

## LAB WORK (13-NOV-2025)

**QUESTION-** Create a module in python which contains following classes :-

**Cylinder** - to calculate csa, tsa and volume of cylinder

**cone** - to calculate csa, tsa and volume of cone

**cuboid** - to calculate csa, tsa and volume of cube

**sphere** - to calculate csa, tsa and volume of spher

In another file create a menu driven perogram which ask the user to select any one of the above figures .After selecting the figure ask the user to select any one operation among total surface area , curved surface area and volume .Perform the specified operation.

**Complete solution with two files as required:**

**1** **shapes.py** → Module containing classes

**2** **main.py** → Menu-driven program

### **1** **shapes.py**

```
import math
class Cylinder:
def __init__(self, r, h):
    self.r = r
    self.h = h
def csa(self): # Curved Surface Area
    return 2 * math.pi * self.r * self.h
def tsa(self): # Total Surface Area
    return 2 * math.pi * self.r * (self.r + self.h)
def volume(self):
    return math.pi * self.r * self.r * self.h
class Cone:
def __init__(self, r, h):
    self.r = r
    self.h = h
    self.l = math.sqrt(r*r + h*h) # Slant height
def csa(self):
    return math.pi * self.r * self.l
def tsa(self):
    return math.pi * self.r * (self.r + self.l)
def volume(self):
    return (1/3) * math.pi * self.r * self.r * self.h
class Cuboid:
def __init__(self, l, b, h):
    self.l = l
    self.b = b
    self.h = h
def csa(self):
    return 2 * self.h * (self.l + self.b)
def tsa(self):
    return 2 * (self.l*self.b + self.b*self.h + self.h*self.l)

def volume(self):
```

```

        return self.l * self.b * self.h
class Sphere:
    def __init__(self, r):
        self.r = r
    def csa(self):
        return 4 * math.pi * self.r * self.r # CSA = TSA for sphere
    def tsa(self):
        return 4 * math.pi * self.r * self.r
    def volume(self):
        return (4/3) * math.pi * self.r * self.r * self.r

```

## File 2: main.py

```

from shapes import Cylinder, Cone, Cuboid, Sphere
while True:
    print("\nSelect Shape:")
    print("1. Cylinder")
    print("2. Cone")
    print("3. Cuboid")
    print("4. Sphere")
    print("5. Exit")
    choice = int(input("Enter choice: "))
    if choice == 5:
        print("Thank you! Exiting...")
        break
    print("\nSelect Operation:")
    print("1. Curved Surface Area (CSA)")
    print("2. Total Surface Area (TSA)")
    print("3. Volume")
    op = int(input("Enter operation: "))
#C Cylinder
    if choice == 1:
        r = float(input("Enter radius: "))
        h = float(input("Enter height: "))
        obj = Cylinder(r, h)
#Cone
    elif choice == 2:
        r = float(input("Enter radius: "))
        h = float(input("Enter height: "))
        obj = Cone(r, h)
# Cuboid
    elif choice == 3:
        l = float(input("Enter length: "))
        b = float(input("Enter breadth: "))
        h = float(input("Enter height: "))
        obj = Cuboid(l, b, h)
# Sphere
    elif choice == 4:
        r = float(input("Enter radius: "))
        obj = Sphere(r)
    else:
        print("Invalid choice!")
        continue

```

```
if op == 1:
    print("CSA =", obj.csa())
elif op == 2:
    print("TSA =", obj.tsa())
elif op == 3:
    print("Volume =", obj.volume())
else:
    print("Invalid operation!")
```

**Example:**

Select Shape:

1. Cylinder
2. Cone
3. Cuboid
4. Sphere
5. Exit

Enter choice: 1

Select Operation:

1. Curved Surface Area (CSA)
2. Total Surface Area (TSA)
3. Volume

Enter operation: 3

Enter radius: 3

Enter height: 7

Volume = 197.92033717615698