

VIVEKANAND COLLEGE, KOLHAPUR
(AUTONOMOUS COLLEGE)

Board of Studies in Foundry Technology

Choice Based Credit System Pattern

Syllabus

For

B. Voc. Part-I (Diploma)

Diploma in Foundry Technology

(To be implemented from Academic Year 2019-2020 onwards)

BACHELOR OF VOCATION (B.Voc.)

STRUCTURE OF SYLLABUS:

To be implemented from the academic year 2019-2020

1. Title of the course: BACHELOR OF VOCATION (FOUNDRY TECHNOLOGY)

A. INTRODUCTION

The proposed curriculum is with the view to make it more contextual, industry affable and suitable to cater the needs of society and nation in present day context. The committee examined the nature of the existing syllabus of various courses in foundry technology and after analysing other curricula of existing universities in respective subjects in terms of content, relevance, quality and pattern of teaching and examination, has synthesized the present proposal. After guidance from industry professionals, consultants and senior faculty, feedbacks from the core faculty and intensive discussions the syllabus is suitably finalized.

The syllabus needs revision in terms of preparing the student for the professional scenario with relevance to practical needs and requirements. A holistic approach includes providing industry training via on job training/internships, handling live projects, visits to foundry units. Regular expert's interaction will help to build a bridge between students and industry.

Technical advancement is the key to a substantial teaching system in today's world and thus a great responsibility lies on the curriculum to prepare students to rise to meet global standards and align seamlessly to changing trends.

B. RATIONALE

Casting process is an art and need to be developed to fulfill the requirement of the global market. The skill of casting will provide us the better quality of automobile, agricultural and heavy engineering cast components. In recent days, Foundry sectors are lacking skilled employees in Pattern making, Molding, Melting and Fettling. This curricular area aims at enabling the students to develop their skills of these different foundry sections.

In today's world of competition, the rejection control has become the key factor in the foundry industry. Rejection control benefits the industry in both quality and profit. This control is not possible without skilled employees present in the industry, which makes this course important for the industry.

The Foundry Technology curriculum focuses on building a strong foundation for developing a career in foundry by learning the basic key factors of Pattern making, molding, melting and fettling. Practical orientation of this course strengthens the skills of students and makes them solving the problems of foundry industry.

C.COURSE OBJECTIVES

To enable the students-

- To promote understanding of basic facts and concepts in foundry process while retaining the excitement of foundry industry.
- To make students capable of studying foundry technology in academic and Industrial courses.
- To expose the students to various emerging new areas of foundry technology and apprise them with their prevalent in their future studies and their applications in various spheres of manufacturing technology.
- To develop problem solving skills in students.
- To expose the students to different processes used in Foundry Industries and their applications.
- To develop ability and to acquire the skill and knowledge of terms, facts, concepts, processes, techniques and principles of foundry industries.
- To develop ability to apply the skill and knowledge of contents of principles of foundry technology.
- To inquire of new skill and knowledge of foundry technology and developments therein.
- To expose and to develop interest in the fields of foundry technology.

D.CORE CONTENT GOALS FOR FOUNDRY TECHNOLOGY

The students will learn:

- Basics of molding, pattern making, melting and fettling.
- Key factors behind accurate pattern construction
- Principles of Melting furnaces
- Study of Charge calculations
- The basics of different molding operations.
- The advanced molding processes.
- The principles of fettling.
- About career options in foundry industry.
- To improve their skills and techniques through practicals and projects.
- To learn problem solving techniques.

In this class, students will learn the basic theory behind all the foundry operations. The Practical part of course will make them confident to work on shop floor. They will demonstrate the processes as expected by the teacher. They are expected to maintain facilities in an appropriate working condition.

2. Duration:

The duration of the B.Voc. Course will be of **three years**.

•**B.Voc. Part I - Diploma in Foundry Technology**

•**B.Voc. Part II - Advanced Diploma in Foundry Technology**

•**B.Voc. Part III - Bachelor of Vocation in Foundry Technology**

The final B.Voc degree will be awarded only after completion of three years course. The suggested credits for each of the years are as follows:

Awards		Normal calendar duration	Skill Component Credits	General Education Credits
Year 1	Diploma in Foundry Technology	Two Semesters	36	24
Year 2	Advanced Diploma in Foundry Technology	Four Semesters	36	24
Year 3	B.Voc in Foundry Technology	Six Semesters	36	24
TOTAL			108	72

General Education Component should not exceed 40% of the total curriculum.

Credits can be defined as the workload of a student in

1. Lectures
2. Practicals
3. Seminars
4. Private work in the Library/home
5. Examination
6. Other assessment activities.

The following formula should be used for conversion of time into credit hours.

- a) One Credit would mean equivalent of 15 periods of 60 minutes each, for theory, workshops /labs and tutorials;
- b) For internship/field work, the credit weightage for equivalent hours shall be 50% of that for lectures/workshops;
- c) For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures/workshops.

3. Eligibility:

The eligibility condition for admission to B.Voc. programme shall be **10+2 or equivalent**, in any stream **from any recognized board or university**.

4. Medium of Instruction:

The medium of instruction of the course will be **Marathi/ English**.

