GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)
Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester - VIII
Course Title : Fabrication Professional Practice
(Course Code : 4385504)

Diploma programmer in which this course is offered	Semester in which offered
Fabrication Technology	Eight

1. RATIONALE

A Professional Practice subject for diploma students is essential to bridge the gap between academic learning and real-world application. This course aims to provide students with a comprehensive understanding of the professional landscape in their chosen field. It emphasizes the practical aspects of fabrication technology, industrial standards, ethical considerations and work place dynamics. By integrating theoretical knowledge with practical insights, the Professional Practice subject is imparting required skills into students for successful entry into their respective profession. It fosters a sense of responsibility, teamwork, and effective communication – attributes crucial for professional success. Moreover, exposure to real-world scenarios helps students develop problem-solving abilities and adaptability. This subject also serves as a platform for students to engage with professionals in their field, fostering networking opportunities and industry connections. This subject will be offered to students after one year successful completion of on job industrial training. Hence, it is providing an excellent platform for them to showcase their professional skills. Overall, a Professional Practice subject enhances students' preparedness for the challenges and expectations of the professional world, laying a strong foundation for their future careers.

2. COMPETENCY

The course content is leading to the achievement of the following competency:

- **Develop various soft and hard professional skills required in fabrication industry.**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

i. Perform fundamental soft skill practices required in fabrication field.
ii. Design major elements of selected fabrication job using suitable codes/standards.
iii. Apply project management practices for a selected job.
iv. Prepare welding procedure and qualification for selected job using suitable codes/standards.
v. Construct a selected fabrication job.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
0	0	4	2	0	0	50	50	100

Legends: L*-Lecture;* ***T*** *– Tutorial/Teacher Guided Theory Practice;* ***P*** *-Practical – Credit,* ***CA*** *- Continuous Assessment;* ***ESE*** *-End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) are the sub-components of the COs. *These PrOs need to be attained to achieve COs.*

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1	Prepare resume/curriculum vitae.	1	2
2	Prepare application for applying job/short leave/long leave etc.,	1	2
3	Solve given reasoning exercises.	1	2
4	Write typical professional emails on any one subject.	1	2
5	To study on "Industry 4.0".	1	2
6	Prepare design of major elements of fabrication job by considering following aspects. • Design codes & standards. • Various loads acting. • Design pressure internal • Design pressure external • Design temperature • Minimum design metal thickness. • Working pressure • Hydro test pressure • Joint efficiency • Internal volume (liter capacity) etc.,	2	2
7	Prepare production drawing of fabrication job by using "CAD" software. • Prepare typical "Title block" with respect to selected fabrication job. • Prepare typical "General notes" as per selected fabrication job. • Prepare "Design data tables" as per selected fabrication job. • Prepare suitable "General arrangement drawing". • Prepare weld plan sketch &give suitable seam no. to each major weld joints etc.,	2	4
8	Prepare table of required raw materials from the drawing. (BOM/MOC)	3	2
9	Prepare any one project management chart for selected job.	3	2
10	Estimation & costing of fabrication job. • Calculate Volume & weight of different components. • Calculate Weld volume & weld weight. • Calculate Material cost • Calculate Consumable cost • Estimate Fabrication time • Estimate total cost of selected fabrication job.	3	2
11	Prepare WPS, WPQ & PQR for selected fabrication job. • Select type of welding process for selected fabrication job. • Prepare chart of Essential variable, non-essential variable,	4	4

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
	supplementary essential variable chart as per selected welding process. • Prepare typical Welding procedure specification chart as per applicable codes/standards. • Prepare typical Welder performance qualification chart as per applicable codes/standards. • Prepare typical Procedure qualification record as per applicable codes/standards.		
12	Prepare different elements of selected fabrication job using • Perform marking on a raw material as per drawing. • Perform suitable cutting process. • Perform forming operation of individual parts. • Perform fit up set up operation to pre assemble parts. • Perform dimensional inspection of pre assemble parts. • Perform selected welding operation as per welding procedure specification. (ex. No. 10) • Perform final assembly of major parts to complete job as per drawing. • Measure final dimension of job and prepare typical dimension report.	5	28
13	Perform anti corrosive painting process on fabricated job. • Perform suitable surface preparation operation • Select suitable method for painting. • Perform anti-corrosive painting process on final job. • Inspection of painting and rectify if any painting defect found.	5	2
		TOTAL HRS.	**56**

Note:

*i. More **Practical Exercises** can be designed and offered 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. Practical Sr. no. 6 to 13 are to be performed in a group of one batch

iii. Boiler suit, safety shoes and necessary hand tools & instruments are compulsory while attending laboratory and has to be bought by students.(Annexure-1)

iv. Student can utilize different facilities available in the laboratory for fabrication of the job. However, students have to manage remaining material/facilities specifically required for selected job.

