GUJARAT TECHNOLOGICAL UNIVERSITY

COURSE NAME : MECHANICAL STRUCTURAL AND PIPING DRAFTING

1. RATIONALE :

This course provides knowledge and practice regarding drafting of different types of fabricated items, process piping, structural items, and mechanical assemblies.

It also provides primary knowledge of Auto CAD. The course develops interpretation ability of industrial blue prints. This makes students conversant with related standards and codes. The student will be in a position to refer and use data-books.

2. SCHEME OF TEACHING :

TOPIC NO.	NAME OF TOPIC	NO OF HOURS		
		LECT.	PRACT.	TOTAL
1.	Introduction to Fabrication Drafting	01	-	01
2	Orthographic Drawing	05	08	13
3	Isometric Drawing	02	05	07
4	Intersection of Solids	03	05	08
5	Development of Lateral Surfaces	03	06	09
6	Nomographs	02	03	05
7	Drafting of Fabrication Drawing	01	08	09
8	Structural Drafting	04	06	10
9	Process Piping Drafting	04	08	12
10	Computer Aided Drafting	03	07	10
	TOTAL	**28**	**56**	**84**

3. TECHNOLOGY RELATED SKILLS(TRS) AND ENABLING OBJECTIVES :

TRS 1.0 : USE INDIAN/INTERNATIONAL CODES AND STANDARDS.

EO's

1.1 Practice the data book and hand book codes/standards (Indian/International).

1.2 Interpret the BIS, ASME, API, TEMA, DIN, ISO, BS, EJMA, ANSI,ASTM Codes, Standards and Databook.

1.3 Use the BIS, ASME, API, TEMA, DIN, ISO, BS, EJMA, Codes, Standards and Databook.

TRS 2.0 : INTERPRET DRAWINGS/BLUE PRINTS.

EO's

2.1 Compare Indian Standards/codes to international standards/codes and vice-a-versa.

2.2 Collect informations provided in drawings/blue prints.

2.3 Draw the details/assembly drawings manually as per BIS.

2.4 Interpret design data and notes given on blue prints.

TRS 3.0 : USE COMPUTER SOFTWARE/HARDWARE FOR DRAFTING.

EO's

3.1 Draw details/assembly drawings as per BIS Using Auto CAD.

3.2 Develop Simple programme for Fabrication Application using computer.

TRS 4.0 : USE STANDARD SYMBOLS FOR DRAFTING.

EO's

4.1 Know various standards for symbols.

4.2 Draw standard symbols for weldings, fastners, pipe fittings, process piping (pumps, valves,vessels, compressors, fans etc..)

4. COMMUNICATION SKILLS :

(1) Follow written or oral instructions and interpret them to others.

(2) Counsel people in work situations.

(3) Write assignments (class-room, library, home).

(4) Give written instructions (Sketch/drawing) to carry out jobs.

(5) Write reports of various types-BOM,MTO,Blue print informations,

Limits, Fits, Tolerances and surface finish representations, Auto CAD commands).

(6) Compile and interpret "Notes" given on blue print.

5. TOPICS AND SUB-TOPICS :

TOPIC : 1.0 INTRODUCTION TO FABRICATION DRAFTING :

1.1 Types of drawing used in Fabrication industries (Design, Working,assembly & Details drawing)
1.2 General format of fabrication drawing.
1.3 Information provided on fabrication drawing (Weld joint detail design data, nozzle schedule, BOM, Revision, Special note)
1.4 Dimensioning methods as per BIS
1.5 Limits, fits and tolerances as per BIS
1.6 Surface roughness representation as per BIS

TOPIC : 2.0 ORTHOGRAPHIC DRAWING :

2.1 Multiview drawing.
2.2 Missing view drawing.
2.3 Sectional drawing.
2.4 Auxilliary drawing.
2.5 Details and assembly drawing.