5. Pattern: Choice Based Credit System with Outcomes.

6. Examination:

A. Scheme of examination:

- The semester examination will be conducted at the end of each term (both theory and practical examination)
- Theory paper will be of 50 marks each. The practical examination will be of 150 marks and industrial practical training/project work of 50 marks in the practical.
- Question papers will be set in the view of the entire syllabus and preferably covering each unit of the syllabus.

For each semester there will be five theory papers. Practical Examination will be conducted at the end of every semester.

Paper Number	Title of Paper (For Semester I)	Internal Marks	Theory Exam Marks	Total Marks
AECC-I	Business Communication-I	10	40	50
CC-I	Engineering Graphics-I.	10	40	50
CC-II	Engineering Materials.	10	40	50
CC-III	Pattern Construction Technology	10	40	50
CC-IV	Moulding Technology.	10	40	50
TOTAL		50	200	250

The practical examination will be of 200 marks.

Sr. No.	Practical examination	Marks	Internal Assessment	Marks
1	Practical	120	Projects/ Industry Training.	50
2	Journal	15		
3	Oral	15		
Total		150		50

The total weightage of first term is of 450 marks, the details of which are-

Sr. No.	Title	Marks
1	Theory Examination 40 X 5	200
2	Practical Examination.	200
3	Internal Assessment	50
	TOTAL	450

B. Nature of question paper:

For each paper there will be **THREE** compulsory questions.

General nature of the question paper will be:

Question Number	Type		Marks
Q.1	Multiple choice question	No internal options.	8
Q.2	Short answer	Any four out of six	16
Q.3	Long answer	Any two out of three	16

C. Standard of Passing:

To pass the examination a candidate must obtain at least 35% (i.e 14 marks out of 40) in individual subjects, in internal assessment and University examination each in all theory and practical subjects.

D. External Students: Not applicable as this is a practical oriented course.

7. University Term: As per academic calendar of the university.

For the first year i.e. Diploma in Foundry Technology practical examination and theory paper assessment will be done at college level.

8. List of equipment and instruments:

1. Sand Rammer
2. Sand Sampler
3. Rapid moisture content tester.
4. Compactability Tester
5. Permeability Tester.
6. Universal sand testing machine
7. Mould hardness teller.
8. Core Hardness Tester.
9. Sand Muller
10. Sand Grinder

9. Laboratory Safety Equipments:

Part I: Personal Precautions:

1. Must wear **Lab Aprons / Lab Jacket** and safety shoes.
2. Except in emergency, over – hurried activities is forbidden.
3. Eating, Drinking and Smoking in the laboratories is strictly forbidden.

Part II: Use of Safety and Emergency Equipments:

1. First aid Kits
2. Fire extinguishers (dry chemical and carbon dioxide extinguishers)

3. Management of Local exhaust systems.
4. Sign in register if using instruments.

10. Workload:

Each skill based paper (i.e. Paper no. II, III, IV and V) will have **three theory** periods per week. There are **four practical** per week. Each practical will be of four periods. The practical batch will have maximum 20 students.

The total workload for one batch will be:

1. One Paper on General Education:	=	06 Theory Periods.
2. Four Papers on skill based Education: 4 X 3	=	12 Theory Periods.
3. Four Practical work per week: 4 X 4	=	16 Practical periods.
4. Project Work per batch per week:	=	02 Periods

TOTAL		36 Periods.

Working hours will be 5 hours (300 minutes) per day i.e. six periods each of 50 minutes.

13. MEMORANDUM OF UNDERSTANDING (MOU):

The purpose of this MOU is to clearly identify the roles and responsibilities of each party (i.e. college and industry partner) as they relate to the implementation of the **B.Voc. Programme in Foundry Technology** at the college.

It is suggested to sign at least **TWO MOU** with the industry partners in the related field.

14. PROGRAM OUTCOMES (PO's)

1. B. Voc. Graduates in Foundry Technology will demonstrate knowledge of Machine Drawing, Material Science, Gating System Design & Metallurgy to solve actual casting products/processes related problems in Foundries.
2. Graduates will become Innovators & Entrepreneurs to address social, technical and business challenges.
3. B. Voc. Graduates in Foundry Technology will select and apply relevant modern technique and IT Tools to solve complex problems in design and manufacturing of casting components.
4. B. Voc. Graduates in Foundry Technology will able to understand and solve social, health, legal issues related to foundry.
5. B. Voc. Graduates in Foundry Technology will able to use appropriate environmental friendly processes for foundry to achieve sustainable growth.
6. B. Voc. Graduates in Foundry Technology will be able apply ethical business practices in Industry.
7. B. Voc. Graduates in Foundry Technology will able to work in Industry/Foundry as a team player as well as a team leader.

8. B. Voc. Graduates in Foundry Technology will be able to communicate effectively and professionally at Local to Global level.
9. B. Voc. Graduates in Foundry Technology will be able to apply Project Management Techniques and Financial Management Techniques in foundry.

Program Educational Outcomes:

1. The graduates will apply knowledge gained in course to improve lives and livelihoods through a successful career in Foundry based Companies.
2. The Graduates will engage in lifelong learning such as higher studies & association with professional bodies.

