GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD,GUJARAT

COURSECURRICULUM
COURSE TITLE: PIPING ENGINEERING
(COURSE CODE: 3385507)

Diploma Programme in which this course is offered	Semester in which offered
Fabrication Technology	8th Semester

1. RATIONALE

The basic purpose of piping engineering subject is for giving basic knowledge of piping in fabrication field. Students will get the exposure of codes used for piping in fabrication industry. Students will get the knowledge of piping drawing, testing of pipes. Students will be able to understand the piping tendering and piping element/component used in fabrication industry.

2. LIST OFCOMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop required skill in the students so that they are able to acquire following competency:

- Use the knowledge of piping component, piping drawing, testing of piping, piping tendering in fabrication industry.

3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to required learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes-

i. Describe scope of code used in piping.
ii. Describe the testing of pipes and piping drawing.
iii. Describe the piping component pumps used in fabrication industry.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
4	-	2	6	70	30	20	30	

Legends:L-Lecture;**T**–Tutorial/TeacherGuidedStudentActivity;**P**-Practical;**C**–Credit;;**ESE**-EndSemesterExamination;**PA**- Progressive Assessment.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-Topics
Unit –I INTRODUCTION TO PIPING	1a. Understand piping terminology 1b. Understand classification and application of piping	**INTRODUCTION TO PIPING** 1.1 Uses of piping 1.2 Piping terminology 1.3 Piping classification 1.4 Duties and responsibilities of piping engineer 1.5 Inputs and outputs of piping engineering department 1.6 Piping applications
Unit – II PIPING COMPONENT	2a. Identify and use of various piping component.	**PIPING COMPONENT** 2.1 Fittings, elbow, bends, mitered elbow, reducers, tee, closer, returns, swage, flanges, weldolet, elbowlet, swipolet, laterals. 2.2 Gaskets 2.3 Piping specialties 2.3.1 Strainer 2.3.2 Steam trap 2.3.3 Expansion joints, bellows and loops 2.4 Fasteners 2.5 Full coupling 2.6 Half coupling
Unit– III HANGERS AND SUPPORTS	3a. Preparation of job for piping supports and hangers. 3b. Calculate support spacing.	**HANGERS AND SUPPORTS** 3.1 Introduction 3.2 Terminology for supports 3.3 Types of Hangers 3.4 Types of supports 3.5 Pipe rack 3.5.1. Function of system of supports 3.5.2. Piping support 3.5.3. Arranging point of support 3.5.4. Calculation of reference point of support
Unit– IV PIPING DRAWING	4a. Understand various piping drawing used in fabrication industry.	**PIPING DRAWING** 4.1. Introduction 4.2. Drawing related to piping 4.3. Piping symbol 4.4. P & ID 4.5. PFD 4.6. Piping spool and ISO 4.7. Plot plans 4.8. Drawing from other source 4.9. Point to be checked for piping drawing 4.10. Column piping

Unit– V **PUMPS**	5a. Describe and classify pumps.	**PUMPS** 5.1 Introduction 5.2 Classification 5.3 Comparison between rotary and reciprocating pump
Unit- VI **PIPING CODES AND STANDARDS**	6a. Apply knowledge of piping codes and standards in piping industries.	**PIPING CODES AND STANDARDS** 6.1 Definition of standards and codes 6.2 Identifying source of standards 6.3 Introduction to ASME B31.1 and ASME B31.3 6.4 Introduction of API 6.5 Standard for flange, gasket, screw threads for nuts and bolts.
Unit VII **LEAK TESTING OF PIPING**	7a. Understanding different leak testing of piping. 7b. Understand method of cleaning after construction.	**LEAK TESTING OF PIPING** 7.1 Introduction 7.2 Hydrostatic leak testing 7.3 Pneumatic leak testing 7.4 In service leak testing 7.5 Vacuum leak testing 7.6 Static head leak testing 7.7 Pressure leak testing 7.8 Leak testing performance 7.9 Test package preparation 7.10 Hydrostatic test preparation 7.11 Test gauges 7.12 Cold weather testing 7.13 Pneumatic testing 7.14 Test blinds 7.15 Pressure data sheet 7.16 Sample hydrostatic test setup 7.17 Cleaning after construction. 7.18 De wetting and drying. 7.19 Fluiding for hydro test
Unit VIII **PIPING TENDERING PROJECT**	8a. Understanding of piping tendering project terminology.	**PIPING TENDERING PROJECT** 8.1 Introduction 8.2 Project scoping data 8.3 Types of contracts/tendering 8.4 General engineering 8.5 Drafting 8.6 Structural and architectural 8.7 Piping 8.8 Electrical 8.9 Instrumentation 8.10 Equipments.

