GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION TECHNOLOGY

SEMESTER: V

Subject Name: **Piping Engineering**

Sr. No.	Course Content
1.	**Piping & Pipe Fittings:** 1.1 Uses of piping 1.2 Commissioning, designing & building a plant 1.3 Process pipe and Classification of pipes 1.4 Sizes & length commonly used for steel pipe 1.5 Diameters & wall thicknesses of pipe 1.6 Materials for pipe and selection of material 1.7 Linings & coatings 1.8 Temperature & pressure limits 1.9 Methods for joining pipes 1.10 Fittings 1.11 Components for butt-welded piping system 1.12 Components for socket welded piping system 1.13 Fittings for branching from socket welded system 1.14 Components for screwed piping system 1.15 Fittings for branching from screwed system 1.16 Flange facing finishes 1.17 Gaskets 1.18 Temporary closures for lines 1.19 Quick connectors & couplings 1.20 Expansion joints & flexible piping 1.21 Separators, Strainers, Screens & Drip legs 1.22 Pipe supports 1.23 Types of special parts, strainer, steam roap 1.24 Expansion joints
2.	**Drafting (Process & Piping Drawings):** 2.1 Piping symbols 2.2 Process Equipment symbols 2.3 General symbols for engineering drawings 2.4 Welding symbols (AWS) 2.5 Process & piping diagram from the schematic diagram 2.6 Interconnecting P&ID 2.7 Views used for piping drawings 2.8 Key plan 2.9 Vessel drawings 2.10 Process & service lines on piping drawings 2.11 Piping fabrication drawings-'ISOS' & 'SPOOLS' 2.12 Dimensioning 2.13 Plan view dimensions 2.14 Checking piping drawings

	2.15 Issuing drawings 2.16 Instrumentation 2.17 Listing piping material on drawings
3.	**DESIGN (Arrangement, Support, Insulation, Heating, Venting & Draining of Piping Systems, Vessels & Equipment):** 3.1 Arranging piping 3.2 Clearance access 3.3 Thermal movement 3.4 flexibility in piping 3.5 Cold spring 3.6 Resistance of piping to flow 3.7 Pipe racks 3.8 Piping safety 3.9 Pipe racks 3.10 Piping safety & relief valves 3.11 Function of the systems of supports 3.11 Pipe supports allowing thermal movement 3.13 Piping case study
4.	**Standards & Codes (Piping Systems, Symbols, Pipe, Pipe Supports, Flanges, Gaskets, Fittings, Pumps, Valves, Exchangers, Steam Traps, & Screw Treads):** 4.1 What are standards & codes? 4.2 Identifying the sources of standards 4.3 Principle design-oriented codes 4.4 Selected standards
5.	**Plot Plan Development:** 5.1 Definition plot plan development and role & responsibility of piping Engineering. 5.2 What piping engineer should know about 5.3 Basic data(electrical, metrological, non plant facilities, utility data, process data statutory requirements, plant facility) 5.4 Development of plot plan 5.5 Step to considered while developing the plot plan 5.6 Layout of liquid storage(explosive tank farm, gas storage)
6.	**Guide Lines for Equipment and Layouts:** 6.1 Criteria for developing equipment and piping layouts 6.2 Pipe size limitations 6.3 Piping arrangement and piping clearance 6.4 Piping accessibility 6.5 Arrangement for fluid flow 6.6 Arrangement and application of valves 6.7 Special piping arrangements, piping outlines, piping connections 6.8 Piping design specification instrument piping 6.9 Pipe ways and supports and piping flexibility

7.	**Basics of Stress Analyis:** 7.1 Responsibilities of stress engineers 7.2 Stress analysis and types of stress in piping system 7.3 General working procedure of stress analysis 7.4 Types of pipe supports
8.	**Reference Document:** 8.1 Check items and points 8.2 Conformation for the design data 8.3 Conformation for the maintained and operation and preparation of information 8.4 Explain plant battery limits 8.5 Requirement of ASME B31.3 (Process piping code) 8.6 Loading and their effects
9.	**Piping Fabrication:** 9.1 Pipe coating, joining methods and adjustment 9.2 Pipe welding positions 9.3 Pipe welding & Fabrication methods 9.4 Principle, equipment, advantages, limitations and applications of welding and fabrication methods 9.5 Special welding method • UP Hill • Down Hill • Orbital welding 9.6 Pipe welding inspection • TKY joint inspection 9.7 Welding defects, causes, and remedies 9.8 WPS, WPQ, AND PQR 9.9 Processing reading 9.10 Coating and insulation

Laboratory Experiences:

Experience No.	Description of Laboratory Experience
1	**Demonstration & Study (Report/Observation Writing):** 1. Demonstration & study of welding safety in welding/cutting equipment Used in piping. 2. Demonstration & study of various types of pipe material. 3. Demonstration & study of various types of pipe fittings. 4. Demonstration & study of various types of piping elements except pipe fitting & pipes. 5. Demonstration & study of pipe welding position.

