Lesson Plan 10

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| **Title**: **Chapter 20: Entropy and the second law of thermodynamics** | | **Ref. No**: Week 5,  Day 2 | | |
| **Target Group/Population**: B. Sc students (CS, EEE and IPE) | | **Duration**: 90 min | | |
| **Aims/Rationale**: To give the students basic concepts of second law of thermodynamics and a Carnot engine | | | | |
| **Learning Outcomes**: At the end of the session, the students will be able to understand and analyze above topics and apply those to solve related problems. | | | | |
| **Contents:** 20-1: Entropy (second law of thermodynamics)  20-2: Entropy in the real world: Engines (a Carnot engine) | Method or  Technique | | Resource  or Aid | Time |
| **Introduction**:   * Welcome address * Rapport building * Review the main topics of last lecture * Importance/bridging the topic * Pre-assessment of student’s knowledge | Lecture  QA | | WB  MMP | 15 min |
| **Development**:  1. Explain the second law of thermodynamics.  2. Sketch a *p-V* diagram for the cycle of a Carnot engine, indicating the direction of cycling, the nature of the processes involved, the work done during each process (including algebraic sign), the net work done in the cycle, and the heat transferred during each process (including algebraic sign).  3. Sketch a Carnot cycle on a temperature–entropy diagram, indicating the heat transfers. | Lecture Discussion QA  Problem Solving | | WB  MMP | 60 min |
| **Conclusion**:   * Quick recap/summary * Feedback from the students * References * Forward planning |  | | WB  MMP | 15 min |
| Problems:  3. A 2.50 mol sample of an ideal gas expands reversibly and isothermally at 360 K until its volume is doubled. What is the increase in entropy of the gas?  4. How much energy must be transferred as heat for a reversible isothermal expansion of an ideal gas at 132 0C if the entropy of the gas increases by 46.0 J/K? | | | | |