Format K1

Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP) Academic Year: **2026-27 (ODD)**

Institute Code and Name: 0078- K. K. Wagh Polytechnic, Nashik **Semester**: Fifth
Programme and Code: Chemical Engineering (CH) **Course Index: 507**
Course and Code: INTRODUCTION TO RENEWABLE ENERGY (IRE) 315311 Date: 01/07/2026
Name of Faculty: Dr S. S. Rikame **CLASS: TYCH**

INDUSTRY EXPECTED OUTCOME

Supervise the operation of different renewable energy equipment in order to preserve conventional energy.

COURSE LEVEL LEARNING OUTCOMES (COS)

- CO507.1 - Undertake the operation of wind mill for generation of electricity.
- CO507.2 - Use solar system for different application
- CO507.3 - Differentiate sources of energy from biomass.
- CO507.4 - Measure the amount of electricity produce using micro-hydro power plant.
- CO507.5 - Compare tidal energy & geothermal energy.

TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
				Actual Contact Hrs/Week			SLH	NLH			Theory				Based on LL & TSL Practical				Based on SL		
											FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
				CL	TL	LL					Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
315311	INTRODUCTION TO RENEWABLE ENERGY	IRE	DEC	4	-	2	-	6	2	03	30	70	100	40	25	10	25#	10	--	--	150

Total IKS Hrs for Sem.: 1 Hrs

Abbreviations: CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

THEORY LEARNING OUTCOME (TLO)

TLO No.	Title of TLO
TLO 1.1	TLO 1.1 Identify major parts of wind turbine
TLO 1.2	TLO 1.2 State wind turbine terminologies
TLO 1.3	TLO 1.3 Describe types of wind turbine
TLO 1.4	TLO 1.4 Explain rotation principle of wind turbine

TLO 2.1	TLO 2.1 State function of PV cells
TLO 2.2	TLO 2.2 Explain solar water heating system
TLO 2.3	TLO 2.3 Describe rooftop home solar system
TLO 2.4	TLO 2.4 Differentiate types of batteries used in solar PV system
TLO 2.5	TLO 2.5 Explain hybrid wind solar system
TLO 2.6	TLO 2.6 Give application of solar energy
TLO 3.1	TLO 3.1 State applications of bioenergy
TLO 3.2	TLO 3.2 Describe power generation from solid biomass
TLO 3.3	TLO 3.3 Describe biodiesel production from oil
TLO 3.4	TLO 3.4 Explain environmental benefits of bioenergy
TLO 4.1	TLO 4.1 State principle of micro-hydro power plant
TLO 4.2	TLO 4.2 Describe high head micro-hydro power plant
TLO 4.3	TLO 4.3 Explain medium head micro-hydro power plant
TLO 4.4	TLO 4.4 Select the site for micro-hydro power plant
TLO 4.5	TLO 4.5 Perform routine maintenance of micro-hydro power plant
TLO 5.1	TLO 5.1 Explain the concept of tidal energy
TLO 5.2	TLO 5.2 Compare different types of turbines
TLO 5.3	TLO 5.3 Write advantages & disadvantages of tidal energy
TLO 5.4	TLO 5.4 Explain concept of geothermal energy

SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)								
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2
CO1	2	2	2	2	3	2	3	2	-
CO2	2	1	2	2	3	1	3	2	-
CO3	2	2	2	2	3	2	3	2	-

CO4	2	1	2	2	3	1	3	2	-
CO5	2	1	2	2	3	1	3	2	-

Maharashtra State Board of Technical Education K-1

Teaching Plan (TP)

Academic Year: 2026-27 **Institute Code:** 0078
Program: Chemical Engineering **Course Code:** 315311
Course: INTRODUCTION TO RENEWABLE ENERGY (IRE) **Semester: Fifth** (CH-5K)
Name of faculty: Dr. S. S. Rikame

.....

Chap No. (Allotted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
Unit - I Wind Energy								
1 (04)	**CO-1**	**TLO 1.1**	1.1 Wind Turbine: Major parts of wind turbine, rotor blades, hub, nacelle, tower, yaw mechanism, shaft, brake, anemometer, vane	02	13/08/2026 to 14/08/2026		Blackboard, Books, media, PPT	
		TLO 1.2	1.2 Wind turbine terminologies: cut-in speed, cut-out speed, survival speed, rated power, nominal power, wind power curve	03	17/08/2026 to 20/08/2026			
		TLO 1.3	1.3 Types of wind turbine: horizontal and vertical axis wind turbine, upwind and downwind turbine, one, two, three blades wind turbine, small and large wind turbine, constant and variable speed wind turbine **MKCL Quiz 1**	03	21/08/2026 to 24/08/2026			
		TLO 1.4,	1.4 Rotation principle: Drag and Lift principle	02	27/08/2026 to 28/08/2026			**1 extra**