2	**Job Preparation (write Sequence and Perameters of Operation):** 1. Job -1: Piping position far 5G & 6G positions. 2. Job -2: Pipe elbow preparation by welding at 90°. 3. Job -3: Pipe joint for elbow fit-up & set-up 45°. 4. Job -4: Threading of pipe. 5. Job -5: Demonstration of pipe cutting by various methods. (Hand hacksaw, M/C hacksaw, Cold saw, Special pipe cutting equipment, Gas cutting, Plasma cutting.)
3	**Seminar & Presentation & Group Discussion:** 1. Prepare a Seminar Using Power Point Presentation/Transparencies on The Topic Covered in Syllabus/Beyond The Syllabus 2. Give 10 minutes Presentation 3. Group Discussion
4	Preparation of Models,Charts,Quiz Competition & Slogans(Group/Individual)
5	**Industrial Visit:** Term Work content of Industrial Visit Report Should Also Include Following a) Brief Detail of Industry Visited b) Type, location, product, rough lay-out, Human resource etc. of industry c) Details, Description, Broad Specification of machinery/Process Observed d) Safety Norms and Precautions observed e) Student on Observation on Industrial Environment, Culture and Attitude f) Any Other Detail/Observation asked by accompanying faculty. 1. Industrial visit of Structural Fabrication Industry.
6	**Sheet & Sketch Work:** 1 types of pipe end connections. a) Butt welded b) Socket and spigot c) Threaded for flanged joint etc. 2. pipe fittings their details. a) X-section drawing. b) Specification/examples c) Application d) If types application. 3. G A drawing & plot plan. 4. PED & P & ID 5. ISO piping drawing with M.T.O. sheet-I. 6. ISO piping drawing with M.T.O. sheet-II. 7. Nozzle schedule and expansion loops and expansion bellows. 8. Piping symbol
7	**Report Writing:** 1. Write a report on properties of fluids 2. Write a report on head loses (pressure loses) in fluid flow through Piping.

	3. Write a report on piping elements. 4. Write a report on piping supports and process plant. 5. Draw a piping sheets. • Plant or plat drawing. • PFD and PID drawing. • GA drawing and piping ISO. • Piping dimensioning system. • MTO for piping drawing. 6. Write a report piping fabrication. 7. Prepare a typical WPS, WPQ & PQR. 8. Write a report on piping supports. 9. Write a report on coating & insulation. 10. Write a report on process piping arrangements.
8	**Beyond SIlabus Activities (Develop Creative & Innovative Ideas Among Students):** Display article, information, sketch, under knowledge zone(K-Zone), inspiration zone(I- Zone) & Creative zone(C-zone)
9	**Literature Survey:** 1. Library assignment 2. Internet surfing 3. Refer product pamphlets 4. Technical magazines
10.	**Shop Talk:** 1 Ten minutes presentation on shop floor/Laboratory during the presentation of job/laboratory experience by the students
11.	**Audio Visual Aids:** 1 Prepare audio cassette 2 Photograph lab manual 3 Technical video download
12.	**Paper Solutions:** 1 Write a paper solution of last five examination papers
13.	**School Within School:** 1. Guiding / Sharing / Mentoring the know-how by meritorious students to lower performing students
14	**Self Learning:** 1. Contact with field expert, seniors, alumni and get further know-how individually or in a group. 2. Read related book / magazine / article / literature and share the content

Notes:

1. Term work report content of each experience should also include following.
   a) Experience description/ data and objective.
   b) A skill which is/are expected to be developed in student after competition of experience.
   c) Drawing of experience / set up with labels / nomenclature to carry out the experience.
   d) The specification of machine / equipment / devices / tools / instruments/items / elements which is / are used to carry out and to check experience**.**
   e) Process parameters / set up settings values applied to carry out experience
   f) Steps / process description to execute the experience.
   g) Observation
   h) Information on resent machine / equipment / devices / tools/ instrument/ item available. In market to carry out the experience.
   i) Special / additional notes or remarks.
2. Term work report of student of regular more should exclude distance learning manual, photocopy, printed content, etc. focus should be on developing the term work as original efforts of student.
3. Term work content of industrial visit report should also include following
   a) brief detail of industry visited
   b) Type, location, product, rough layout, human resource, etc of industry.
   c) Details, description and broads specification of machinery / process observed.
   d) Safety norms and precautions observed
   e) Student on observation on industrial environment, culture and attitude
   f) Any other detail /observation asked by accompanying faculty.
4. Term work also include experience logbook duly certified by subject teacher.

Reference Book:

Sr. No.	Name of Book	Author Name
1.	Piping Engineering	K.p.Madhavan, Praful Ganvit
2.	Design & Production Process	R.K.Jain, Makawana Manoj
3.	Piping Design Layout, and stress analysis	Ronak.K.Panchal
4.	Piping Hand Book	Ronak.K.Panchal
5.	Piping Design Engineering & Material Of const.	Ronak.K.Panchal
6.	Liquid process piping	Ronak.K.Panchal
7.	Corrosion Engineering	Ronak.K.Panchal
8.	Mechanical Maintenance	Ronak.K.Panchal
9.	B31.3	Ronak.K.Panchal
10.	Piping(Inspection Manual)	Ronak.K.Panchal
11.	Welding Technology for Engineers	Baldes Raj
12.	Welding Technology & design	V.M.Radhakrishna
13.	Welding Productivity & quality	A.k. Shah