear interpolation** to find $x(\frac{n}{3})$. **Show all of your work.**
6. Write **at least two** properties of **impulse function**.
7. Establish **the condition for periodicity** of the complex exponential signal $x[n] = e^{j\Omega n}$.
8. If $x(n) = \{4, 3, 2, \underset{\uparrow}{1}, 2, 3, 4\}$ Find $x(-n+3)$ and $x(n-3)$
9. If $x(n) = \{1, 2, 3, \underset{\uparrow}{1}, 2, 3, 4\}$ Find $x(n-0.5)$.
10. **Prove** that, the response of LTI system to periodic signal is also periodic with identical period.
11. Compare **non – recursive** filters with **recursive filters**.
12. $x(n) = u(n)$ and $h(n) = \alpha^n u(n), \alpha < 1$. Using convolution, find $y(n)$. **Show all of your work.**
13. Define **anti – causal** and **non – causal** systems. What are the **basic difference** between them (use **examples**)

(B) Answer **any two (2)** of the following questions. **3X2=6**

1. If $x(n)$ is 0.5+0.5+1+1



Draw (i) $x(2t-6)$ (ii) $x(1-t)$ (iii) $x(0.5t+0.5)$ (iv) $2x(-\frac{t}{3}+\frac{2}{3})$

2. Define with proper examples 1.5+1.5
   (i) Causal system, static and dynamic systems
   (ii) Time Invariant system and Time varying system.
3. Compute the **convolution** of $h(n)=\{1,2,1\}$ and $x(n)=\{1,-1,2,1,2-1\}$ using 1.5+1.5
   (i) sliding rule method (ii) z – transform method

(C) Answer any **one (1)** of the following questions.. **1X4 = 4**

4. $y(n)-0.5y(n-1)=5\cos(0.5n\pi)$, $n\geq 0$ with $y(-1)=4$, find the total solution of the difference equation. 4
5. Compute the **convolution** and **cross – correlation** of $h(n)=\{1,2,1,1,1\}$ and $x(n)=\{1,1,1,2,1\}$. 2+2