Lesson Plan 11

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| **Title**: **Chapter 20: Entropy and the second law of thermodynamics** | | **Ref. No**: Week 6,  Day 1 | | |
| **Target Group/Population**: B. Sc students (CS, EEE and IPE) | | **Duration**: 90 min | | |
| **Aims/Rationale**: To give the students basic concepts of work done, net entropy change and efficiency of 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:** 20-2: Entropy in the real world: Engines (the work, entropy changes, efficiency of 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. Determine the work done and net entropy change around a Carnot cycle.  2. Derive the efficiency of a Carnot engine in terms of the heat transfers and also in terms of the temperatures of the reservoirs. | 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:  23. A Carnot engine whose low-temperature reservoir is at 17 0C has an efficiency of 40%. By how much should the temperature of the high-temperature reservoir be increased to increase the efficiency to 50%?  24. A Carnot engine absorbs 52 kJ as heat and exhausts 36 kJ as heat in each cycle. Calculate (a) the engine’s efficiency and (b) the work done per cycle in kilojoules. | | | | |