



# **NILE UNIVERSITY OF NIGERIA**

**Faculty of Natural and Applied Sciences**

**Department of Computer Science**

**Physics Unit**

**PHY 107: Experimental Physics I (Mechanics)**

**Experiment 1: MEASUREMENTS**

**Student Name:**

**Student ID:**

**Department:**

**Date of the Experiment:**

**Group:**

**Purpose:**

1. To measure the Length and Diameter of a given metal cylinder and calculate its volume
2. To measure the diameter of a given wire by using a micrometer screw gauge and calculate the volume of the wire

**Equipment needed:****Task A:**

- Vernier calipers,
- Metal cylinder and
- Meter rule

**Task B:**

- Micrometer screw gauge,
- long copper wire and
- Meter rule.

**Set-up and procedure: Task A**

Examine carefully the main scale of the vernier calipers. Write your observations as requested on the data sheet. Close the jaws of the calipers and see that the zero of the main scale and the zero of the vernier scale are coinciding otherwise report your observations as zero error. Gently grip the length of the given cylinder between the two jaws. Record the reading indicated by the zero of the vernier on the main scale. Look for the number of the vernier division, which is coinciding with a main scale division. This number should be multiplied by the least count and then added to the product of the main scale reading, which will be the length of the cylinder. Measure the length of the cylinder at three more places and find the average length.

Thus *length of the cylinder = main scale reading + least count x vernier coincide.*

Record your readings on the data sheet. Similarly, find the diameter of the cylinder. Take the readings and calculate the volume of the cylinder.

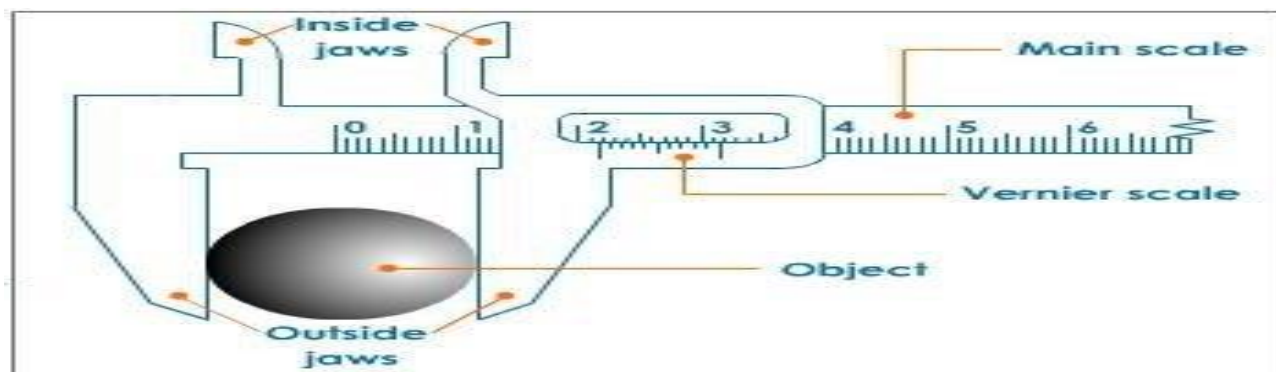


Figure 1: Experimental set up for vernier caliper

**Data Sheet:**

The main scale divisions are at interval (S) =                      cm  
 The length of the Vernier scale =                      cm  
 The number of divisions on the Vernier scale =                      Divisions  
 So that the Vernier divisions are at interval (V) =                      cm  
 The least count (LC) =  $S - V$  =                      cm  
 Zero error =                      cm

**I      Length of Cylinder**

No. of Reading	Main Scale Reading (MSR) (cm)	Vernier Coincide (VC)	Vernier Scale Reading (VSR) = LC x VC (cm)	Length, L = MSR + VSR (cm)
1				
2				
3				

Mean Length =

**II INTERNAL DIAMETER OF CYLINDER**

No. of Reading	Main Scale Reading (MSR) (cm)	Vernier Coincides (VC)	Vernier Scale Reading (VSR) = LC x VC (cm)	Diameter, D = MSR + VSR (cm)	Radius $\frac{d}{2}$ (cm)
1					
2					
3					