TOPIC : 3.0 ISOMETRIC DRAWING :

3.1 Orthographic drawing to isometic drawing.
3.2 Isometric drawing to orthographic drawing.

TOPIC : 4.0 INTERSECTION OF SOLIDS :

4.1 Cylinder to Cylinder.
4.2 Cylinder to Cone.

TOPIC : 5.0 DEVELOPMENT OF LATERAL SURFACES :

5.1 Development of Cylinder.
5.2 Development of Cone.
5.3 Development of Prisms.
5.4 Development of Pyramids.
5.5 Development of different types of Nozzle set-up on shell

TOPIC : 6.0 NOMOGRAPHS :

6.1 Importance of Nomographs.
6.2 Types of Nomographs.

TOPIC : 7.0 DRAFTING OF FABRICATION DRAWINGS :

7.1 Symbols and free hand sketches.

7.2 Drafting of P/V,H/E, Agitators, Condensors, Dryers, Filters, Crystalizers,Reaction Vessels, Distillation Columns etc..

TOPIC : 8.0 STRUCTURAL DRAFTING

8.1 Commercial forms of metal (angle, flat, plate,channel,strip, " I " Sec., pipe, gusset plate, batten, lacing etc..)

8.2 Study of structural drawing.

8.3 Calculation of BOM from given blue print.

8.4 Draw structural set-up and fit-up.

TOPIC : 9.0 PROCESS PIPING DRAFTING

9.1 Symbols

9.2 Study P & I diagram, GA diagram, nozzle orientation drawing & special support drawing.

9.3 Calculation of MTO from given blue prints

9.4 Prepare material take-off (MTO) report from given piping drawing.

TOPIC : 10.0 COMPUTER AIDED DRAFTING

10.1 Introduction of Auto CAD.

10.2 Auto CAD.

6. LABORATORY EXPERIENCES

(A)	Drawing Sheets on	Number of Sheets
1.	Multiview projections	**TWO**
2.	Missing views	**ONE**
3.	Orthographic Sectional views	**ONE**
4.	Auxilliary views	**ONE**
5.	Orthographic to Isometric and vice-a-versa	**ONE**
6.	Intersection of Soilds	**ONE**
7.	Development of Lateral surfaces	**ONE**
8.	Nomographs	**ONE**
9.	Piping Drawing	**TWO**
10.	Structural Drawing	**TWO**
11.	Details and Assembly Drawing	**ONE**

(B) Sketch Work

1. Drawing Symbols as per BIS
2. Weld symbols and Welding symbols
3. Piping symbols
4. Structural joint symbols
5. Freehand sketches of various parts and components of pumps, valves, vessels, compressors etc.

(C) Auto CAD Practice

Practice of 2D drafting on computer
- Line, Arc, Circle, Ellipse etc..

(D) Report preparation

1. Preparing bill of materials from given blue print.
2. Preparation of materials take off from given piping drawing.
3. Report on limits, fits, tolerances and surface finish representation.
4. Preparing informations provided on blue prints.
5. Management of new technology

(E) Enhancement study.

1. Computer hardware.
2. Computer software.
3. Role of engineer.
4. Codes and standards

7. SUGGESTIVE INSTRUCTIONAL STRATEGIES

Sr. No.	TR'S No.	EO'S No.	Instructional Strategies	Key Resources Needed
1.	1	1.1 to 1.3	National/International Data books/ Hand books Standars / Codes	P / V - Magucy
2.	2	2.1 to 2.4	Industrial blue prints Lab-experience	
3.	3	3.1,3.2	Lab-experience	
4.	4	4.1,4.2	BIS; Data books	

8. REFERENCES

Sr. No.	Name of References	Authors
1.	BIS 696 1972	
2.	BIS 919 1963	
3.	BIS 2709 1964	
4.	Elementary Engineering Drawing	N.D.Bhatt
5.	Machine Drawing	N.D.Bhatt
6.	Graphics for Engineers	W.J.Luzzadar
7.	Fundamentals of Engineering Drawing	W.J.Luzzadar
8.	Fundamentals of Drawing	K.R.Gopala Krishna
9.	Machine Drawing	K.R.Gopala Krishna
10.	Drafting & Graphics	Gia Chino, Beukema
11.	Drafting Technology	Gleclino & Beukema
12.	Fundamentals of Tool Design	A.S.T.M.E. Frank W.Wilson
13.	Tool Design (Revised Edition)	Donalson Lecain Goold
14.	Engineering Drawing	P.J.Shah
15.	Machine Drafting	Herbert W.Vanlce
16.	Piping Guide	
17.	Structural Work for Students	L.V.Leach