Program Specific Outcomes:

1. B. Voc. Graduates in Foundry Technology will collect and analyze data for solving the problems related with casting by using modeling, analysis & design tools.
2. Make Use of Material Testing Techniques, Sand Testing Techniques & Appropriate Gating Design Techniques for improving quality of product.

B.Voc. Part - I (Diploma in Foundry Technology) Course structure

General Structure:

The diploma course has two semesters; each one is of 450 marks. There will be five theory papers for each semester having 50 marks each.

SEMESTER – I

- | | |
|--|-------------|
| 1) Paper-I: Business Communication- I | - 50 Marks. |
| 2) Paper-II: Engineering Graphics-I. | - 50 Marks. |
| 3) Paper-III: Engineering Materials. | - 50 Marks. |
| 4) Paper-IV: Pattern Construction Technology | - 50 Marks |
| 5) Paper V- Molding Technology. | - 50 Marks. |

SEMESTER – II

- | | |
|---|-------------|
| 1) Paper-VI: Business Communication-II | - 50 Marks. |
| 2) Paper-VII: Engineering Graphics-II | - 50 Marks. |
| 3) Paper-VIII: Melting Technology | - 50 Marks. |
| 4) Paper-IX: Gating Systems & Riserling | - 50 Marks. |
| 5) Paper X: Casting Processes. | - 50 Marks. |

There will be practical examination for each semester. The practical examination will be conducted in **two days** each of six hours. It will be of 150 marks of which 30 marks are reserved for oral and journal. The internal assessment of 50 marks includes industry training via internships, handling live projects, visits to foundry units etc.

SYLLABUS

N. B.

- (i) Figures shown in bracket indicate the total lectures required for the respective units.
- (ii) The question paper should cover the entire syllabus. Marks allotted to questions should be in proportion to the lectures allotted to respective to units.
- (iii) All units should be dealt with S.I. units.
- (iv) **Industrial training / tour / visit per semester is compulsory.**
- (v) Use of recent editions of reference books is essential.
- (vi) Use of Scientific calculator is allowed.

SEMESTER – I

AECC– I: Business Communication-I

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Information about English grammar
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	04/02/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	/ /00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To inculcate basic communication techniques amongst the students.
2. To train students for representing their credentials professionally.
3. To train students on various effective representation methods.
4. To guide students on various interview processes.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF101.1	Use appropriate words and sentences for effective communication.	8
CF102.2	Use appropriate skills for resume writing.	8
CF103.3	Use various data representation techniques.	8
CF104.4	Understand skills required for effective interview.	8

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)
1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF101.1	-	-	-	-	-	-	-	2	-	-	-
CF102.2	-	-	-	-	-	-	-	2	-	-	-
CF103.3	-	-	-	-	-	-	-	2	-	-	-
CF104.4	-	-	-	-	-	-	-	2	-	-	-

Course Content:

Unit 1: Use of English in Business Environment

Topics:

Business Vocabulary: Vocabulary for banking, marketing and for maintaining public relations

What is a sentence?

Elements of a sentence

Types of sentence: Simple, compound, complex

Unit 2: Writing a Letter of Application and CV/ Resume

Topics:

Structure of a letter of application for various posts

CV/ Resume and its essentials

Unit 3: Presenting Information/Data

Topics:

Presenting information/data using graphics like tables, pie charts, tree diagrams, bar diagrams, graphs, flow charts

Unit 4: Interview Technique

Topics:

Dos and don'ts of an interview

Preparing for an interview

Presenting documents

Language used in an interview

Practical: Based on the theory units

10 Marks.

Text Books/Reference Books/ Other Books/E-material/Paper

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Business Communication	Sethi, Anjane & Bhavana Adhikari	Tata McGraw Hill	-	-
2	Writing with a purpose	Tickoo, Champa & Jaya Sasikumar	OUP	-	1979
3	The Art of Effective Business Communication	Sonie, Subhash C. Mastering	Student Aid Publication	-	2008
4	Business Communication	Herekar, Praksh	Mehta Publications	-	2007
5	Principals of Business Communication	Herekar, Praksh	Mehta Publications	-	2003
6	Business Communication	Rai, Urmila & S. M. Rai	Himalaya Publishing House	-	2007
7	Business Communication	Pradhan, N. S	Himalaya Publishing House	-	2005

8	Managerial Communication	Pardeshi, P. C	NiraliPrakashan	-	2008
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**Pattern of a Question Paper
Business Communication-I (AECC-I)**

Time: 2 hours

Total Marks: 40

Q. 1	Do as directed. Question items on Unit 1 to be asked. (10 out 12)	10
Q. 2	Write a letter of application. OR Draft a CV/ Resume for a particular post.	10
Q. 3	Present a given information or data using a table/ chart/ pie diagram, etc (Any one diagram to be drawn.)	10
Q. 4	Fill in the blanks in the given interview.	10

Practical Evaluation:

10 Marks

Oral and Presentation based on the units prescribed.