Mean Diameter =

Radius (r) =

Volume of the cylinder =

Evaluate the Volume of the Cylinder (V) =

**Set-up and procedure: Task B**

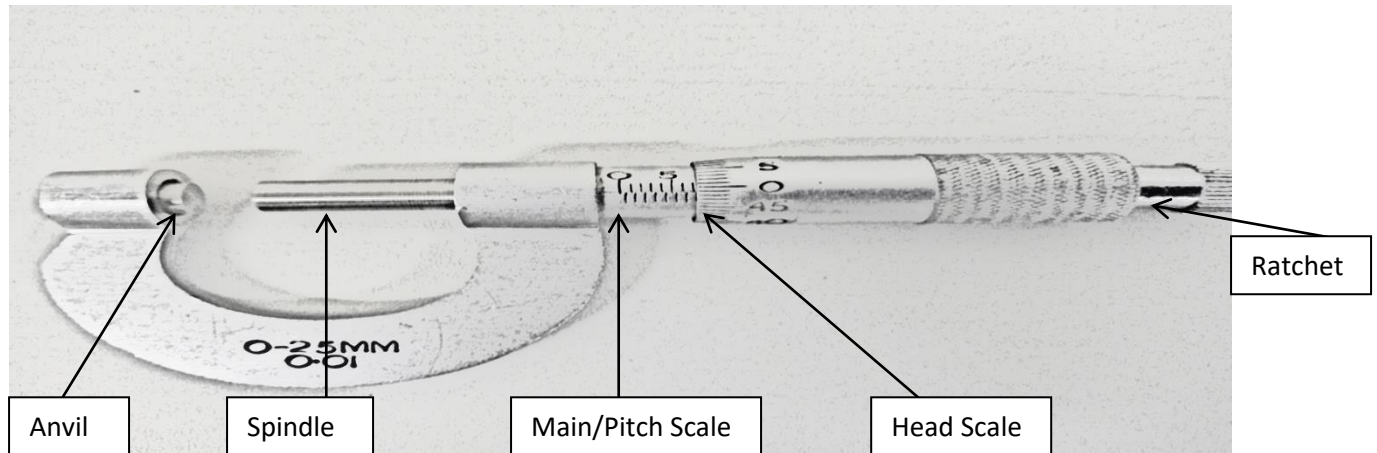
First determine the pitch of the screw by the following method: rotate the head of the micrometer screw gauge through 10 complete rotations. On the pitch scale, read the distance moved by the head. Divided this distance moved by the number of rotations to get the pitch (p) of the screw. Count the number of divisions on the head scale (n). The pitch divided by the number of divisions on the head scale (p/n) gives the least count of the screw.

Turn the head of the micrometer screw gauge until the gaps is fully closed, record the zero error of the instrument (if any). Gently grip the Sphere between the two jaws and take the readings first of the pitch and then of the head scale.

Thus *fractional reading = least count x the head scale coincides*

The sum of the two readings (pitch scale and fractional reading) will give the diameter of the Sphere. Measure the diameter of the same Sphere in three other places. Record your reading and calculate the volume of the Sphere.

**Diameter = pitch scale reading + (Head scale coincidence) x least count.**



**Figure 1: Experimental set up for micro meter screw-gauge**

### Data Sheet:

Number of rotations made by the head	=	Rotations
Reading on the pitch scale	=	cm
Pitch ( <i>P</i> )	=	cm
Number of divisions on the head	=	Divisions
Least count (LC)	=	cm
Zero error	=	cm

### EXTERNAL DIAMETER OF THE WIRE

No. of Reading	Pitch Scale Reading (PSR) (cm)	Head Scale Coincides (HSC)	Head Scale Reading (HSR) = LC x HSC (cm)	Diameter, D = PSR + HSR (cm)
1				
2				
3				

Mean Diameter of the Sphere =

$$\text{Radius } (r) \text{ of the Sphere} = \frac{d}{2} =$$

Volume of the Sphere  $V =$

**Instructor Signature and Date** \_\_\_\_\_

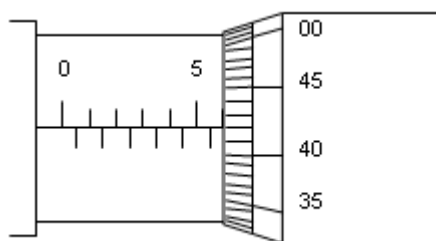
**Precaution:**

State the precautions taken to ensure accurate results

**Question:**

1. What do you understand by the reading/measuring accuracy of an instrument
2. Write down the reading accuracies of the following:
  - a stop watch
  - b meter rule
  - c thermometer
  - d ammeter
  - e voltmeter
3. what is the reading as shown on the given micrometers

I



II

