GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

Mechanical Engineering (I.C.Engine & Automobile)

Subject Name Advanced Thermodynamics & Heat Transfer

Sr.No	Course content
1.	Basic concepts of thermodynamics; irreversibility; Review of basic laws of thermodynamics and their consequences; Concept of Exergy and Entropy; Exergy for closed system; Entropy generation; entropy balance for closed system; behavior of gases; Equations of state.
2.	Phase equilibrium; phase rule without chemical reaction; chemical potential of ideal gases; T-ds equations for simple compressible systems; Helmholtz and Gibbs functions; Maxwell relations; generalized relations for changes in enthalpy; entropy and internal energy; equations for specific heats; Clausius clapeyron equation; Joule-Thomson and Joule coefficients; applications of thermodynamic relations.
3.	Review of the basic laws of conduction; One dimensional steady state conduction with variable thermal conductivity and with internal distributed heat source; Extended surfaces-review and design considerations; Two dimensional steady state conduction; Unsteady state conduction; solutions using Groeber's and Heisler's charts for plates,cylinders and spheres suddenly immersed in fluids.
4.	Review of convection and radiation heat transfer laws, Natural and forced convection; Heat transfer in turbulent flow; eddy heat diffusivity; Reynold's analogy between skin friction and heat transfer; von Karman; turbulent flow through circular tubes; Review of radiation principles; diffuse surfaces and the Lambert's Cosine law; Radiation through non-absorbing media; Hottel's method of successive reflections.

Reference Books:

1. Fundamentals of Engineering Thermodynamics, Moran MJ & Shapiro HM, John Wiley,
2. Engineering Thermodynamics work and heat Transfer, Roger Gordon & Yon Mayhew, Addison-Wesley, 2001
3. Thermodynamics an Engineering Approach, Cengel Y.A. & Boles M.A., Tata McGraw-Hill,
4. Fundamentals of Classical Thermodynamics, Van Wylen GJ & S onntag RE, Wiley
5. Thermodynamics, Wark K. Jr. & Donald E.R.,Mc Graw Hill (6^{th} Edn.); 1999.
6. Fundamentals of Heat Transfer, Encropera
7. Heat, Mass and Momentum transfer, Rohsenow and Choi Prentice Hall
8. Fundamentals of Heat Transfer, Grober, Erk and Mc Graw Hill Grigull
9. Analysis of Heat and Mass Transfer, Eckert and Drake McGraw Hill
10. Thermal Radiation, Siegel and Howell McGraw Hill.
11. Engineering Thermodynamics by Jones & Dugan
12. Engineering Thermodynamics by P. K. Nag
13. Basic Engineering Thermodynamics by T Ray chaudhary
14. Fundamentals of Engineering thermodynamics, R. Yadav.
15. Advanced thermodynamics Engineering, Kalyan Annamalai & Ishwar K Puri, CRC Press.
16. Heat and Mass Transfer, R.K.Rajput
17. Heat and Mass Transfer, D.S.Kumar
18. Handbook of Thermal Engineering, Kreith F