

071306T4ELC

ELECTRONICS ENGINEERING LEVEL 6

ENG/OS/ET/CR/06/6/A

Maintain Automation and Radio Frequency Systems

March/April 2025



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

PRACTICE ASSESSMENT

Time: 4 HOURS

INSTRUCTIONS TO CANDIDATE:

Figure 1 illustrates a “High Temperature” indicator circuit comprising two main sections: a temperature sensing circuit and a voltage comparator circuit (located to the right of the dotted line). The non-inverting amplifier in the circuit has a gain of 5. The comparator circuit’s set point voltage is 4 V, achieved through voltage division (with $R_2=1.65\text{ k}\Omega$), corresponding to a temperature of 27°C . When the temperature exceeds 80°F , the comparator output saturates (under no-load conditions). To protect the LED, a $R_{out}=500\Omega$ resistor ensures the current through the LED does not exceed 20 mA.

1. You are required to perform the following tasks:

TASK 1: Inspect the circuit and prepare a detailed maintenance checklist.

TASK 2: Identify faults using testing equipment, repair the circuit, and verify the circuit's functionality by adjusting the feedback variable resistor until you get the desired gain of 5 and adjusting R2 so that the circuit is operating as expected (LED is ON as soon as the input voltage to Pin 3 exceeds 4 V)

TASK 3: Perform initial testing and verification

- i. Verify amplifier gain is 5.
- ii. Confirm comparator input voltage is 4 V.
- iii. Measure the LM34 output.
- iv. Monitor the LED's behavior and record results.

TASK 4: Transfer and solder the circuit on a copper stripboard, ensuring proper connections and joint quality.

TASK 5: Repeat all measurements (gain, input voltage, sensor output, and LED behavior) to confirm the circuit's performance post-transfer.

TASK 6: Compile a report detailing all repairs, test results, and the final operational status of the circuit.

2. You have been provided with the following resources for the practical tasks:

- Faulty "High Temperature" indicator circuit installed on breadboard.
- Testing equipment (multimeter).
- Soldering equipment (soldering iron, solder wire).
- 12 V DC power source.
- Single-phase AC source (for soldering equipment).
- Copper stripboard.
- Oscilloscope

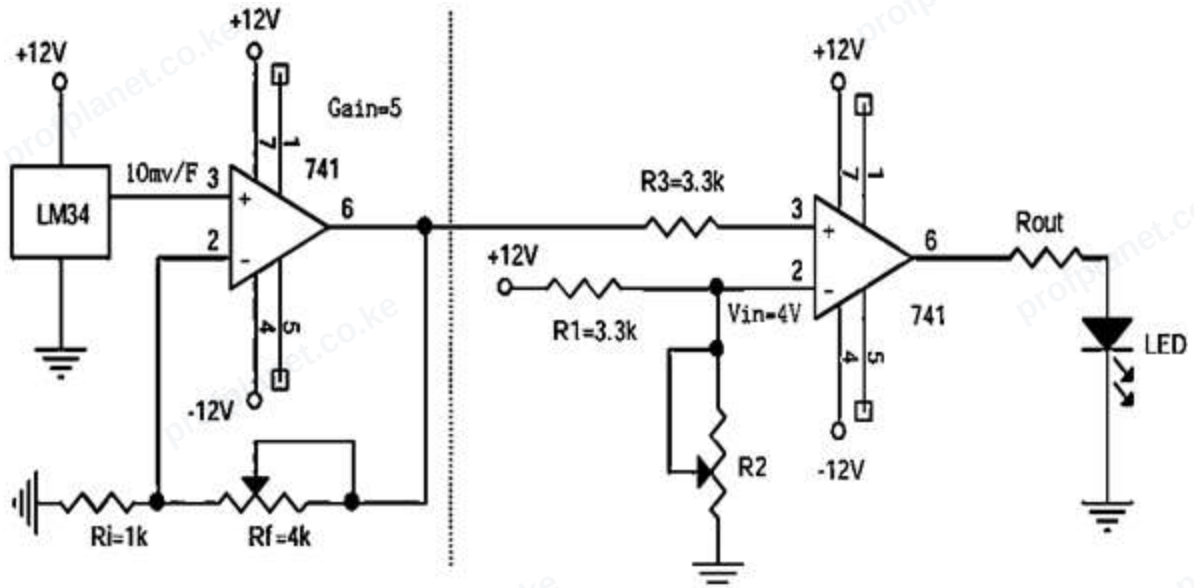


Figure 1

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