SKILL BASED PAPERS:

CC-I: ENGINEERING GRAPHICS-I

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Information about geometrical shapes.
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	03/00/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	50/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To understand basics of drawing & drawing Instruments.
2. To study construction techniques of conics such as Ellipse, Parabola etc.
3. To study various constructional techniques of special curves.
4. To understand Projection techniques of points.
5. To understand Projection techniques of Lines.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF102.1	Use various drawing techniques & drawing instruments.	1
CF102.2	Draw various Conics such as Ellipse & Parabola.	1
CF102.3	Draw various special curves.	1
CF102.4	Take appropriate projections of given point.	1
CF102.5	Take appropriate projections of given Line.	1

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)

1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF102.1	1	-	-	-	-	-	-	-	-	1	-
CF102.2	3	-	-	-	-	-	-	-	-	1	-
CF102.3	3	-	-	-	-	-	-	-	-	1	-
CF102.4	3	-	-	-	-	-	-	-	-	1	-
CF102.5	3	-	-	-	-	-	-	-	-	1	-

Course Content:**1. 0. Drawing office practice.****10Hrs.**

1.1. Importance of engineering drawing - drawing instruments: drawing board, mini drafter, compass, divider, protractor, drawing sheets etc., - layout of drawing sheets.

1.2. Importance of legible lettering and numbering - single stroke letters - upper case and lower case letters- general procedures for lettering and numbering - height of letters - guidelines.

1.3. Dimensioning - Need for dimensioning - terms and notations as per BIS - Dimension line, Extension line and Leader line - Methods of dimensioning – Importance of dimensioning rules - Exercises.

1.4. Scales - Study of scales - full size scale, reduced scale and enlarged scale.

2.0. Constructions of conics.**15Hrs.**

2.1. Conics: Different types – Definition of locus, focus and directrix - Applications of ellipse, parabola and hyperbola.

2.2. Ellipse: Construction of ellipse by concentric circle method, rectangular method and Eccentricity method when focus and directrix are given – Practical applications.

2.3. Parabola: Construction of parabola by rectangular method, parallelogram method and eccentricity method when focus and directrix are given– Practical applications.

2.4. Hyperbola: Construction of hyperbola by rectangular method and eccentricity method

when focus and directrix are given– Practical applications.

2.5.Scales: Construction of Diagonal and Vernier scales.

2.6.Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects.

3.0. Constructions of special curves. 10Hrs.

3.1. Geometric curves: Definition, application and construction of cycloid - epicycloid – hypocycloid – exercises.

3.2. Involute of a circle - Archimedean spiral – helix – exercises.

4.0. Projection of points. 5Hrs.

4.1. Projection of points – points in different quadrants.

5.0. Projection of straight lines. 10Hrs.

5.1. Projection of straight lines – parallel to one plane and perpendicular to other plane – inclined to one plane and parallel to the other plane – parallel to both the planes – inclined to both the planes (simple problems only).

Text Books/Reference Books/ Other Books/E-material/Paper

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Engineering drawing	Gill P.S	S.K.Kataria & Sons	-	-
2	Engineering Drawing	Bhatt N.D. and Panchal V.M	Charotar Publishing House	50th	2010
3	Engineering Drawing (Vol. I&II)	Gopalakrishna K.R	Subhas Stores	-	2007
4	Engineering Graphics	Venugopal K. and Prabhu Raja V	New Age International (P) Limited	-	2008
5	A text book of Engineering Graphics	Natrajan K.V	Dhanalakshmi Publishers	-	-
6	Engineering drawing and graphic technology	Thomas E.French, Charles J.Vierck, Robert J.Foster	McGraw Hill International Editions	-	-
7	First Year Engineering Drawing	Barkinson & Sinha	Pitman Publishers		
8	Engineering Drawing	Shah M.B, and Rana B.C	Pearson	2nd	2009
9	Engineering Drawing	BasantAgarwal and Agarwal C.M	Tata McGraw Hill	-	2008

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawingsheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

CC-II: ENGINEERING MATERIALS

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Basic information about chemistry.
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	03/00/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	50/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To study Properties & Classifications of Ferrous metals.
2. To study properties & alloys of Non-ferrous metals
3. To study the properties & Compositions of engineering Plastics & Fibers.
4. To study Refractory Materials.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF103.1	Select appropriate materials and its compositions amongst Ferrous Metals.	1
CF103.2	Select & Recommend suitable Non-ferrous Metal for Materials of Construction.	1
CF103.3	Apply knowledge of Plastics & Fibers for Material selection.	1
CF103.4	Apply knowledge of Refractory Materials in Industry.	1

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)

1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF103.1	3	-	-	-	-	-	-	-	-	-	1
CF103.2	3	-	-	-	-	-	-	-	-	-	1

CF103.3	3	-	-	-	-	-	-	-	-	-	1
CF103.4	3	-	-	-	-	-	-	-	-	-	1

Course Content:

1.0. Ferrous metals: 10Hrs.

Physical and mechanical properties viz. strength, elasticity, ductility, toughness, malleability, brittleness, hardness, stiffness, fatigue, Classification of iron and steel; pig iron, cast iron, wrought iron, steel, alloy steel, stainless steel and carbon steels.

2.0. Non- ferrous metals: 8Hrs.

Non- ferrous metals, Introduction to metals aluminum, copper, zinc, lead, tin, nickel and magnesium and their alloys; physical and mechanical properties of all the above alloys.

3.0. Engineering plastics and fiber: 10Hrs.

Important sources of plastics, Classification – thermoplastic and thermosetting, Various trade names of engineering plastics, Fiber and their classification: Inorganic and organic fibers, Usage of fiber. Plastics; Introduction, types of plastics, properties, composition and their applications.

