SSN COLLEGE OF ENGINEERING, KALAVAKKAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LAB EXERCISE 7

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1. Compute ab mod N

Code:

```cpp
#include <stdlib.h>
#include <iostream>
using namespace std;
long long binpow(long long a, long long b, long long m)
{
    a %= m;
    long long rem = 1;
    while (b > 0)
    {
        if (b & 1)
        {
            rem = rem * a % m;
        }
        a = a * a % m;
        b = b / 2;
    }
    return rem;
}

int main(int argc, char const *argv[])
{
    long long a, b, m;
    cout << "Enter a:";
    cin >> a;
    cout << "Enter b:";
    cin >> b;
    cout << "Enter m:";
    cin >> m;
    cout << a << "^" << b << " mod " << m << " = " << binpow(a, b, m);
    return 0;
}
```

Output:

```
Enter a:2
Enter b:5
Enter m:13
2^5 mod 13 = 6
```

2. To Implement Sieve of Eratosthenes Algorithm

Code:

```
#include <stdlib.h>
#include <vector>
#include <cstring>
#include <iostream>
using namespace std;
int main(int argc, char const *argv[])
{
    int n;
    cout << "Enter n:";
    cin >> n;
    bool is_prime[n + 1];
    memset(is_prime, true, sizeof(is_prime));
    is_prime[0] = false;
    is_prime[1] = false;
    for (int i = 2; i <= n; i++)
    {
        if (is_prime[i] && i * i <= n)
        {
            for (int j = i * i; j <= n; j += i)
            {
                is_prime[j] = false;
            }
        }
    }

    cout << "\n Prime numbers less than or equal to " << n << endl;
    for (int i = 2; i <= n; i++)
    {
        if (is_prime[i])
        {
            cout << i << " ";
        }
    }

    return 0;
}
```

Output:

```
Enter n:55

 Prime numbers less than or equal to 55
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53
```