The following are some sample 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed Practical Exercises of this course required which are embedded in the COs and ultimately the competency.

Sr. No.	Sample Performance Indicators for the PrOs	Weightage in %
For PrOs no: 1 to 6 & 8 to 11		
1	Knowledge of experiment	30
2	Quality of report	30
3	Participation	20
4	Punctuality	10
5	Originality	10
Total		**100**

Sr. No.	Sample Performance Indicators for the PrOs	Weightage in %
For PrOs no: 7		
1	Knowledge and Use of Content	20
2	Quality of drawing	30
3	"Autocad" commands and tools	20
4	Dimensions (accuracy)	20
5	Punctuality	10
Total		**100**

Sr. No.	Sample Performance Indicators for the PrOs	Weightage in %
For PrOs no: 12 & 13		
1	Knowledge of experiment	20
2	Performance	30
3	Procedure followed	30
4	Quality of report	10
5	Punctuality	10
Total		**100**

MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

These major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to user in uniformity of practical's in all institutions across the state.

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1.	Necessary stationeries with drawing instruments.	1 to 11
2.	Computer with M.S. OFFICE and CAD software.	1 to 11
3.	Basic manufacturing and inspection/test facilities as per individual project requirement	12,13

6. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs and PrOs. More could be added to fulfill the development of this course competency.

a) Follow safety practices in laboratory.
b) Practice good housekeeping.
c) Work as a leader/a team member.

d) Maintain tools/equipment
e) Follow ethical practices

The ADOs are best developed through the laboratory/field-based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year& 4th year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of *Revised Bloom's taxonomy* that are formulated for development of the COs and competency. If required, more such UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs)	Topics and Sub-topics
Unit - I Professional soft skill practices	1a. Describe supervisor/ managerial skill for fabrication engineers. 1b. Explain importance of Microsoft office for professionals. 1c. Prepare resume / Curriculum Vitae. 1d. Prepare application for job/leave. 1e. Write typical professional emails on any one subject. 1f. Understand industry 4.0	1.1 Supervisor/managerial skill for fabrication engineers. 1.2 Application of Microsoft office. 1.3 Resume / Curriculum Vitae preparation. 1.4 Drafting an application for fresher vacancy in fabrication industries. 1.5 Drafting an application for short leave/long leave. 1.6 Reasoning/aptitude for written test for campus placement. 1.7 Professional emails. 1.8 Introduction to industry 4.0
Unit - II Design & drafting practices	2a. Select fabrication job which should cover all the aspect of fabrication professional practices. 2b. Design major element of selected job as per applicable codes & standards. 2c. Prepare production drawing of selected fabrication job by using "CAD" software.	2.1 Introduction of design 2.2 Importance of design 2.3 Various elements of fabrication job. 2.4 Practical aspects of design e.g. Design code & standards, Various loads acting, Internal design pressure, External design pressure, Design temperature, Working pressure, Hydro test pressure, Joint efficiency, Minimum design metal thickness, Internal volume (liter capacity), etc. 2.5 Introduction of process equipment drawing. 2.6 Types of process equipment drawing (GA & detail drawing, transport drawing) 2.7 General notes & bill of material in GA drawing.

