**PW 01 : BULK AND ABSOLUTE DENSITY**

***BULK DENSITY***

1. **Objective of the Experiment**Measure the apparent (bulk) and absolute density of gravel and sand.
2. **Necessary Materials**

* A container of known volume V
* A funnel
* A scale
* A metal ruler

1. **Materials Used**

* A sample of sand
* A sample of gravel

1. **Procedure**

* Pour the dry aggregates into the container in successive layers without compacting (use the funnel or your hands).
* Level off using the metal ruler.
* Weigh the filled container: note down M.
* Calculate the apparent density: ρa = M / V.
* Repeat the measurement 3 times.

1. **Required Work**

* Fill in the tables
* Comment on the results
* Make a conclusion

**Table 1: Apparent Density of Gravel**

| **Designation** | **M** | **ρ a** | **Average** |
| --- | --- | --- | --- |
| **Trial 1** |  |  |  |
| **Trial 2** |  |  |  |
| **Trial 3** |  |  |  |

**Table 2: Apparent Density of Sand**

| **Designation** | **M** | **ρ a** | **Average** |
| --- | --- | --- | --- |
| **Trial 1** |  |  |  |
| **Trial 2** |  |  |  |
| **Trial 3** |  |  |  |

***ABSOLUTE DENSITY***

1. **Objective of the Experiment**  
   Measure the absolute density of gravel and sand.
2. **Necessary Materials**

* A container
* A funnel
* A scale

1. **Materials Used**

* A sample of sand
* A sample of gravel

1. **Procedure**

* Fill the graduated cylinder with a volume of water V1​.
* Weigh a dry sample M of aggregates.
* Introduce the aggregate into the graduated cylinder, ensuring to eliminate air bubbles.
* Read the new volume V2​.
* Calculate the absolute density: ρabs = M / V2 – V1
* Repeat the measurement 3 times.

1. **Required Work**

* Fill in the tables
* Comment on the results
* Make a conclusion

**Table 1: Absolute Density of Gravel**

| **Designation** | **M** | **ρ abs** | **Average** |
| --- | --- | --- | --- |
| **Trial 1** |  |  |  |
| **Trial 2** |  |  |  |
| **Trial 3** |  |  |  |

**Table 2: Absolute Density of Sand**

| **Designation** | **M** | **ρ abs** | **Average** |
| --- | --- | --- | --- |
| **Trial 1** |  |  |  |
| **Trial 2** |  |  |  |
| **Trial 3** |  |  |  |