Instructions:

* Execute the below programs in Python.

* Save Screenshots of the outputs (Energy, Integral & Power).

* Fill the Observation Table with your Answers.

*Save File in format : ROLL_NO_LAB_03.pdf (upload pdf file).

Q1)

1. x(t)=A, -t1/2 <t<t1/2 and zero elasewhere

```
from sympy import*
import sympy as sp
import numpy as np
from numpy import*
A,t,t1,T,n,N=symbols('A,t,t1,T,n,N')
init_printing(pretty_print=True)
```

```
Integral(A**2,(t,-t1/2,t1/2))
```

```
Energy=integrate(A**2,(t,-t1/2,t1/2))
display('Energy of the signal E1=',Energy)
E1=Energy
```

```
Power=limit((Integral(A**2,(t,-t1/2,t1/2))/T),T,oo)
display('Power of the signal P1=',Power)
P1=Power
```

```
if E1==oo and P1!=0 and P1!=oo:
    display('x(t) is Power signal')
if P1==0 and E1!=0 and E1!=oo:
    display('x(t) is Energy signal')
if E1==oo and P1!=oo and P1==0:
    display('x(t) is Neither Energy Nor Power signal')
if E1==oo and P1==oo:
    display('x(t) is Neither Energy Nor Power signal')
if E1==0 and P1==0:
    display('x(t) is Neither Energy Nor Power signal')
```

Output1:

```
'x(t) is Energy signal'
```

Q2)

2.x(t)=cos(t) ¶

```
Integral((sp.cos(t)**2),(t,-oo,oo))
```

```
Energy=integrate((sp.cos(t)**2),(t,-oo,oo))
display('Energy of the signal E2=',Energy)
E2=Energy
```

```
Integral((sp.cos(t)**2)/T,(t,-T/2,T/2))
```

```
Power=limit(integrate((sp.cos(t)**2)/T,(t,-T/2,T/2)),T,oo)
display('Power of the signal P2=',Power)
P2=Power
```

```
if E2==oo and P2!=0 and P2!=oo:
    display('x(t) is Power signal')
if P2==0 and E2!=0 and E2!=oo:
    display('x(t) is Energy signal')
if E2==oo and P2!=oo and P2==0:
    display('x(t) is Neither Energy Nor Power signal')
if E2==oo and P2==oo:
    display('x(t) is Neither Energy Nor Power signal')
if E2==0 and P2==0:
    display('x(t) is Neither Energy Nor Power signal')
```

Output2:

```
if E2==oo and P2!=0 and P2!=oo:
    display('x(t) is Power signal')
if P2==0 and E2!=0 and E2!=oo:
    display('x(t) is Energy signal')
if E2==oo and P2!=oo and P2==0:
    display('x(t) is Neither Energy Nor Power signal')
if E2==oo and P2==oo:
    display('x(t) is Neither Energy Nor Power signal')
if E2==0 and P2==0:
    display('x(t) is Neither Energy Nor Power signal')

'x(t) is Power signal'
```

Q3)

3.x(n)=(1/4)^n*U(n)

```python
Energy=Sum(((1/4)**n)**2,(n,0,oo))
E3=Energy.evalf()
```

```python
display('Energy E3=',E3)
```

```python
Power=Sum(((1/4)**n)**2,(n,0,N))/(2*N)
y=Power.doit()
Power1=limit(y,N,oo)
P3=Power1
display('Power P3=',P3)
```

```python
if E3==oo and P3!=0 and P3!=oo:
    display('x(t) is Power signal')
if P3==0 and E3!=0 and E3!=oo:
    display('x(t) is Energy signal')
if E3==oo and P3!=oo and P3==0:
    display('x(t) is Neither Energy Nor Power signal')
if E3==oo and P3==oo:
    display('x(t) is Neither Energy NP signal')
if E3==0 and P3==0:
    display('x(t) is NENP signal')
```

Q4)

4. (t)^(-0.5)U((t-2))

```
x=Integral(((t)**(-1/2))**2,(t,2,oo))
Energy=x
Energy
```

```
y=integrate(((t)**(-1/2))**2,(t,2,oo))
E4=y
display('Energy E4=',y)
```

```
x1=(1/T)*Integral(((t)**(-1/2))**2,(t,2,T/2))
x1
```

```
y1=limit((1/T)*integrate(((t)**(-1/2))**2,(t,2,T/2)),T,oo)
display('Power P4=',y1)
P4=y1
```

```
if E4==oo and P4!=0 and P4!=oo:
    display('x(t) is Power signal')
if P4==0 and E4!=0 and E4!=oo:
    display('x(t) is Energy signal')
if E4==oo and P4!=oo and P4==0:
    display('x(t) is Neither Energy Nor Power signal')
if E4==oo and P4==oo:
    display('x(t) is Neither Energy NP signal')
if E4==0 and P4==0:
    display('x(t) is NENP signal')
```

Q5) Calculate the Energy and Power of the following problem. Classify the problem into one of the five categories mentioned above.
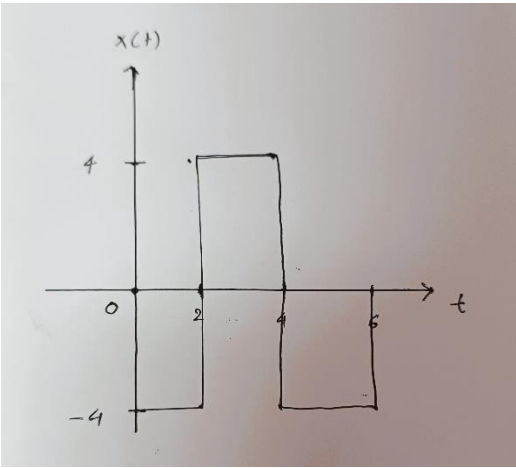
Observations:

Sr. No.	Energy Output	Power Output	Category (Among the mentioned 5)