Indian Institute of Technology Bombay
Department of Energy Science and Engineering
Thermodynamics and Energy Conversion
(EN 203)

1. Course Content (Tentative)

1.1. **Introduction:** Definitions: Systems, Control volume, Property, State, Process, Cycle; Equilibrium; Gibbs Phase Rule

1.2. **First Law of Thermodynamics:** Work; Heat; Internal Energy; Steady state

1.3. **Second Law of Thermodynamics:** Introduction; Clausius and Kelvin-Planck statements and their equivalence; Irreversibility; Carnot's Theorems; Maximum performance measures for cycles; Entropy and its properties

1.4. **Third Law of Thermodynamics:** The Zero of Entropy; Joule-Thomson expansion (Cryogenics)

1.5. **Auxiliary Functions & Maxwell Relations:** Auxiliary functions; Maxwell relations; Thermodynamic parameters as functions of P and T and simply any other parameters

1.6. **Power Systems:** Rankine cycle; Air standard Otto, Diesel, Brayton cycles

2. Bibliography

2.1. *Thermodynamics and Chemistry*; Howard DeVoe; Pearson Education Inc., New York, 2nd Ed. (2020) – Copyright by Howard DeVoe.
E-book and Solutions manual are available at
http://www2.chem.umd.edu/thermobook/downloads.htm

2.2. *Fundamentals of Engineering Thermodynamics*; M. J. Moran, H. N. Shapiro, D. D. Boettner, M. B. Bailey; John Wiley & Sons, New York, 7th Ed. (2010)

2.3. *Thermodynamics – An Engineering Approach*; Y. A. Çengel, M. A. Boles; McGraw Hill, New York, 8th Ed. (2017)

2.4. *Engineering Thermodynamics*; M. Achuthan; Prentice Hall India, India, 2nd Ed. (2009)

2.5. *Engineering Thermodynamics*; P. K. Nag; McGraw Hill, India, 6th Ed. (2010)

3. Schedule

Slot 8: Mon: 14:00-15:25 Thu: 14:00-15:25

4. Mode of conducting the course

4.1. ***Flipped classroom:*** Students have to watch pre-recorded lecture videos on specific topics every week and attend the live sessions as announced by the instructor or TA.

4.2. ***Video Lectures:*** Links of lecture videos will be posted every week in Moodle and Microsoft Teams. Students should watch the videos and solve any practice problems during Monday 14:00-15:25 or as per their convenience (but before Thursday 14:00) every week. Instructor and TA will not be available during this time.

4.3. ***Live Sessions:*** Every Thursday between 14:00-15:25 through Microsoft Teams. Links of these sessions will be posted every week in Moodle and Microsoft Teams. Students must attend these live sessions. These sessions are only for discussions and Q&A and not for teaching any new topics. However, the instructor may choose to solve some new problems on case-to-case basis during these sessions. More participation is needed from students during these live interactions.

4.4. ***Forums:*** Topic-specific Forums will be opened in Moodle as appropriate. The students can post their questions and discussions in these forums. The longevity of the Forums is the same as that of the corresponding topics. The instructor and TA will monitor these Forums regularly.

4.5. ***Class Notes:*** An online class notes may be maintained by the instructor using Microsoft OneNote software and embedded in Microsoft Teams to summarize the lectures, and provide any additional learning material, tips etc. Part of this material may be used in exams. Students are expected to go through this material. Please note: This is only experimental.

5. Attendance in Live sessions

Not compulsory; 5% Bonus Marks if >80%

6. Evaluation (mode: online/offline will be announced appropriately)

Quizzes (4x15% each): 60%
End Semester Exam: 40%

7. Teaching Assistants

Satyaki Chandra (174176002); 174176002@iitb.ac.in

8. Instructor

Sankara Sarma V Tatiparti; Faculty Office 6; 6th Floor, DESE-CESE Bldg., sankara@iitb.ac.in; Ph. 7672; Reachable in Moodle and Microsoft Teams

9. Software and Web (Login using LDAP credentials)

Students must install/access the following on your computers/ mobile devices

- Moodle – website; or desktop/mobile app
- Microsoft Teams – website; or desktop/mobile app
- Microsoft OneNote – website; or desktop/mobile app

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