Unit	Unit Outcomes (UOs)	Topics and Sub-topics
		2.8 Typical fabrication job drawing with its terminology. 2.9 Detailing of fabrication drawing. 2.10 Weld joint geometry/nomenclature/ terminology/types & weld symbols.
Unit - III Fabrication Estimation & Project management practices	3a. Calculate area, volume, mass & weight of different components. 3b. Estimate total cost of fabricated job. 3c. Prepare material requirement planning sheet from the drawing. 3d. Prepare "GANTT" or related chart.	3.1 Introduction and importance of estimation & costing in fabrication field. 3.2 Basics of Mensuration (area, volume, density, mass, weight) 3.3 Weld volume & weld weight. 3.4 Material cost 3.5 Estimation of consumables cost and total welding cost. 3.6 Estimation of Fabrication work. 3.7 Estimation of total cost of fabrication job. 3.8 Material resource planning. 3.9 Material requirement planning 3.10 Introduction of project management. 3.11 Types of project management chart.
Unit - IV Welding procedures & qualifications practices	4a. Select type of welding process for selected fabrication job. 4b. Prepare chart of Essential variable, non-essential variable, supplementary essential variable chart as per selected welding process. 4c. Prepare typical WPS for selected job. 4d. Prepare typical WPQ for selected job. 4e. Prepare typical PQR for selected job.	4.1 Introduction of welding processes and welding procedures, and welding qualification. 4.2 Introduction of ASME SEC-IX 4.3 Essential variable, non-essential variable, supplementary essential variables. 4.4 Welding procedure specification. 4.5 Welder performance qualification. 4.6 Procedure qualification record.
Unit - V Professional fabrication manufacturing practices.	5a. Perform various fabrication processes e.g., marking, cutting, forming, fit up & set up, welding, final assembly etc., 5b. Perform dimensional inspection of pr- assembled parts. 5c. Prepare different elements of selected fabrication job. 5d. Calculate surface area for selected fabrication job.	5.1 Introduction & importance of fabrication processes. 5.2 Types of fabrication processes. 5.3 Marking. 5.4 Introduction and types of cutting processes. 5.5 Forming process. 5.6 Fit up & set up. 5.7 Dimensional inspection. 5.8 Welding processes. 5.9 Final assembly of major parts. 5.10 Final inspection & dimension report. 5.11 Introduction, importance & types of surface treatment.

Unit	Unit Outcomes (UOs)	Topics and Sub-topics
		5.12 Introduction, importance, selection, types, processes& inspection of anti-corrosive painting.

9. SUGGESTED STUDENT ACTIVITIES

Other than the laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should perform following activities in group and prepare reports/charts for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

a) Small groups of students can be formed for assigned work. Assigned work should be such that it covers market survey, team work, presentation, time management, quality development, etc. for selected job.
b) Prepare solutions of different assignments given by subject faculty.
c) Prepare a list of specifications for various tools/equipment/machines used for selected fabrication job.
d) Charts can be prepared.
e) Small report on any topic given by concern faculty.
f) Download videos showing correct practices for manufacturing processes or inspection & testing.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) Guide student(s) in undertaking micro-projects.
c) ***'L' in section No. 4***means different types of teaching methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature is to be given to the students for ***self-learning***, but to be assessed using different assessment methods.
e) With respect to ***section No.9***, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.

11. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Practical guide to pressure vessel manufacturing.	Sunil Pullarcot	Marcel Dekker inc. ISBN: 0-8247-0740-0
2	Process Equipment Design	V. V. Mahajani S. B. Umreji	Macmillan Publishers India Ltd.
3	Chemical equipment design	B. C. Bhattacharya	CBS publishers
4	A text book of machine design	R. S. Khurmi J. K Gupta	Euresia Publishing House (Pvt.) Ltd.
5	Pressure Vessel Design manual	Deniss Moss	Gulf professional publishing
6	Design and Analysis of Steel structures	V. N. Vazirani M. M. Ratwani	Honey Mehra Khanna Publishers
7	Chemical equipment design	B. C. Bhattacharya	CBS Publishers & Distributers
8	Production Technology vol-1&2	O. P. Khanna	Dhanpat Rai & Sons Publication. Latest edition
9	ASME Sec –II,V,VIII,IX	ASME	ASME
10	IS 2825: Code for Unfired Pressure Vessels	BIS	Bureau of Indian Standards
11	TEMA Standards	TEMA	Tubular Exchanger Manufacturers Association, Inc.
12	PD 5500	BSI	BSI ISBN: 978 0 539 28638 0
13	Basic Welding & Fabrication	W. Kenyon	-
14	Welder fitter guide	John P. Stewart	D. B. Tarapurwala
15	Design data handbook	PSG	PSG College of Technology
16	Introduction to Chemical Engineering	Salil K Ghosal & Siddhartha Datta	Tata Mc Graw Hill
17	Welders guide handbook	Jems E. Brumbaugh	D. B. Tarapurwala
18	Welding Technology	Dr. O.P. Khanna	Dhanpatrai Publicaitons
19	Welding Processes and Technology	Dr. R.S. Parmar	Khanna Publishers ISBN:81-7409-126-2
20	Modern Arc Welding Technology	S.V. Nadkarni	Oxford & IBH Publishing co., Latest edition
21	Welding Technology for Engineers	Baldev Raj, V Shankar, A K Bhaduri	Narosa Publishing House ISBN:978-81-7319-607-2
22	Welding Technology & Design	V. M. Radhakrishnan	New age International publishers ISBN (10): 81-224-1672-1 ISBN (13): 978-81-224-1672-5
23	Material Science & Technology	Dr. O. P. Khanna	Dhanpatrai Publicaitons

