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| **Aim:**  Measurement of earth resistance.  **Objective:**  Measurement of earth resistance by three electrode methods.  **Apparatus required:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Serial Number** | **Instrument Name** | **Specifications** | **Quantity** | **Maker’s Name** | | **1** | Earth resistance testing kit |  | 1 | Nanin Bokun Instrument Equipment Co. LTD | | **1 a.** | Earth tester (Model:AR-4105A) | 2Ω-0.5 ~ 1.99Ω  20Ω-2 ~19.99Ω  200Ω-20~199.9Ω | 1 | Nanin Bokun Instrument Equipment Co. LTD | | **1 b.** | Connecting leads (with crocodile clips) | Red , yellow,green color codes | 3 | Nanin Bokun Instrument Equipment Co. LTD | | **1 c.** | Auxiliary earth spikes |  | 2 | Nanin Bokun Instrument Equipment Co. LTD | | **2** | Earth electrode |  | 2 | Nanin Bokun Instrument Equipment Co. LTD | | **3** | Metering tape | 30 meters | 1 | FMI LTD |       **Theory :**  This instrument makes earth resistance measurement with fall-of-potential method, which is a method to obtain earth resistance value Rx by applying AC constant current I between the measurement object E (earth electrode) and C (current electrode), and finding out the potential difference V between E and P  (Potential electrode).  **Rx=V/I** |

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| **Original Circuit:**    **Observation Table:**   |  |  |  | | --- | --- | --- | | **Serial Number** | **Distance from Earth Electrode (in meters)** | **Earth Resistance(Ω)** | | **1** | 0.9 | 0.8 | | **2** | 1.9 | 1.0 | | **3** | 2.9 | 1.58 | | **4** | 3.9 | 1.59 | | **5** | 4.9 | 1.56 | | **6** | 5.9 | 1.61 | | **7** | 6.9 | 10 | | **8** | 7.9 | 15 | | **9** | 8.9 | 19 | | **10** | 9.9 | 26 | |

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| **Graph:**    **Calculations:**  From the graph we find the value of earth resistance remain almost constant from 2.9m to 5.9m. Thus, earth resistance offered by the earth electrode ~ 1.58Ω. |

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| **Conclusion:**  ● The measured earth resistance readings are better on a rainy day than a  sunny day due to the moisture in the soil.  ● The earth resistance value should not exceed 5 ohms in practice (according  to Indian Electricity Earthing Standards).  ● The measured earth resistance increases with the increase in distance  from the earth electrode until it becomes constant. However, when we  move closer to the current electrode, the value of earth resistance  increases again. This is because the electric field lines are concentrated at  the earth and current electrodes and become almost constant around the  midway point between the 2 electrodes, provided that they are sufficiently  far apart from each other and their effective resistance areas don’t overlap. |