

KIIT POLYTECHNIC, BHUBANESWAR

LESSON PLAN

Session 2022-23

Discipline : Metallurgical Engineering	Semester: 5th, Winter/2022	Name of the Faculty: Manas Ranjan Behera Lecturer E-mail Id: mrbeherafmt@kp.kiit.ac.in
Subject: Heat transfer, Fluid flow and Furnaces (Th.2)	No. Days/Week: 4	Start date: 14/09/2022 End date: 21/01/2023
Week	Class Day	Theory Topics
1st	1st	Introduction to fluid flow.
	2nd	Discussion on types of fluid.
	3rd	Discussion on ideal fluid.
	4th	Discussion on real fluid.
2nd	1st	Discussion on types of flow.
	2nd	Discussion on streamline flow.
	3rd	Discussion on turbulent flow.
	4th	State Bernoulli's equation.
3rd	1st	Explanation of Bernoulli's equation.
	2nd	Discussion about flow through orifices.
	3rd	Discussion about flow through Pitot tube.
	4th	Discussion about flow through venturimeters.
4th	1st	Define loss of head (friction loss).
	2nd	Calculation of loss of head in straight pipes, in bends and channel with sudden enlargement and sudden contraction.
	3rd	Numerical on fluid flow.
	4th	Discussion on possible questionnaire.
5th	1st	Quiz test
	2nd	Introduction to heat flow.
	3rd	Discussion on different modes of heat transfer.
	4th	Define and explain conduction.
6th	1st	State and derive Fourier's law.
	2nd	Explain the steady state heat conduction through flat walls.
	3rd	Define and explain convection.
	4th	Define natural convection and forced convection.

7th	1st	Differentiate between natural convection and forced convection.
	2nd	State the natural and forced heat transfer co-efficient.
	3rd	Define and explain radiations.
	4th	State the Stefan Boltzmann's law.
8th	1st	Define emissivity.
	2nd	Define emissivity of black bodies.
	3rd	Define emissivity of grey bodies.
	4th	Discussion on possible questionnaire.
9th	1st	Introduction to furnaces.
	2nd	Define furnace with examples.
	3rd	Classification of furnace based on use, heat source and material movement.
	4th	Discussion about different metallurgical furnaces.
10th	1st	Discussion on soaking pit.
	2nd	Discussion on reheating furnace.
	3rd	Discussion on heat treatment furnace.
	4th	Discussion on melting furnace.
11th	1st	Discussion on smelting furnace.
	2nd	Discussion on refining furnace.
	3rd	Introduction to electric furnace.
	4th	Principle of heat generation in electric furnace.
12th	1st	Principle of heat generation in arc furnace.
	2nd	Principle of heat generation in resistance furnace.
	3rd	Principle of heat generation in induction (core less) furnace.
	4th	Discussion on possible questionnaire.
13th	1st	Discussion on heat losses.
	2nd	Discussion on heat balance.
	3rd	Discussion on furnace efficiency.
	4th	Quiz test.
14th	1st	Waste heat recovery systems.
	2nd	Types of waste heat recovery systems.
	3rd	Discussion on regenerators.
	4th	Discussion on recuperators.
15th	1st	Difference between regenerators and recuperators.
	2nd	Discussion on previous year's questions.

	3rd	Practice test
	4th	Practice test

Recommended books: 1.Elements of Fluid mechanics by V.C.sheshadri&U.Patankar

2. Principles of Extractive Metallurgy by A.Ghosh&H.S.Ray