12. SOFTWARE/LEARNING WEBSITES

- https://www.pvma.org/
- https://www.petrosync.com/
- https://www.youtube.com/watch?v=EMIP2aQa4ss
- https://youtu.be/EB2Q2Ps8tW0?si=knjfR_Ll4DOq0BFJ
- https://youtu.be/ZclqO5NGyLI?si=7kkQMVSbecpVDbII
- https://youtu.be/4fjwOdQg5qo?si=BTeTgRgVn2Vf6p7M
- https://youtu.be/ob9fv3HwfP4?si=Lh4qENDZpqU7ep8u
- https://youtu.be/EipDZE64XXc?si=tWkHvyo2lnYAcmD3
- https://www.youtube.com/watch?v=mlJ8gNayGkw&t=16s
- https://www.youtube.com/watch?v=z1CiGAU81Nw
- https://iiwindia.com

13. PO-COMPETENCY-CO MAPPING

Semester VIII	Fabrication Professional practice (Course Code:4385503)						
	POs						
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ develop-ment of solutions	PO 4 Engineering Tools, Experimen-tation&Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Manage-ment	PO 7 Life-long learning
Competency	• **Develop various soft and hard professional skills required in fabrication industry.**						
Course Outcomes CO 1) Perform fundamental soft skill practices required in fabrication field.	3	-	-	-	1	-	2
CO 2) Design major elements of selected fabrication job using suitable codes/standards.	3	1	2	-	1	-	2
CO 3) Apply project management practices for a selected job.	3	-	-	-	-	3	2
CO 4) Prepare welding procedure and qualification for selected job using suitable codes/standards.	3	-	-	1	-	-	2
CO 5) Construct a selected fabrication	3	-	-	2	1	-	3

job.							

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

14. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Sr. No.	Name and Designation	Institute	Contact No.	Email
1.	Mr. Samirbhai Y. Merchant *I/C H.O.D Fabrication Technology Department*	Sir Bhavsinhji Polytechnic Institute Bhavnagar	9428408314	symerchant72@gmail.com
2.	Mr. Ashoksinh M. Gohil *Lecturer in Fabrication Technology*	Sir Bhavsinhji Polytechnic Institute Bhavnagar	9924682010	amgohilges@gmail.com
3.	Mr. Nilesh M. Bhangale *Lecturer in Fabrication Technology*	Sir Bhavsinhji Polytechnic Institute Bhavnagar	9016926792	nmbhangale@gmail.com
4.	Mr. Parthiv T. Trivedi *Lecturer in Fabrication Technology*	Sir Bhavsinhji Polytechnic Institute Bhavnagar	9924185501	trivediparthivbpti@gmail.com
5.	Mr. Jasmin M. Bhanderi *Lecturer in Fabrication Technology*	Sir Bhavsinhji Polytechnic Institute Bhavnagar	9723496425	bhanderi.jasmin.bpti@gmail.com

ANNEXURE-1

❖ SAMPLE SEFTY CONTRACT:

(To be filled by the students and submitted to concerned faculty/staff)

-- Use for reference purposes only --

1. You have to read and sign the safety contract.
2. The safety contract says that you understand that safety is your responsibility.
3. The safety contract to be signed before you carry out any work in the laboratory and if you don't observe and obey the safety rules, you will not be allowed in the laboratory.

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Safety Contract

Date: ______________

Name of Institute: ____

Name of Course with Code: Fabrication Professional Practice (4385503)

Name of Faculty/Staff with Designation: 1. ____________________________________

2. ____________________________________

3. ____________________________________

I RECOGNIZE THAT:

1. Safety is my responsibility when using a tool.
2. Safety regulations have been provided to me.
3. The possibility of accident and injury increases if I do not follow all the safety guidelines.
4. I must act responsibly to ensure my own safety & the safety of others in the work area.

I AGREE TO:

1. Never work in the shop without my faculty's/instructor's supervision.
2. Read and practice all the safety regulations that have been distributed to me in this course or have beenposted in the work areas.
3. Act in a responsible manner at all times in the laboratory.
4. Follow all instructions given by the faculty.
5. Immediately report any unsafe condition or activity to my faculty/instructor.
6. Wear eye protection at all times when working with tools or working anywhere near someone who is usingtools.
7. Cut or Tie back long hair, remove jewellery, secure loosed clothing, and wear boiler suit & safety shoes in the laboratory.
8. Clean all work areas and put equipment away before leaving the laboratory.

I, ____, have read and agree with all the safety instructions.

Particulars:

Programme: ______________________ Student Signature

Batch No.: ______________________ ________________________

Enrollment No.: __________________