4.0. Insulating material 8Hrs.

Various heat insulating material and their usage like asbestos, glass wool, cork, puf, china clay, thermocole, various electrical insulating material and their use like china clay, leather, bakelite, ebonite, glass wool, rubber felt. Composite materials: Introduction, properties and application.

5.0. Fuels: 4Hrs.

Coal, coke, liquid fuel, light diesel Oil (LDO), HSD, LPG, Natural gas, Principles of efficient combustion , liquid and gas fuel burners.

6.0. Refractories: 10Hrs.

6.1. Definition, classification and properties of refractories.

6.2. Manufacture of Refractories.

6.3. Testing of refractories

- Specific gravity
- Bulk density
- Porosity
- Refractoriness
- Slag attack
- Cold crushing strength

6.4. Refractory failures due to slagging, abrasion, fusion, spalling.

Text Books/Reference Books/ Other Books/E-material/Paper

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Material science	RK Rajput	SK Kataria and sons	-	-
2	Material science and engineering	Raghavan	Prentice Hall of India, Delhi	-	-
3	Material science and engineering	Srivastava	New age international (P) Ltd.	-	-
4	Materials and metallurgy	OP Khanna	Dhanpatrai	-	-
5	Manufacturing processes	V. Raghvan	Prentice Hall	-	-
6	Introduction to physical metallurgy	Sidney H Avner	Tata McGraw-Hill	-	-

CC-III: PATTERN CONSTRUCTION TECHNOLOGY:

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Basic Information about Sand Making & Casting
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	03/00/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	50/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To study various Allowances, Materials & Types of Patterns.
2. To study patterns for special processes such as foam molding, shell molding
3. To study Pattern Making

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF104.1	Identify various types of Patterns & their Allowances.	1
CF104.2	Study of patterns for special processes	1
CF104.3	Study process of pattern making.	1

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)

1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF104.1	1	-	-	-	-	-	-	-	-	-	-
CF104.2	1	-	-	-	-	-	-	-	-	-	-
CF104.3	1	-	-	-	-	-	-	-	-	-	-

Course Content:

- 1.0** Pattern materials. Pattern making tools, different pattern materials their merits and Demerits. **10Hrs.**
- 2.0** Different types of patterns such as single piece, Cope and Drag, Followboard, Match plate pattern etc. **10Hrs.**
- 3.0** Tools for making Wood patterns and Metal patterns. **6Hrs.**
- 4.0.** Patterns for special processes such as foam moulding, shell moulding. **6Hrs.**
- 5.0.** Principles of pattern construction and layout. Machines for making wooden pattern and machine patterns. **10Hrs.**
- 6.0.** Finishing of patterns, colour codes for pattern and importance. **4Hrs.**
- 7.0.** Pattern allowances. **4Hrs.**

Text Books/Reference Books/ Other Books/E-material/Paper

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Metal casting	R. Heine & Rosenthal	TMH	-	-
2	Foundry Engineering	Howard F. Taylor	Wiley Eastern Ltd	-	-
3	Test book of foundry technology	M.Lal & O.P. Khanna	Dhanpat Rai & Sons	-	-
4	Foundry Engineering	T.R. Banga, R.L. Agrawal & T. Manghani		-	-
5	Foundry technology	K.P. Sinha & D.B. Goel	Standard Publishers & Distributors	-	-
6	Foundry Engineering	P.L. Jain	TMH	-	-
7	Applied metallurgy	S. Burton		-	-
8	Metal Casting Technology	P.C. Mukherjee	Oxford & IBH	-	-
9	Principal of foundry technology	P. L. Jain		-	-
10	Fundamental of metal casting	P.C. Mukherji		-	-

11	Introduction to foundry technology	Ekay Winter		-	-
12	Foundry technology	O.P. Khanna	S. Chand & Co	-	-
13	Manufacturing Processes	Ghosh& Malik	Pitman Publishers	-	-
14	Workshop Practice II	Hazra Chaudhary	Khanna Publisher	-	-

Paper – V: MOULDING TECHNOLOGY

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Basic Information of Mould & Casting.
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	03/00/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	50/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To study Sand Molding
2. To study Sand Molding Machines.
3. To study Mould design.
4. To study Core Making.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF105.1	Understand Sand Molding Techniques.	1
CF105.2	Understand sand molding machines.	1
CF105.3	Understand various mold design techniques.	1
CF105.4	Identify Core making processes.	1

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)

1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF105.1	2	-	-	-	-	-	-	-	-	-	2
CF105.2	2	-	-	-	-	-	-	-	-	-	2
CF105.3	2	-	-	-	-	-	-	-	-	-	2

1.1 Conventional Sand moulding:**6Hrs.**

Hand moulding with green sand using natural binders like clay, use of mechanical ramming aids & mould manipulation dry sand process, loam sand moulding, use of cow dung, Bentonites dextrin core oils & molasses as binder, mould washers Skin drying of moulds.

