GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Metallurgy Drawing
(Code: 3322102)

Diploma Programmes in which this course is offered	Semester in which offered
Metallurgy Engineering	**Second Semester**

1. RATIONALE

Drawing is a communicating and representing medium, which has a significant role in the design profession of technician, developing competencies related to work more closely with design engineer. This includes visualization of an object in space as well as proficiency in reading and interpretation of working drawing. It is the skill, which translates an engineering idea into lines and dimensions on a piece of paper.
This course for diploma programme is aimed at developing a sound knowledge of dimensions, shape, refractories, accessories/auxiliaries and fuels used in various furnaces by drawing them. Also the course would treat the students with the understanding of various metal shaping techniques by drawing various processes with respects to equipment & working principles.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

i. **Develop drawings for various metallurgical processes, equipment & accessories**

3. 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	
0	1	7	8	0	0	40	60	**100**

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** – Credit;; **ESE** - End Semester Examination; **PA** - Progressive Assessment.

Note: It is the responsibility of the institute heads that marks for **PA of theory** & **ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **Furnaces**	1a. Describe constructional features of different types of furnaces	1.1 Types of furnaces- crucible furnace, cupola, blast furnace, open hearh furnace, L.D. & kaldo, electrical furnaces, heat treatment furnaces & their constructional features
	1b. Explain various fuels & refractories used in various furnace	1.2 Fuels & Refractories used in furnaces.
Unit– II **Metal casting**	2a. Explain various types of casting techniques	2.1 Types of casting techniques
	2b. List advantages & disadvantages of casting over other metal shaping processes	2.2 Advantages & disadvantages of various casting techniques
	2c. Outline general steps of foundry practice	2.3 Steps of foundry practice
Unit– III **Metal forming**	3a.Explain different types and products of metal forming processes	3.1 Types of metal forming processes 3.2 Products of metal forming processes
Unit – IV **Welding**	4a. Identify various weld joints	4.1 Types of welding processes 4.2 Types of weld joints

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

Unit No.	Unit Title	Tutorial Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I.	Furnaces	07	**Not applicable**			
II.	Metal casting	03				
III.	Metal forming	03				
IV.	Welding	01				
	Total	**14**				

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES /PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the above mentioned expected competency.

Sheet No.	Unit No.	Practical Exercise	Approx Hours Required
1	I	• Draw drawings of different metallurgical furnaces - - Natural draft pit furnace, - Gas fired crucible furnace, - Coke fired pit furnace, •Draw Sectional view of cupola	07
2	I	• Draw drawings of following furnaces- - Indirect arc furnace, - Direct arc furnace, - Resistance furnace. - Lift coil furnace, - Induction furnace	07
3	I	• Draw Section of moderate size blast furnace • Draw Section of Blast furnace hearth and bosh, Double cup and cone.	07
4	I	Draw Open Hearth furnace with Front view & Side view	07
5	I	Draw Kaldo furnace and L.D.Converter	07
6	I	Draw Muffle furnace, Salt bath furnace.	07
7	II	Draw various types of patterns & core	07
8	II	Draw different types of Top gate, Bottom gate & Parting line gate.	07
9	II	Draw various types of Blind riser & Open riser.	07
10	II	Draw procedural step for Shell moulding, Centrifugal casting & Concast machine.	14
11	III	•Draw Work roll ,Rolling mill line & Types of rolling mil •Draw Types of tube rolling	07
12	III	Draw various Forging equipment & two types of extrusion	07
13	IV	Draw different types of weld joints with weld symbols	07
		Total	**98**

7. SUGGESTED LIST OF STUDENT ACTIVITIES

7.1 Students may be given data to draw schematic drawings of different metallurgical furnaces & processes.

7.2 Students will prepare sketch book and get it checked from concerned faculty

7.3 Student will prepare drawing in sheet.

7.4 Student may be asked to answer briefly questions related to drawings and submit file for the above mentioned drawings.

8. SUGGESTED LEARNING ACTIVITIES

A. List of Books

S.No.	Author	Title of Books	Publication
1	Winter, A.K.	Introduction to Foundry Technology	McGraw-Hill
2	Higgings, R.A.	Engineering Metallurgy Vol. I & II	Tata McGraw-Hill
3	Dieter	Mechanical metallurgy	McGraw-Hill
4	Swaroop, D	Elements of metallurgy	Rastogi Publications

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnic

1. **Prof. I. B. DAVE** , HOD, Dept of Metallurgy, Dr S & S.S Ghandhy college of engineering & Technology

2. **Prof. Smt B. H. Goyal**, Lecturer, Dept of Metallurgy, Dr S & S.S Ghandhy college of engineering & Technology

Co-ordinator and Faculty Members from NITTTR Bhopal

1. **Dr. K. K. Jain**, Professor & Head, Dept. of Mechanical Engg.
2. **Dr. A.K. Sarathe**, Associated Professor, Dept. of Mechanical Engg.