GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma in Engineering

Level: Diploma

Branch: Fabrication Technology

Course / Subject Code: DI01055011

Course / Subject Name: Fabrication Technology-1

w. e. f. Academic Year:	2024-25
Semester:	1st
Category of the Course:	PCC-01

Prerequisite:	-
Rationale:	This course mainly focus on one of the important areas of fabrication technology i.e., structural fabrication. Student can aware about different codes and standards used in structural fabrication industry. Student will develop capability to read and interpret structural fabrication drawing. Hands on practice in laboratory develops skill in the student for preparing various structural fabrication joints. Student can select and use appropriate cutting and joining methods. This course not only make student employable but entrepreneur also. He / She will be capable for calculating material cost of various commercial forms used in structure. The safe working procedure used in laboratory develops safety consciousness among students, which requires in structural fabrication industry.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Describe importance of structural fabrication and codes/standards used for it.	**U**
02	Interpret structural fabrication drawing.	**U**
03	Estimate the cost of given structural job.	**A**
04	Prepare a job with given specification by selecting appropriate cutting and joining operations.	**A**
05	Select the appropriate tools & equipment required for given structural fabrication job.	**A**

**Revised Bloom's Taxonomy (RBT)*

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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to Structural Fabrication** Need, scope importance, layout of structural fabrication industry, Definition &classification of structural, Fabrication, List & function of structural fabrication, processes/operations, Application of structural fabrication, Scope, need importance of codesand standards, Importance and introduction of structural, fabrication codes & standards like BIS–800, AWSD1.1, BIS: 226, BIS-2062, Role of Third-Party Inspection (TPI), agencies in structural fabrication, industry, Need attitude&skillrequire for shop-floor supervisor.	8	19
2.	**Structural fabrication drawing and materials** Introduction of structural fabrication drawing, Types of structural fabrication drawing, General notes & bill of material in GA drawing, Introduction of pre-engineered building (PEB), Detailing of structures, terminology/various parts used in structural fabrication drawing, Various types of joints & fit up-set up, Typical members of industrial buildings & roof truss, Welding symbols represented in structural drawing, Symbols for fasteners used for, structural fabrication, Structural fabrication general arrangement drawing, Structural fabrication detailed drawing, Introduction, classification, advantages of structural steel, commercially available forms/profile, sections of metals, Material Test Certificate (MTC).	10	23
3.	**Structural fabrication calculation & marking** Definition and unit conversion of Area, Volume, Density, Mass, Weight, Problems related to Area, Volume, Mass & Weight, Use of different mensuration formulas, Cost estimation of structural job,	8	20

	Trigonometry function and related exercise/ calculation for structural fabrication, Geometrical construction used for marking of large size jobs		
4.	**Structural cutting and Joining Processes** Introduction and Classification of cutting processes used in structural fabrication, Working principle, setup sketch, advantages, disadvantages and application for: Sawing (Manual/hacksaw machine /bandsaw machine), Shearing, Oxy fuel cutting, Air arc gouging, Introduction of joining process, Classification of joining process, Selection of joining method, Introduction, types, terminology, process, advantages and dis advantages of riveted joints, Introduction, types, terminology, process, advantages and dis advantages of bolted joints, Safety in cutting shop.	8	19
5.	**Tools, Equipment, machinery &accessories for fabrication** Introduction, Classification of tools, equipment, accessories & machineries used for structural fabrication, Work holding tools, Marking and measuring tools, cutting tools, Finishing/fitting tools, Power, portable and other tools, Machineries & various accessories used for structural fabrication.	11	19
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
27 %	**57%**	**16%**	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Structural Steel Fabrication and Erection,S.K. Saxena & R.B. Asthana,Somaiya publication ISBN: 81-7039-207-1
2. Structural Steel Drafting & Detailing, R.B. Asthana & R.B. Shivagunde, Somaiya publication.
3. Westerman Tables,Jutz & Eduard Scharkus,New Age International
4. Welders/Fitters Guide, John P StewartD.B. Taraporewala Sons & Co. Pvt Ltd.
5. Workshop calculation & science 1ST Year,National instructional media institute, Chennai
6. Workshop calculation & science 2nd Year,National instructional media institute, Chennai
7. Basic Welding &Fabrication, W. Kenyon,Pitman publishing limited, ISBN: 0273013211
8. Welding technology, O.P. KhannaDhanpatrai publications (p) ltd.

