

INSTITUTE	DIPLOMA STUDIES
PROGRAM	DIPLOMA ENGINEERING (CHEMICAL ENGINEERING)
SEMESTER	3
COURSE TITLE	REACTOR & BOILER OPERATION SKILL
COURSE CODE	09CH2304
COURSE CREDITS	3

Objective:

- 1 To study about Reactor and Boiler Operation for getting well developed skill for working, construction and operation of different types of reactors and boilers used in Chemical Processes Industries
- 2 To study about Reactor and Boiler Operation for getting well developed skill for working, construction and operation of different types of reactors and boilers used in Chemical Processes Industries

Course Outcomes: After completion of this course, student will be able to:

- 1 Working and operation of different types of Boilers used in process industries
- 2 Working and operation of different types of Reactors used in chemical industries
- 3 Identify accessories of boiler
- 4 Identify mounting of boiler

Pre-requisite of course: Knowledge of basic chemistry

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	2	0	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Generation of steam Introduction and definition of steam, Types of Steam, vaporization, basic of boiling and evaporation, Properties of steam and terminologies, heat energy basic related to production of steam,	4
2	Basic of Boiler Classification of boiler according to tube content, furnace condition, pressure of steam, mobility of boiler and heat source, Importance of steam trap, Circulation of water, different types of cycle for boiler	6
3	Types of boiler and their working and construction Basic technologies related to different boilers, simple vertical boiler, Cochran boiler, Babcock and Wilcox boiler, Different types of mountings and accessories of boiler, Application of boiler in industries	6

Contents : Unit	Topics	Contact Hours
4	Batch Reactor & Semi Batch Reactor Mass and energy balances around a volume element. Performance equation of Batch reactor design equation. Concept of semi batch reactor	4
5	Mixed Flow Reactor Mass and energy balances around an element. Performance equation of Mixed flow reactor design equation effect of concentration and temperature on conversion	4
6	Plug Flow Reactor Mass and energy balances around an element. Performance equation of Plug flow reactor design equation	4
Total Hours		28

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiment 1 Working and construction of Cochran boiler	2
2	Experiment 2 To Study about different kind of steam	2
3	Experiment 3 Working and construction of Babcock and wilcox boiler	2
4	Experiment 4 To study of construction and working of mountings of boiler	2
5	Experiment 5 To study of construction and working of accessories of boiler	2
6	Experiment 6 Working and construction of plug flow reactor	2
7	Experiment 7 To find out the conversion of plug flow reactor using its performance equation	2
8	Experiment 8 Working and construction of batch reactor	2
9	Experiment 9 To find out the conversion of batch reactor using its performance equation	2
10	Experiment 10 Working and construction of Continues stirred reactor and mixed flow reactor	2
11	Experiment 11 To study about application of reactors in chemical Process Industries	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
12	Experiment 12 To find out the conversion of Continues stirred reactor using its performance equation	2
13	Experiment 13 To study about application of boiler in thermal power station	2
14	Experiment 14 To study about classification of boiler	2
Total Hours		28

Textbook :

- 1 Fundamental of Mechanical Engineering, R.B. Varia, Atul Prakashan, 2014
- 2 Chemical Engineering Kinetics 2nd Edition, J. M. Smith, McGraw - Hill, 1981

References:

- 1 Elements of Mechanical Engineering, Elements of Mechanical Engineering, N.M. Bhatt, Mahajan Publication, 2013
- 2 Elements of Mechanical Engineering, Elements of Mechanical Engineering, N.V. Rachchh, McGraw-Hill Publication, 2015

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
40.00	40.00	10.00	10.00		

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- 1 <https://archive.nptel.ac.in/courses/103/103/103103153/>