KIIT POLYTECHNIC

Department of Metallurgical Engineering

LESSON PLAN

Session	::	Winter-2022
Course Type	::	Theory
Semester/Branch	::	5th Semester, Metallurgical Engineering
Subject (with code)	::	**Heat Transfer, Fluid Flow and Furnace (Th.2)**
Contacthours/week	::	4
Name of Faculty	::	Manas Ranjan Behera & Durga Sankar Panda

SL. NO.	CLASS ID	Introduction. Properties of fluid.	MODE OF DELIVERY	EXHIBIT/ REFERENCE
1	1	Properties of fluid. Problem.	Lecture (Explanation)	1. Study Material 2. A Text Book of Fluid Mechanics and Hydraulic Machines –Dr. R. K. Bansal
2	2	Types of fluids (ideal and real). Type of flow (stream line & turbulent).	Lecture (Explanation)	1.Study Material 2. A Text Book of Fluid Mechanics and Hydraulic Machines –Dr. R. K. Bansal
3	3	Equation of Continuity. Problems.	Lecture (Explanation)	1.Study Material 2. A Text Book of Fluid Mechanics and Hydraulic Machines –Dr. R. K. Bansal
4	4	State and explain Bernouli's equation. Limitation	Lecture (Demonstration)	
5	5	Problem solving		
6	6	Application. Flow through venturies.	Hybrid	NPTEL :: Mechanical Engineering - Introduction to Fluid Machines and Compressible Flow
7	7	Flow through orifices, pitot tube.	Flipped class	
8	8	Flow through Pipes. Darcy's Formula. Simple Problems.	Lecture (Explanation)	1.Study Material 2. A Text Book of Fluid Mechanics and Hydraulic Machines –Dr. R. K. Bansal
9	9	Chezi's Formula. Simple Problems.	Lecture (Elaboration)	1.Study Material 2. A Text Book of Fluid Mechanics and Hydraulic Machines –Dr. R. K.

				Bansal
10	10	Introduction. Properties of fluid.	Lecture (Explanation)	1.Study Material 2. A Text Book of Fluid Mechanics and Hydraulic Machines –Dr. R. K. Bansal
11	11	Define and calculate loss of head (friction loss) in straight pipes, in bends and channel with sudden enlargement. Problems.	Lecture (Elaboration)	1.Study Material 2. A Text Book of Fluid Mechanics and Hydraulic Machines –Dr. R. K. Bansal
12	12	Calculate loss of head (friction loss) in straight pipes, in bends and channel with sudden contraction. Simple problems.	Lecture (Elaboration)	1.Study Material 2. A Text Book of Fluid Mechanics and Hydraulic Machines –Dr. R. K. Bansal
13	13	Discussion & Problem Practice.		
14	14	**Assignment evaluation, class test**		
15	15	Discuss the elementary idea on different modes of heat transfer.	Prompt & Clue	
16	16	Conduction. Define and derive the Fourier's law.	Lecture (Explanation)	1.Study Material 2.Thermal Engineering By A. R. Basu
17	17	Discussion and Problem Practice.		
18	18	Explain & calculate the steady state heat conduction through flat walls.	Lecture (Explanation)	1.Study Material 2.Thermal Engineering By A. R. Basu
19	19	Discussion and Problem Practice.		
20	20	Define Convection. Define and differentiate between natural and forced convection.	Lecture (Elaboration)	1.Study Material 2.Thermal Engineering By A. R. Basu
21	21	State the natural and forced heat transfer co-efficient (equation only, no derivation). Problems.	Lecture (Elaboration)	1.Study Material 2.Thermal Engineering By A. R. Basu
22	22	Define radiation. State the Stefan Boltzmann's Law.	Lecture (Explanation)	1.Study Material 2.Thermal Engineering By A. R. Basu
23	23	Define emissivity of black bodies and grey bodies.	Lecture (Explanation)	1.Study Material 2.Thermal Engineering By A. R. Basu
24	24	Discussion and Problem Practice.		
25	25	Discussion and Problem Practice.		
26	26	**Assignment evaluation, class test**		

27	27	Classify the furnaces based on use, heat source and material movements.	Lecture (Explanation)	Study material
28	28	Soaking pits	Lecture (Explanation)	Study material
29	29	Reheating furnace	Lecture (Explanation)	
30	30	Heat treatment furnace	Lecture (Explanation)	Study material
31	31	Melting		
32	32	Smelting	Flipped class	Study material
33	33	Refining furnaces	Lecture (Explanation)	Study material
34	34	Discussion		
35	35	**Assignment evaluation, class test**		
36	36	The principles of heat generation in electric furnaces	Lecture (Explanation)	Study material
37	37	Principles of heat generation in electric furnaces: arc	Lecture (Explanation)	Study material
38	38	Principles of heat generation in electric furnaces: resistance	Studio based	Study material
39	39	**Assignment evaluation, class test**		
40	40	Heat losses.	Lecture (Explanation)	Study material
41	41	Heat balance. Furnace efficiency.	Lecture (Explanation)	Study material
42	42	Heat balance. Furnace efficiency.		
43	43	Problems.		
44	44	Problems.		
45	45	**Assignment evaluation, class test**		
46	46	Explain the types of waste heat recovery system.	Lecture (Explanation)	Study material
47	47	Explain the types of waste heat recovery system.	Lecture (Explanation)	Study material
48	48	*Discussion of previous year questions*		

Signature of Concern Teacher