9. Thick Plate/structural steel working-1,EITB,Engineering industry training board
10. ISBN:0 85083 025 7, ISBN:0 85083 531 3
11. Engineering Drawing Practices for School and Colleges SP 46:2003,Bureau of Indian Standards, Bureau of Indian Standards, Government of India, Third Reprint, October 1998; ISBN. 81-7061-091-2
12. Basic Sheet Metal Practice,J.W. Giachino,D. Van Nostrand Company, Inc., Latest edition
13. Production Technology vol-1&2, O.P.Khanna, Dhanpat Rai & Sons Publication. Latest edition
14. Welding Science & Technology,Md. Ibrahim Khan,New Age International, Latest edition

(b) Open source software and website:

1. https://fabricatorguide.com/
2. https://www.steelconstruction.info/Fabrication
3. https://mbphenix.com/
4. https://primesourceco.com/latest-news/guide-to-metal-fabrication/
5. http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf
6. http://www.weldingtechnology.org
7. http://www.newagepublishers.com/samplechapter/001469.pdf
8. https://nptel.ac.in/courses/112/103/112103305/
9. https://nptel.ac.in/courses/113/106/113106087/
10. https://www.youtube.com/watch?v=mX1zpbDva-w
11. https://www.youtube.com/watch?v=9-yd1QGwng4

Suggested Course Practical List:

1. Draw typical layout of structural fabrication industry.
2. Demonstrate various personal protective equipment with safe operating procedure for structural fabrication work.
3. Draw and interpret given structural fabrication drawing.
4. Demonstrate various tools & equipments used for structural fabrication work.
5. Prepare a structural fit up-set up job using various commercial forms of metal as per given sketch. (Marking, Cutting, Filing/finishing, fit up Set up, Tack welding etc.)
6. Prepare a structural fabrication job as per given drawing. (Marking, Cutting, Filing/finishing, fit up-set up, Tack welding etc.)
7. Perform oxy-fuel cutting process used for structural fabrication.
8. Perform air arc gauging process used for structural fabrication work.
9. Prepare a structural fabrication job using mechanical fasteners.
10. (Marking, Cutting, Filing/finishing, fit up Set up, Drilling, Bolting etc.)
11. Estimate cost of material used in structural fabrication work.

Note

i. *More **Practical Exercises** can be designed and offered and can be changed by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.*
ii. *Boiler suit, safety shoes, other safety items& hand tools are compulsory while attending laboratory and has to be brought by students.*

List of Laboratory/Learning Resources Required:

1. Hand gloves, Welding face guard, Safety goggles, Hand sleeve, Leg guard etc.
2. Steel tape, Steel rule, Drawing set, Protractor etc.
3. Portable drill machine, angle grinder, Pillar drill machine, Die grinder, Power hacksaw machine, Straight grinder, Drill bits, and Portable cutting machine.
4. Tri square, Scriber, Hacksaw blade & frame, Flat files, Hand files, Half round file, Triangular file, Rough files, Smooth files, Bevel protractor, Hammer, Chisels, Bench vice, C-clamp, Welding machine (rectifier), Power cable, Earthing clamp, Electrode holder, SMAW electrodes, chisels, Wire brush, Chipping hammer, Inside caliper, Outside caliper, Odd leg caliper, Fix spanners, Ring spanner, Adjustable spanner, Plyer, Lock Plyer, Adjustable plyer, Vice grip plyer, Combination plyer, Elen keys, Wedges, Compass, Divider, Spirit level, Taung tester etc.
5. Oxygen cylinder, Acetylene cylinder, Oxygen cylinder regulator, Acetylene cylinder regulator, Hose pipe, Oxy fuel cutting torch, Ignitor, Back fire arrestor etc.
6. Welding power source, Compressor, gouging holder, Gouging electrode etc.
7. Weighing scale etc.

Suggested Project List:

1. Prepare charts of different commercial forms of metal as per standards.
2. Draw different joints used for structural fabrication.
3. Prepare chart of illustration of welding symbols.
4. Prepare typical industrial building/shed drawing.
5. Prepare special tools/projects used for fabrication.
6. Prepare report on PEB.
7. Prepare chart regarding safety precautions for structural fabrication.
8. Prepare report on oxy fuel & plasma cutting processes.
9. Select a structural fabrication product (approved by subject teacher) and prepare list of tools and equipment's required to manufacture it.
10. Prepare report using different books, technical magazine, and journals etc. on the topic given by the subject teacher within the syllabus or beyond the syllabus.
11. prepare his/her video on demonstrating different fit up set up, cutting process, joining process etc. given by the subject teacher.

12. Collect some brochure of tools/equipments used for fabrication from local/online vendors.

Suggested Activities for Students:

1. Prepare solutions of different assignments given by subject faculty.
2. Prepare a list of specifications for various tools/equipment/machines used in the
3. Structural fabrication work.
4. Visit the local metal trader/fabricator and collect all relevant information and prepare the detailed report.
5. Undertake a market survey of local dealers for procurement of commercial forms of metal.
6. Download videos showing correct practices for marking, cutting & fit up set up for structural fabrication.
7. Student will visit the respective discipline industry/site and will prepare the list of structural fabrication related equipment/machineries used in that industry/site.
8. Collect some industrial structural component, identify type of commercial form used in it.
9. Collect videos, animation showing structural fabrication.
10. Prepare power point presentation on structural fabrication marking & cutting process.

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