

**GOPAL KRISHNA COLLEGE OF
ENGINEERING AND TECHNOLOGY
GOURAHARI VIHAR, PO: RANIPUT, JEYPORE – 764 005**

LESSON PLAN

Name of the Subject: HEAT TRANSFER (HT)

Name of the Faculty: Er. PRADEEP KUMAR NAHAK

Subject Code:MEPC3002

Course Structure:3-0-0

Semester: 5th Semester

Branch:Mechanical

Semester From: July to November

No. of Weeks: 15 Weeks

WEEK	DAY	THEORY TOPIC	CLASS
1		Unit 1 – Fundamentals of Heat Transfer	6
	1	Introduction to heat transfer and modes: conduction, convection, radiation	1
	2	Basic laws governing heat transfer	1
	3	Thermal conductivity, conductance and resistance	1
2	4	Contact resistance and heat transfer coefficients	1
	5	Electrical analogy and combined heat transfer modes	1
	6	Boundary conditions and initial conditions	1
		Unit 2 – Heat Conduction	12
3	7	General heat conduction equation	1
	8	Simplifications for 1D and 2D conduction	1
	9	Steady state conduction in plane walls	1

4	10	Conduction in cylinders and spheres	1
	11	Composite systems and insulation	1
	12	Critical thickness of insulation	1
5	13	Extended surfaces (fins): types and analysis	1
	14	Fin efficiency and effectiveness	1
	15	Lumped heat analysis	1
6	16	Numerical problems (Module-II)	1
	17	Revision session	1
	18	Tutorial/problem-solving	1
		Unit 3 – Convection Heat Transfer	12
7	19	Introduction to convection: forced and natural	1
	20	Dimensional analysis and similarity	1
	21	Dimensionless numbers (Re, Pr, Nu, Gr, St)	1
8	22	Boundary layer theory	1
	23	Flow over flat plates	1
	24	Drag and heat transfer correlations	1
9	25	Internal flow in ducts and pipes	1
	26	Empirical correlations for turbulent flow	1
	27	Natural convection mechanisms	1

10	28	Natural convection correlations (plates and tubes)	1
	29	Numerical problems (Module-III)	1
	30	Revision session	1
		Unit 4 – Radiation Heat Transfer	9
11	31	Radiation heat transfer basics	1
	32	Radiation properties: absorptivity, emissivity	1
	33	Kirchhoff's law and black body radiation	1
12	34	Stefan-Boltzmann law and Wien's law	1
	35	Shape factors and radiation exchange	1
	36	Radiation between gray bodies	1
13	37	Radiosity and irradiation	1
	38	Radiation shields	1
	39	Numerical problems (Module-IV)	1
		Unit 5 – Boiling, Condensation and Heat Exchangers	9
14	40	Boiling heat transfer: regimes and correlations	1
	41	Condensation: film and dropwise	1
	42	Critical heat flux and forced boiling	1
15	43	Heat exchangers: types and applications	1
	44	LMTD method	1

	45	NTU method	1
16	46	Numerical problems on heat exchangers	1
	47	Overall revision	1
	48	Doubt clearing and exam preparation	1

Books Recommended

1. *Heat and Mass Transfer* by R.K. Rajput
2. *Fundamentals of Heat and Mass Transfer* by Incropera and DeWitt
3. *Heat Transfer* by J.P. Holman
4. *A Textbook of Heat Transfer* by S.P. Sukhatme

NPTEL Lectures

1. <https://nptel.ac.in/courses/112101097>
2. <https://nptel.ac.in/courses/112105245/>