		8.11 Material purchase 8.12 Special consideration 8.13 Environmental information 8.14 Fluid characteristics 8.15 Offshore environment information

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Introduction to piping	4	3	0	0	3
II	Piping component	10	0	7	7	14
III	Hangers and supports	4	0	7	0	7
IV	Piping drawing	10	7	7	0	14
V	Pumps	2	4	0	0	4
VI	Piping codes and standards	4	7	0	0	7
VII	Leak testing of piping	12	0	7	7	14
VIII	Piping tendering project	10	0	0	7	7
	TOTAL	**56**	**21**	**28**	**21**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's Revised taxonomy)
NOTE:-Suggested specification table shall be treated as a general guidance for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISE/PRACTICAL/EXPERIMENTS

The exercise / practical / experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list of exercise / practical / experiments for the guidance

***Note**: Here only outcomes mainly in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus overall development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes

S. No.	Unit No.	Exercise /Practical (Outcomes in psychomotor domain)	Approx. Hrs. Required
1.	2	Prepare a mitre elbow	4
2.	3	Prepare a job for piping support	4
3.	3	Calculate piping support spacing from the given data.	2
4.	4	Prepare ISO spool from the given drawing (2 Exercise)	4
5.	4	Draw various piping symbol used in piping drawing.	2
6.	4	Prepare and understand P. & I.D. Diagram	2
7.	4	Prepare and understand PFD Diagram	2
8.	6	Prepare a case study of piping tendering project.	2
9.	7	Demonstration of Hydrostatic test preparation	2
10.	7	Demonstration of Pneumatic leak test	2
11.	7	Demonstration of pipe bending/forming	2
		Total Hrs.	**28**

8. SUGGESTED LIST OF PROPOSED STUDENTACTIVITIES

Following is the list of proposed student activities:

8.1 Prepare sketchbook of drawing of various topics of syllabus
8.2 Prepare a question bank.
8.3 10 min PPT presentation on the given topic from the syllabus and beyond the syllabus
8.4 Report writing on various topics from syllabus and beyond syllabus
8.5 Fill up lab manual.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Arrange industrial visit.
ii. Arrange expert lecture.
iii. Show video films/animation films/photographs of different automated manufacturing process and discuss their features.

10. SUGGESTED LEARNINGRESOURCES

A. List of Books

S.No.	Title of Books	Author	Publication
1	The piping guide	David R. Sherwood	Syentk books company San Francisco.
2	Pipe line rules of thumb Handbook	E.W. McAllister	Gulf Professional Publishing (ELSEVIER)
3	Piping/Mechanical Handbook	Bechtel Corporation	Bechtel Corporation printed in USA
4	Welding process	Dr. R. S. Parmar	Khanna Publishers

S.No.	Title of Books	Author	Publication
5	Welding engineering and Technology	Dr. R. S. Parmar	Khanna Publishers
6	Modern Arc Welding	S.V.Nadkarni	Oxford Publication
7	Welding Technology and design	V.M.Radhakrishnan	New Age International publication
8	Welding Technology for engineers	Baldev Raj V Shekhar A K Bhaduri	Narosa Publishing House

B. List of Major Equipment/Instrument

1. Pipe bending equipment
2. Different piping component
3. Oxy acetylene welding/cutting equipment
4. Ultrasonic flaw detector
5. Dye Penetrant kit

C. List of Software/Learning Websites

1. Wikipedia
2. www.slideshare.com
3. Archieve.org
4. www.nptel.ac.in

11. COURSE CURRICULUM DEVELOPMENTCOMMITTEE

Faculty Members from Polytechnics

- **Prof. P. B. Pathak,** I/C HOD**,** Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar
- **Prof. B. K. Gandhi,** Sr. Lecturer, Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar
- **Prof. S. Y. Merchant**, Sr. Lecturer, Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar
- **Prof. A. M. Gohil**, Lecturer, Deptt. of Fabrication Technology, Sir B.P.I., Bhavnagar
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Co-coordinator and Faculty Members from NITTTR Bhopal