Applied Thermodynamics & Heat Transfer

712101N

M.E. (Thermal Engineering)

Mechanical Engineering Department

Ghandhinagar Institute of Technology

2011-2012

Gandhinagar Institute of Technology

Mechanical Engineering Department

ME Semester I

Applied Thermodynamics & Heat Transfer (712101N)

Index

GUJARAT TECHNOLOGICAL UNIVERSITY

Mechanical Engineering (Thermal Engineering)

M.E. Semester: 1

Subject Code	Subject	Teaching Scheme (Hours)			Credit
		Theory	Tutorial	Practical	
712101N	Applied Thermodynamics & Heat Transfer	4	0	0	4

University		MSE Marks (M)	Practical (I)	Total Marks	Branch Code
Theory	Practical / Viva				
70	0	30	20	120	21

Sr. No	Sub. Part.	Course Content
1	*Applied Thermodynamics*	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; behaviour 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	*Heat Transfer*	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.

Gandhinagar Institute of Technology

Mechanical Engineering Department

Subject: Applied Thermodynamics & Heat Transfer (712101N)

Reference Books

Applied Thermodynamics:

1. Fundamentals of Engineering Thermodynamics, Moran MJ & Shapiro HM, John Wiley.
2. Engineering Thermodynamics work and heat Transfer, Roger Gordon & Yon Mayhew, Addison-Wesley.
3. Thermodynamics an Engineering Approach, Cengel Y.A. & Boles M.A., TMH.
4. Fundamentals of Classical Thermodynamics, Van Wylen GJ & Sonntag RE, Wiley
5. Thermodynamics, Wark K. Jr. & Donald E.R.,Mc Graw Hill (6th Edn.); 1999.
6. Engineering Thermodynamics by Jones & Dugan
7. Engineering Thermodynamics by P. K. Nag
8. Basic Engineering Thermodynamics by T Ray chaudhary
9. Fundamentals of Engineering thermodynamics, R. Yadav.
10. Advanced thermodynamics Engineering, Kalyan Annamalai & Ishwar K Puri, CRC Press

Heat Transfer:

11. Fundamentals of Heat Transfer, Incropera.
12. Heat, Mass and Momentum transfer, Rohsenow and Choi Prentice Hall
13. Fundamentals of Heat Transfer, Grober, Erk and Mc Graw Hill Grigull
14. Analysis of Heat and Mass Transfer, Eckert and Drake McGraw Hill
15. Thermal Radiation, Siegel and Howell McGraw Hill.
16. Heat and Mass Transfer, R.K.Rajput
17. Heat and Mass Transfer, D.S.Kumar
18. Handbook of Thermal Engineering, Kreith F

Gandhinagar Institute of Technology

Mechanical Engineering Department

M.E. Thermal Engineering

Lesson Planning

Subject: Applied Thermodynamics & Heat Transfer (712101N)

Sr. No.	Topics	Lectures (Hours)	Reference books	Teaches by
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; behaviour of gases; Equations of state.	10	1,3,4,5,7,9	HBK
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.	14	1,3,4,5,7,9	HBK

Subject in charge	**Taken by**	**HOD**
Prof. Nimesh M Gajjar	Prof. Hardik Kothadia	Prof. Mitesh J Mungla

Reference Books:

Applied Thermodynamics:

1. Fundamentals of Engineering Thermodynamics, Moran MJ & Shapiro HM, John Wiley.
2. Engineering Thermodynamics work and heat Transfer, Roger Gordon & Yon Mayhew, Addison-Wesley.
3. Thermodynamics an Engineering Approach, Cengel Y.A. & Boles M.A., TMH.
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Gandhinagar Institute of Technology

Mechanical Engineering Department

M.E. Thermal Engineering

Lesson Planning

Subject: Applied Thermodynamics & Heat Transfer (712101N)

Sr. No.	Topics	Lectures (Hours)	Reference books	Teaches by
1	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.	11	11,12,16,17	NMG
2	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.	13	11,12,15,16, 17	NMG

Subject in charge	**Taken by**	**HOD**
Prof. Nimesh M Gajjar	Prof. Nimesh M Gajjar	Prof. Mitesh J Mungla

Reference Books:

Heat Transfer:

11. Fundamentals of Heat Transfer, Incropera.
12. Heat, Mass and Momentum transfer, Rohsenow and Choi Prentice Hall
13. Fundamentals of Heat Transfer, Grober, Erk and Mc Graw Hill Grigull
14. Analysis of Heat and Mass Transfer, Eckert and Drake McGraw Hill
15. Thermal Radiation, Siegel and Howell McGraw Hill.
16. Heat and Mass Transfer, R.K.Rajput
17. Heat and Mass Transfer, D.S.Kumar
18. Handbook of Thermal Engineering, Kreith F

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ME semester – I

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TA component	Plan		
	Faculty Name	**Type**	**Proposed date/present status during semester**
TA 1	NMG	Term Assignment	Fifth week /
TA 2	HBK	Term Assignment	Six week /
TA 3	NMG	Term Assignment	Tenth week /
TA 4	HBK	Term Assignment	Eleven week /

Above assignment will have to be submitted within a week from the given date.

Course coordinator

Prof. Nimesh M Gajjar