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
			Practice test 1 and MKCL Quiz 2*	--				
Unit - II Solar Energy								
2(08)	**CO-2**	**TLO 2.1**	2.1 Photovoltaic (PV): Function of PV cells, cell, module, array and panel	2	29/08/2026 to 31/08/2026		Blackboard, Books, media, PPT	
		TLO 2.2	2.2 Solar water heating system **MKCL QUIZ 3**	2	02/09/2026 to 03/09/2026			
		TLO 2.3	2.3 Rooftop home solar system	1	04/09/2026 to 04/09/2026			
		TLO 2.4	2.4 Types of batteries used in solar PV system	2	05/09/2026 to 07/09/2026			
		TLO 2.5	2.5 Hybrid wind solar system	1	09/09/2026 to 09/09/2026			
		TLO 2.6	2.6 Solar application: solar distillation and solar PV pumping **MKCL QUIZ 4 and Practice Test 2**	2	10/09/2026 to 11/09/2026			
Unit - III Energy from Biomass								
3(08)	**CO-3**	**TLO 3.1**	3.1 Concept and application of bioenergy	2	12/09/2026 to 14/09/2026		Blackboard, Books, media, PPT	
		TLO 3.2	3.2 Energy from solid biomass: Wood gasifier and biogas plant (floating drum and fixed dome) **MKCL Quiz 5**	2	16/09/2026 to 17/09/2026			
		TLO 3.3	3.3 Energy from liquid biomass: biodiesel, benefits of biodiesel, biodiesel from jatropha	2	18/09/2026 to 19/09/2026			

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
		TLO 3.4	3.4 Environmental benefits of bioenergy, advantages & disadvantages of bioenergy	2	21/09/2026 to 23/09/2026			
			MKCL Quiz 6, Practice test 3	--	24/09/2026 to 24/09/2026			
Unit - IV Micro-hydro Power Plant								
4(10)	**CO-4**	**TLO 4.1**	4.1 Concept and principle of micro-hydro power plant	1	25/09/2026 to 25/09/2026		Blackboard, Books, media, PPT	
		TLO 4.2	4.2 High head micro-hydro power plant: construction and working **MKCL Quiz 7**	2	26/09/2026 to 28/09/2026			
		TLO 4.3	4.3 Medium head micro-hydro power plant: construction and working	1	30/09/2026 to 30/09/2026			
		TLO 4.4	4.4 Site selection of micro-hydro power plant	1	01/10/2026 to 01/10/2026			
		TLO 4.5	4.5 Routine maintenance of micro-hydro power plant	2	02/10/2026 to 03/10/2026			**1 extra**
			Practice test 4 and MKCL Quiz 8	--	05/10/2026 to 05/10/2026			
Unit - V Tidal & Geothermal Energy								
5(20)	**CO-5**	**TLO5.1**	5.1 Physical concepts of the tidal phenomena, principles of tidal power generation systems, semidiurnal tides with monthly variation	2	07/10/2026 to 08/10/2026		Blackboard, Books, media, PPT	

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
		TLO 5.2, TLO 5.3	5.2 Types of turbines: bulb turbine, rim turbine, reciprocating device 5.3 Advantages & disadvantages of tidal energy	2	09/10/2026 to 10/10/2026			**1 extra**
		TLO 5.4	5.4 Geothermal energy, generating electricity from geothermal resources, types of geothermal plant, difference between conventional steam thermal power plant and geothermal power plant **MKCL Quiz 9**	1	12/10/2026 to 12/10/2026			
		TLO 5.5	5.5 Advantages & disadvantages of geothermal power plant, environmental issues of geothermal power plant	2	14/10/2026 to 15/10/2026			
		--	**Practice test 5 and MKCL Quiz 10**	--	16/10/2025 to 16/10/2025			**1 extra**

ASSESSMENT METHODOLOGIES/TOOLS

A. Formative assessment (Assessment for Learning) (FA-TH)

- Continuous assessment based on process and product related performance indicators. Each practical will be assessed considering
  - 60% weightage is to process
  - 40% weightage to product

B. Summative Assessment (Assessment of Learning) (SA-TH)

- Continuous Assessment based on Process and Product related performance indicators. Each practical will be assessed considering
  - 60% weightage to Process
  - 40% weightage to Product

SUGGESTED LEARNING MATERIALS / BOOKS

Sr. No.	Author	Title of Book	Publication

Sr. No.	Author	Title of Book	Publication
1	Tushar Ghosh and Mark Prelas	Energy Resources & Systems Volume 2: Renewable Resources	Springer, ISBN 9400714025
2	Earnest, Joshua, Rachel, Sthuthi	Wind Power Technology	PHI Learning, 9789388028509
3	D. P. Kothari, K. C. Singal, Rakesh Ranjan	Renewable Energy Resources & Emerging Technologies	Prentice Hall of India ISBN- 9789389347890
4	S. C. Bhatia, R. K. Gupta	Textbook of Renewable Energy	Woodhead Publishing India Pvt Ltd, ISBN-978-81-936446-0-7

LEARNING WEBSITES & PORTALS

Sr. No.	Link / Portal	Description
1	https://archive.nptel.ac.in/courses/103/103/103103206/	Video Lectures
2	https://archive.nptel.ac.in/courses/121/106/121106014/	Video Lectures
3	https://nptel.ac.in/courses/103103206	Video Lectures
4	https://nptel.ac.in/courses/115105127	Video Lectures
5	https://www.iitr.ac.in/wfw/web_ua_water_for_welfare/education/proceeding_of_short-term_training/diploma/hydropower_dev_engg_elec/lecture_notes/LECTURE_ON_RENEWABLE_ENERGY_SOURCES.pdf	Presentation

Note : Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

Dr. S. S. Rikame
(Name & signature of staff)

Dr. P. S. Bhandari
(Name & signature of HOD)

CC: Course file –IRE-315311