1.2 Moulding Machine:**7Hrs.**

Use of moulding machines, jolt squeeze, jolt squeeze & slinger, insertion of cores, power computation, type of flask equipment, preparation of sand cycle, mulling of the sand, flow charting special moulding/core making process, Use of plaster of Paris & cement as a moulding material carbon dioxide process, shell moulding & metal moulds, gravity & pressure die casting, V moulding processes.

1.3 Mould Quality:**6Hrs.**

Role of quality & packaging of sand. Mould hardness variation, Strength of mould & core enforcement, core floatation, use of chaplets for supporting cores, use of chills, mass hardness & hard spots. Defects like scabs & rat tails, storage of mould & moisture pick up.

1.4 Functions & design of mould:**6Hrs.**

Function of cavity, components of mould, gating system & risers, Directional solidification of metals, streamlined pouring of mould, maintenance of metal purity, Rigging and shake out, recycling of sand, reclamation of sand.

2.0. Core Making:**25Hrs.**

2.1 Importance and requirement of cores, Core making materials.

2.2 Core sand, its ingredients and properties.

2.3 Binders & machines used in core making.

2.4 Types of Cores, Core making processes.

2.5 Core venting, Core baking by different methods.

2.6 Finishing of Cores. Core setting chaplets.

2.7 Core sand disposal.

Text Books/Reference Books/ Other Books/E-material/Paper

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Metal casting	R. Heine & Rosenthal,	TMH	-	-
2	Foundry Engineering	Howard F. Taylor,	Wiley Eastern Ltd.	-	-

3	Test book of foundry technology	M.Lal& O.P. Khanna,	DhanpatRai& Sons.	-	-
4	Foundry Engineering -	T.R. Banga, R.L. Agrawal& T. Manghnani		-	-
5	Foundry technology	K.P. Sinha& D.B. Goel,	Standard Publishers & Distributors	-	-
6	Foundry Engineering -	P.L. Jain.	TMH.	-	-
7	Applied metallurgy	S. Burton.		-	-
8	Metal Casting Technology	P.C. Mukherjee,	Oxford & IBH	-	-
9	Principal of foundry technology	P. L. Jain		-	-
10	Fundamental of metal casting	P.C.Mukherji		-	-

B) Practical

A. Basic Sand Testing

50 Hrs.

- 1. Introduction to Sand Testing Equipments**
- 2. Sand Sample Preparation**
- 3. Moisture Content Test**
- 4. Compactability Test**
- 5. Pearmeability Test**

B. Physical Properties of Molding Sand

50 Hrs.

- 1. Universal Strength Test of molding sand**
- 2. Mold Hardness test of sand**
- 3. Core Hardness Test**

B. Pattern Making Processes

50 Hrs.

- 1. Wooden pattern manufacturing**
- 2. Metal Pattern Manufacturing**

A) Project Work

50 Hrs.

- 1) Collecting References**
- 2) Collecting Molding sand samples from foundries**
- 3) Analysis of Molding sand properties and reporting**

SEMESTER II

A. Nature of Examination:

For second semester there will be five theory papers. Practical Examination will be conducted at the end of the semester.

Paper Number	Title of Paper (For Semester I)	Internal Marks	Theory Exam Marks	Total Marks
AECC-II	Business Communication-II	10	40	50
CC-V	Engineering Graphics-II.	10	40	50
CC-VI	Melting Technology	10	40	50
CC-VII	Gating System and Riser	10	40	50
CC-VIII	Casting Processes	10	40	50
TOTAL		50	200	250

The practical examination will be of 200 marks.

Sr. No.	Practical examination	Marks	Internal Assessment	Marks
1	Practical	120	Projects/ Industry Training.	50
2	Journal	15		
3	Oral	15		
Total		150		50

The total weightage of first term is of 450 marks, the details of which are-

Sr. No.	Title	Marks
1	Theory Examination 40 X 5	200
2	Practical Examination.	200
3	Internal Assessment	50
TOTAL		450

B. Nature of question paper:

For each paper there will be **THREE** compulsory questions.

General nature of the question paper will be:

Question Number	Type		Marks
Q.1	Multiple choice question	No internal options.	8
Q.2	Short answer	Any four out of six	16
Q.3	Long answer	Any two out of three	16

SYLLABUS

N. B.

- (i) Figures shown in bracket indicate the total lectures required for the respective units.
- (ii) The question paper should cover the entire syllabus. Marks allotted to questions should be in proportion to the lectures allotted to respective to units.
- (iii) All units should be dealt with S.I. units.
- (iv) Project/ Industrial visit per semester is compulsory.
- (v) Use of recent editions of reference books is essential.
- (vi) Use of Output Devise allowed.

SEMESTER II

GENERAL EDUCATION PAPER:

B. Voc. Part-I (Diploma) AECC-II Business Communication-II

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Information about business vocabulary and Presentation skill
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	04/02/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To Inculcate group discussion techniques amongst the students.
2. To train students for professional and global communication for effective business processes.
3. To highlight importance of negotiation along with its stages for effective business model.
4. To guide students for implementing relevant business marketing model/models.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF106.1	Use appropriate communication skills and vocabulary for effective group discussion on a particular topic	8
CF106.2	Communicate professionally with his/her subordinates and business concerns effectively.	8
CF106.3	Use various negotiation techniques for business dealings for his/her organization.	8
CF106.4	Use effective marketing aids for organizational business growth.	8

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)

1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF106.1	-	-	-	-	-	-	-	3	-	-	-
CF106.2	-	-	-	-	-	-	-	3	-	-	-
CF106.3	-	-	-	-	-	-	-	3	-	-	-
CF106.4	-	-	-	-	-	-	-	3	-	-	-

Course Content:

Units Prescribed for Theory:

Unit 5: Group Discussion

Topics:

Preparing for a Group Discussion
 Initiating a Discussion
 Eliciting Opinions, Views, etc.
 Expressing Agreement/ Disagreement
 Making Suggestions; Accepting and Declining Suggestions
 Summing up.

