

**The University of Jordan  
School of Engineering  
Electrical Engineering Department**

**EE 449  
Instrumentation and Control Lab**

**EXPERIMENT 1 REPORT  
EARTHING AND GROUND RESISTANCE**

Section # \_\_\_\_\_ Group # \_\_\_\_\_

**Student Name**

**ID**

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# EXPERIMENT 1

## EARTHING AND GROUND RESISTANCE

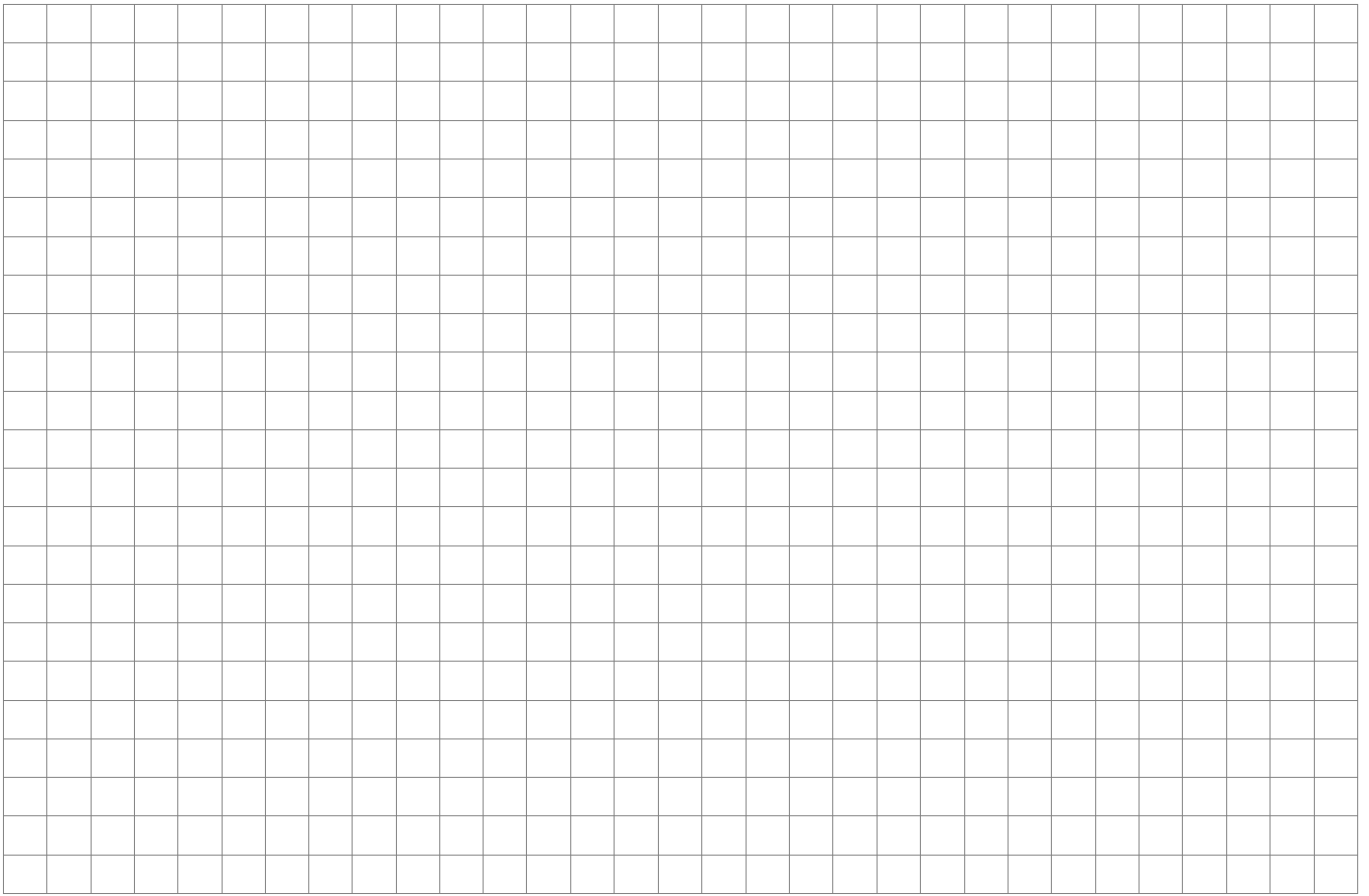
### PROCEDURE A: GOOD WEATHER

1. Use a fall-of-potential testing device to test the *short* earthing rod (which is driven about 50 cm into the ground). Place the earth probe (E) on the rod, and place the current probe (C) at a distance of **D = 22 meters** from the earth probe. Now place the potential probe (P) at different distances (X) from the earth probe (E) to read the resulting ground resistance. Fill the table below with the measured values. Remember to select a proper ohm rang on the testing device, and take all distance measurements on a straight path between the earth probe (E) and the current probe (C).

