King Fahd University of Petroleum and Minerals

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EET-027, Experiment # 5

Thermocouple Voltage Measurement

Objectives:

To examine the thermocouple voltage and find corresponding temperature under the following conditions:

- 1. To measure voltage of thermocouple without considering the intermediate thermocouple effect of measurement setup.
- 2. To measure voltage of thermocouple with ice-point reference junction and fine corresponding voltage using the thermocouple table.
- 3. To measure voltage of thermocouple using ambient reference block and calculate the corrected voltage and then find the corresponding temperature.

Apparatus:

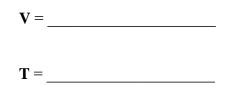
J type thermocouples 4-1/2 digit DVM. Temperature Indicator. Ice point water Boiling water

Theory:

Theory as per attached sheets.

Procedure:

1. Setup the experiment as Figure 4 in theory sheets and measure voltage V.



2. Setup the experiment as Figure 6 of theory sheets and measure voltage V and calculate V₁. Find temperature (T₁) corresponding to V₁ from table.

$$V = V_1 - V_2$$
$$V = \alpha (T_1 - T_2)$$

where,

$$V_1 = \alpha t_1$$
$$V_2 = \alpha t_2$$
$$t({}^{0}C) = T({}^{0}K) + 273.15$$

V	V ₁	Т	T ₁

- 3. Setup the experiment according to figure 12.
 - a. Note reference temperature, which will be ambient temperature from temperature indicator.
 - b. Measure V and find V_1 .

$$V = V_1 - \alpha T_{REF}$$

c. Find the temperature from table corresponding to V.

T _{REF}	V	V ₁	Т	T ₁

4. Compare voltages from setup 1, 2 and 3 and write your conclusions below.

Conclusions:

Explain:

Which set up gives the correct temperature? Which set up gives maximum error?