Unit 6: Business Correspondence

Topics:

Writing Memos, e-mails, complaints, inquiries, etc.
 Inviting Quotations
 Placing Orders, Tenders, etc.

Unit 7: English for Negotiation

Topics:

Business Negotiations
 Agenda for Negotiation
 Stages of Negotiation

Unit 8: English for Marketing

Topics:

Describing/ Explaining a Product/ Service
 Promotion of a Product
 Dealing/ bargaining with Customers
 Marketing a Product/ Service: Using Pamphlets, Hoardings, Advertisement,
 Public Function/ Festival

Practical: Based on the theory units

Text Books/Reference Books/ Other Books/E-material/Paper

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Business Communication	Herekar, Praksh	Mehta Publications	-	2007
2	Principals of Business Communication	Herekar, Praksh	Mehta Publications	-	2003
3	Group Discussions	John, David	Arihant Publications	-	-
4	Business Communication	Kumar, Varinder	Kalyani Publishers	-	2000
5	Managerial Communication	Pardeshi, P. C	Nirali Prakashan	-	2008
6	Business Communication	Pradhan, N. S.. Mumbai	Himalaya Publishing House	-	2005
7	Business Communication	Rai, Urmila & S. M. Rai.	Himalaya Publishing House	-	2007
8	Business Communication	Sethi, Anjane & Bhavana Adhikari	Tata McGraw Hill	-	-
9	The Art of Effective Business Communication	Sonie, Subhash C. Mastering	Student Aid Publication	-	2008
10	Writing with a Purpose	Tickoo, Champa & Jaya Sasikumar	OUP	--	1979
11	Business Correspondence	Whitehead, Jeoffrey & David H. Whitehead	Wheeler Publishing	-	1996

**Pattern of a Question Paper
Business Communication-II****Time: 2 hours****Total Marks: 40**

Q. 1	Fill in the blanks in the following Group Discussion. (On Unit 5) (10 out 12)	10
Q. 2	Attempt ANY ONE of the following (A or B): (On Unit 6)	10
Q. 3	Fill in the blanks with appropriate responses: (On Unit 7)	10
Q. 4	Attempt ANY ONE of the following (A or B): (On Unit 8) (10 out 12)	10

Practical Evaluation:**10 Marks**

Oral and Presentation based on the units prescribed.

SKILL BASED PAPERS:

CC –V: ENGINEERING GRAPHICS-II

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Information about geometrical shapes and projections.
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	03/00/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	50/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To understand Concept of Engineering Drawing and its application in foundry/Industries.
2. To study & visualize various projection methods for lines & planes.
3. To understand & study Projections of solids.
4. To understand & study Development of Surfaces.
5. To study Isometric and Perspective Projections.
6. To study Computer Aided Drafting.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF107.1	Use concepts of engineering drawing for Manufacturing/Fabrication/Design in foundry/Industries	1
CF107.2	Visualize and draw various projection methods for lines and planes	1
CF107.3	Visualize and draw various projection methods of solids	1
CF107.4	Understand sketching of development of surfaces	1
CF107.5	Read and Interpret concepts of Isometric and Perspective Projections.	1
CF107.6	Use various commands in Computer Aided Drafting.	1,3

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)

1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF107.1	1	-	-	-	-	-	-	-	-	1	-
CF107.2	1	-	-	-	-	-	-	-	-	1	-
CF107.3	1	-	-	-	-	-	-	-	-	1	-
CF107.4	1	-	-	-	-	-	-	-	-	1	-
CF107.5	1	-	-	-	-	-	-	-	-	1	-
CF107.6	1	-	1	-	-	-	-	-	-	1	-

Course Content:

1.0. Projection of Points, Lines and Plane Surfaces. 10Hrs.

- 1.1. Orthographic projection- principles-Principal planes-First angle projection-projection of points.
- 1.2. Projection of straight lines (only First angle projections) inclined to both the principal planes
- 1.3. Determination of true lengths and true inclinations by rotating line method and traces
- 1.4. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

2.0. Projection of Solids. 10Hrs.

- 2.1. Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

3.3. Projection of Sectioned Solids and Development of Surfaces. 10Hrs.

- 3.1. Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section.
- 3.2. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.
- 3.3. Development of lateral surfaces of solids with cut-outs and holes

4.0. Isometric and Perspective Projections. 10Hrs.

- 4.1. Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems.
- 4.2. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method

5.0. Computer Aided Drafting (Demonstration Only). 10Hrs.

- 5.1. Introduction to drafting packages (AUTOCAD) and demonstration of their use.