Distance (X) between potential probe (P) and earth probe (E)	Percentage of distance (X) to distance (D), i.e., X/D	Measured ground resistance value ( $\Omega$ )
0.5 m	2%	
1.1 m	5%	
2.2 m	10%	
3.3 m	15%	
4.4 m	20%	
5.5 m	25%	
7.7 m	35%	
9.9 m	45%	
11.4 m	52%	
13.6 m	62%	
15.8 m	72%	
17.6 m	80%	
18.7 m	85%	
19.8 m	90%	
20.9 m	95%	
21.5 m	98%	

2. Plot (**by hand**) the measured ground resistance values versus the percentage of distance (X) to overall distance (D) (i.e., X/D).

*See next page*



3. Does the measured curve resemble the expected theoretical curve?

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4. Determine the average ground resistance for this short rod from the three readings at 52%, 62%, and 72% of the distance ratio (X/D)?

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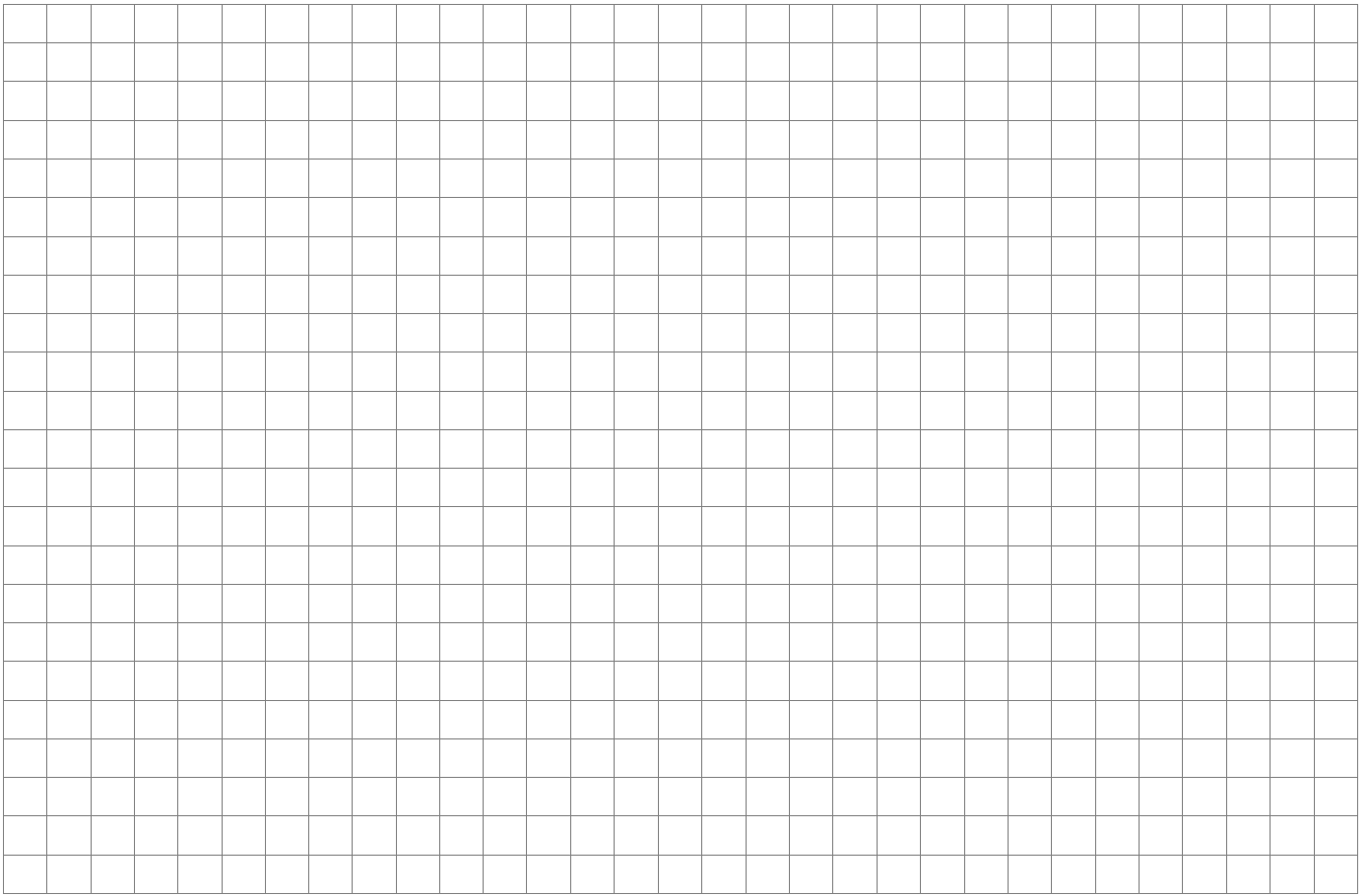
**PROCEDURE B: RAINY DAY**

