

Solution Summary:

- Recognize that for an isothermal process, temperature (T) remains constant.
- Use the formula for work in an isothermal process:

$$W = nRT \ln \frac{V_2}{V_1}$$

- Substitute known values and compute.

Step-by-step Breakdown:

- Write down the ideal gas law: $(PV = nRT)$.
- Recall that for an isothermal process, the work done is based on pressure-volume work:

$$W = \int_{V_1}^{V_2} P \, dV$$

- Express (P) as $(\frac{nRT}{V})$.
- Integrate:

$$W = nRT \int_{V_1}^{V_2} \frac{1}{V} \, dV = nRT \ln \frac{V_2}{V_1}$$

- Plug in the values and solve.

This clear methodology helps students understand the process rather than just memorizing formulas.

Example 2: Analyzing a Carnot Cycle

Problem:

Calculate the thermal efficiency of a Carnot engine operating between two reservoirs at temperatures (T_H) and (T_C) .

Solution Summary:

