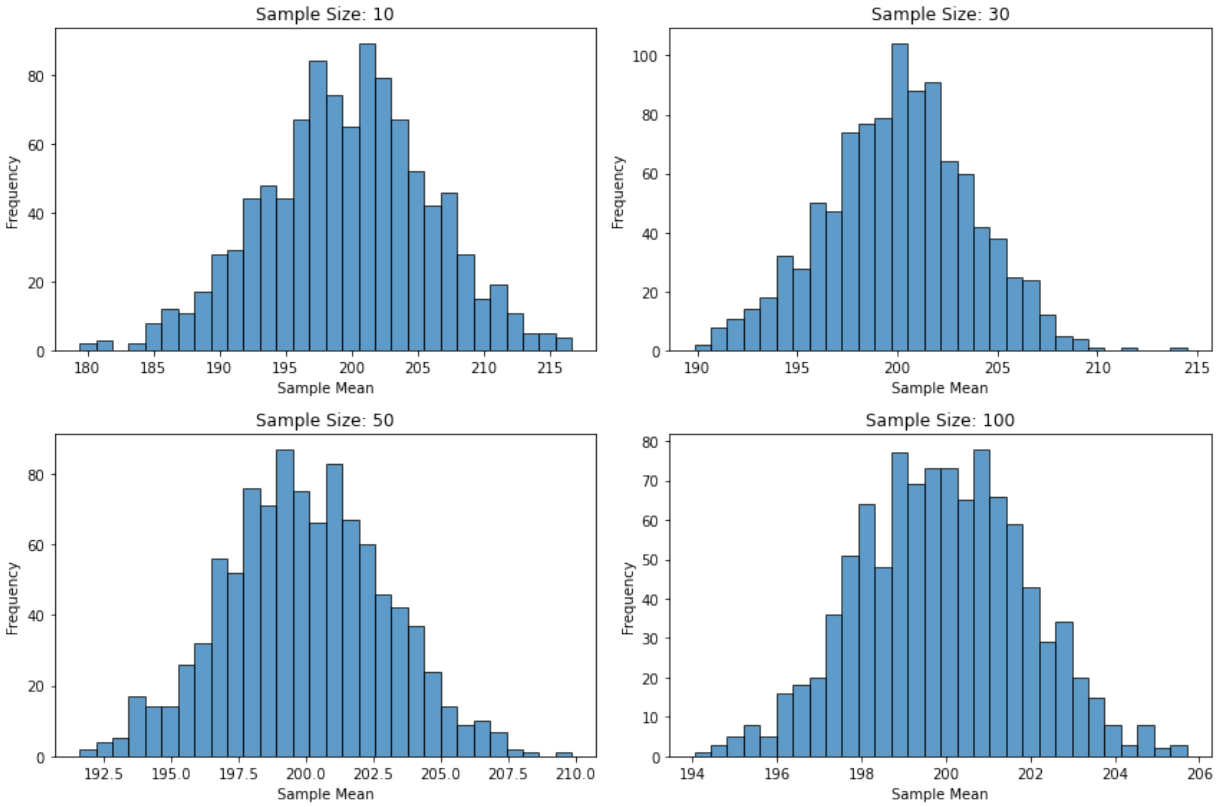
Program 10 : Program to demonstrate sampling distribution using python

In [2]:

```
import numpy as np
import matplotlib.pyplot as plt

# Population parameters
population_mean = 200
population_std = 20
population_size = 20000

# Generate the population data
population_data = np.random.normal(population_mean, population_std, population_size)

# Function to calculate sample mean
def calculate_sample_mean(sample_size):
    sample_means = []
    num_samples = 1000  # Number of samples to draw
    for _ in range(num_samples):
        sample = np.random.choice(population_data, size=sample_size, replace=False)
        sample_means.append(np.mean(sample))
    return sample_means

# Sample sizes to consider
sample_sizes = [10, 30, 50, 100]

# Plot sampling distributions
plt.figure(figsize=(12, 8))
for i, sample_size in enumerate(sample_sizes):
    plt.subplot(2, 2, i+1)
    sample_means = calculate_sample_mean(sample_size)
    plt.hist(sample_means, bins=30, alpha=0.7, edgecolor='black')
    plt.title(f'Sample Size: {sample_size}')
    plt.xlabel('Sample Mean')
    plt.ylabel('Frequency')

plt.tight_layout()
plt.show()
```


Sample Size: 10
Frequency
Sample Mean
Sample Size: 30
Frequency
Sample Mean
Sample Size: 50
Frequency
Sample Mean
Sample Size: 100
Frequency
Sample Mean