1. Repeat the above fall-of-potential test for the same *short* earthing rod after you have poured some tap water on and around the rod (simulating rain on a winter day). One or two liters of water should be enough. Keep the distance **D = 22 meters** between the earth probe (E) and the current probe (C). Fill the table below with the new ground resistance readings.

Distance (X) between potential probe (P) and earth probe (E)	Percentage of distance (X) to distance (D), i.e., X/D	Measured ground resistance value ( $\Omega$ )
0.5 m	2%	
1.1 m	5%	
2.2 m	10%	
3.3 m	15%	
4.4 m	20%	
5.5 m	25%	
7.7 m	35%	
9.9 m	45%	
11.4 m	52%	
13.6 m	62%	
15.8 m	72%	
17.6 m	80%	
18.7 m	85%	
19.8 m	90%	
20.9 m	95%	
21.5 m	98%	

2. Plot (**by hand**) the measured ground resistance values versus the percentage of distance (X) to overall distance (D) (i.e., X/D).

*See next page*



3. Determine the average ground resistance for this short rod (on a rainy day) from the three readings at 52%, 62%, and 72% of the distance ratio (X/D)?

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4. Comment on the difference between the results in this procedure and results of the previous procedure A (without using water)?

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5. Why did extra moisture change the ground resistance value? Explain the science behind this.

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**PROCEDURE C: OTHER EARTHING ROD**

1. Repeat the above fall-of-potential test, but for the other *longer* earthing rod (which is driven about 120 cm into the ground). **No need** to pour any water. Maintain similar distance **D = 22 meters** between the earth probe (E) and the current probe (C). Fill the table below with the new readings by varying the distance (X) between the potential probe (P) and the earth probe (E).

Distance (X) between potential probe (P) and earth probe (E)	Percentage of distance (X) to distance (D), i.e., X/D	Measured ground resistance value ( $\Omega$ )
0.5 m	2%	
1.1 m	5%	
2.2 m	10%	
3.3 m	15%	
4.4 m	20%	
5.5 m	25%	
7.7 m	35%	
9.9 m	45%	
11.4 m	52%	
13.6 m	62%	
15.8 m	72%	
17.6 m	80%	
18.7 m	85%	
19.8 m	90%	
20.9 m	95%	
21.5 m	98%	

2. Plot (**by hand**) the measured ground resistance values versus the percentage of distance (X) to overall distance (D) (i.e., X/D).

*See next page*

3. Determine the average ground resistance for the long rod from the three readings at 52%, 62%, and 72% of the distance ratio (X/D)?

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4. Comment on the difference between the results in this procedure and the previous results of procedure A?

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