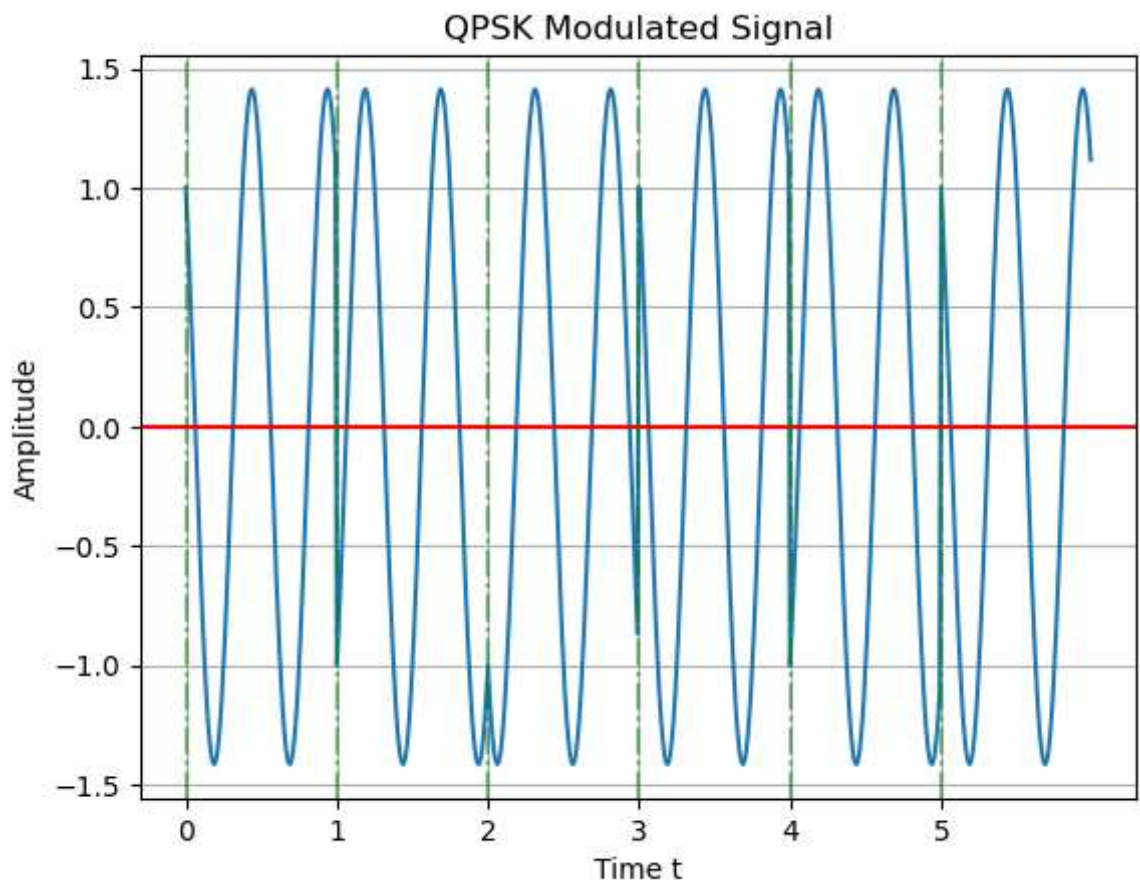


```
In [46]: import numpy as np
import random as rd
import matplotlib.pyplot as plt
# Creating Bit Stream
m=[]
m_len=12
d=np.arange(0,m_len,1)
k=[0,1]
for i in range(m_len):
    m.append(rd.choice(k))
```

```
In [47]: # Splitting message into Odd-Even bit streams
odd=[]
even=[]
for i in range(m_len):
    if i%2==0: # Since python and natural indexing starts frm 0,1 respectively,
        odd.append(m[i]) # even indices are appended to odd arr.
    else:
        even.append(m[i]) # odd indices are appended to even arr.
```

```
In [48]: o_bpsk=[]
e_bpsk=[]
for i in odd:
    if i==1:
        for j in range(100):
            o_bpsk.append(1)
    else:
        for j in range(100):
            o_bpsk.append(-1)
for i in even:
    if i==1:
        for j in range(100):
            e_bpsk.append(1)
    else:
        for j in range(100):
            e_bpsk.append(-1)
```

```
In [54]: t=np.arange(0,6,0.01)
qpsk=np.array(e_bpsk)*np.sin(2*np.pi*2*t)+np.array(o_bpsk)*np.cos(2*np.pi*2*t)
plt.plot(t,qpsk)
plt.xticks(np.arange(0,6,1))
plt.grid()
plt.axhline(0,color='red')
plt.title("QPSK Modulated Signal")
plt.xlabel("Time t")
plt.ylabel("Amplitude")
for i in range(6):
    plt.axvline(i,linestyle='-.',color='green',alpha=0.5)
```



In []: