

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

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| 1. | Title of the Course | Chemical Engineering Thermodynamics-I |
| 2. | Course Number | CH2105 |
| 3. | Status of the Course | Core |
| 4. | Structure of Credits | 2-1-0-3 |
| 5. | Offered To | UG |
| 6. | New Course/Modification to | New |
| 7. | To be Offered by | Department of Chemical Engineering |
| 8. | To take effect from | July 2018 |
| 9. | Prerequisite | Nil |
| 10. | Whether approved by the Department | Yes |
| 11. | Course Objective: To provide a fundamental overview of the thermodynamic laws, properties and their applications in ideal and real fluids. To learn some of the basic principles behind the design of engineering equipment and process operations and solve a wide variety of problems that chemical engineers tackle. | |
| 12. | Course Content: First Law: energy balance in open, closed, and isolated systems; Steady state and transient processes; Second law: reversible and irreversible processes; Entropy balance for open, closed, and isolated systems; Third law: molecular basis for zero entropy at zero temperature; Properties of pure fluids: phase diagrams, equations of state, compressibility factor, generalized correlations, residual properties, equations of state for liquids; Ideal gas and real fluids: cubic equations; departure functions; Relationship among thermodynamic functions: fundamental relationships between thermodynamic properties; Maxwell's equations; Thermodynamic property calculations; Thermodynamics of fluid flow and devices: expansion and compression of fluids; turbines, tubes, throttling, nozzles, pumps; Thermodynamics of energy conversion: power production (e.g. Carnot cycle; Rankine cycle, internal combustion engine; diesel engine); Refrigeration and liquefaction: Carnot and actual cycles; vapor compression and absorption; refrigerants; liquefaction of gases. | |
| 13. | Text book(s): 1. Sandler S I, <i>Chemical, Biochemical and Engineering Thermodynamics, 4th Edition</i> , John Wiley (2006). 2. Smith J M, Van Ness H C and Abbott M M, <i>Introduction to Chemical Engineering Thermodynamics, 7th Edition</i> , Prentice Hall (2005). | |
| 14. | Reference(s): 1. Elliot J R and Lira C T, <i>Introductory Chemical Engineering Thermodynamics, 2nd Edition</i> , Prentice Hall (2012). 2. Tester J W and Modell M, <i>Thermodynamics and its Applications, 3rd Edition</i> , Prentice Hall (1997). | |