Text Books/Reference Books/ Other Books/E-material/Paper

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Engineering drawing	Gill P.S	S.K.Kataria & Sons	-	-
2	Engineering Drawing	Bhatt N.D. and Panchal V.M	Charotar Publishing House	50th	2010
3	Engineering Drawing (Vol. I&II)	Gopalakrishna K.R	Subhas Stores	-	2007
4	Engineering Graphics	Venugopal K. and Prabhu Raja V	New Age International (P) Limited	-	2008
5	A text book of Engineering Graphics	Natrajan K.V	Dhanalakshmi Publishers	-	-
6	Engineering drawing and graphic technology	Thomas E.French, Charles J.Vierck, Robert J.Foster	McGraw Hill International Editions	-	-
7	First Year Engineering Drawing	Barkinson & Sinha	Pitman Publishers	-	-
8	Engineering Drawing	Shah M.B, and Rana B.C	Pearson	2nd	2009
9	Engineering Drawing	BasantAgarwal and Agarwal C.M	Tata McGraw Hill	-	2008

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

CC –VI MELTING TECHNOLOGY

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Information of different materials and molding practices
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	03/00/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	50/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To study remelting procedures.
2. To study melting terminology.
3. To study composition control and melt quality.
4. To understand parameters for efficient operation of furnace.
5. To study various handling techniques for liquid metals in foundry.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF108.1	Handle scraps and select proper charging method in furnace	1
CF108.2	Find appropriate melting operations and decide post melting treatments as per type and grade of metal	1
CF108.3	Decide correct procedure of composition control as per required properties and composition	1
CF108.4	Select appropriate parameters for efficient operations of furnace	1
CF108.5	Decide appropriate handling techniques for liquid metals in foundry	1

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)

1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF108.1	1	-	-	-	-	-	-	-	-	-	-
CF108.2	1	-	-	-	-	-	-	-	-	-	-
CF108.3	1	-	-	-	-	-	-	-	-	-	-
CF108.4	1	-	-	-	-	-	-	-	-	-	-
CF108.5	2	-	-	-	-	-	-	-	-	1	-

Course Content:**1.1 Melting of primary and secondary metals:****10Hrs.**

Basics of melting scrap and smelting, handling and characterization of scrap, cleaning and bailing charge preparation control and charge balance, general methods of charging in furnaces, changes for SG cast iron.

1.2 Melting technology:**10Hrs.**

Role of flux; Reducing agents; Air reductants and chemical additives, in the furnaces; types and, selection of furnaces suitable for specific metals; cupola, induction, rotary, pit furnaces their operation and nature\characteristics of product there from; role of temperature and superheat; acid, basic and neutral operations; post melting treatment and air furnaces; melting of various types of cast iron, steel, aluminum, brass, SG cast iron.

1.3 Composition control and melt quality:**10Hrs.**

Importance of metal cleanliness; endogenous and exogenous inclusions; need of formation of right quality and nature of slag; oxygen, chlorine or argon blowing to improve melt quality; role of temperature and super heat.

1.4 Efficient Operation: 10Hrs.

Control of fuel consumption, quality of fuel coke in context to sulphur and ash, use of hot blast cupola; method of producing hot blast. Use of recuperators and regenerators, regulation control of power input into the furnaces, comparison of power input into different furnaces.

1.5 Handling of liquid metal:**10Hrs.**

Different methods to consume liquid metal, ingot, pigging, power production, casting etc. economical output, management of liquid metal; handing devices, preheating of laddles; use of vacuum assisted equipment for degasification, killing and rimming of steels, inoculation in SG cast iron and its control.

Text Books/Reference Books/ Other Books/E-material/Paper

Sr.No	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Metal casting	R. Heine & Rosenthal	TMH	-	-
2	Foundry Engineering	Howard F. Taylor	Wiley Eastern Ltd.	-	-
3	Test book of foundry technology	M.Lal & O.P. Khanna	Dhanpat Rai & Sons	-	2011
4	Principal of foundry technology	P. L. Jain	McGraw Hill Education	5 th	2017
5	Fundamentals of Metal Casting Technology	P.C. Mukherjee	Oxford & IBH	2 nd	1988
6	Industrial Furnaces	Trinks, Mawhinney, Shannon, Reed and Garvey	J.R. Publishers	-	-
7	Refractories and Furnaces	Francis Thompson Havard	McGraw Hill	-	-

CC-VII GATING SYSTEM AND RISERING

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Basics of drawing, Melting, Pattern and molding
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	03/00/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	50/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To study gating system & gating designs.
2. To study risering system.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF109.1	Select appropriate Gating System.	1
CF109.2	Design Gating system for given mould.	1
CF109.3	Design appropriate risers for a particular mould	1

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)
1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF109.1	2	-	-	-	-	-	-	-	-	-	2
CF109.2	2	-	-	-	-	-	-	-	-	-	2
CF109.3	2	-	-	-	-	-	-	-	-	-	2

Course Content:

1.0 GATING SYSTEM:

25Hrs.

- 1.1: Components of gating system- Pouring basin, down sprue, sprue well, runner bar, skimbob and ingates: Significance and function.
- 1.2: Types of gating: Top gate, bottom gate and parting gates.
- 1.3: Steps in design of gating area, calculations of pouring time, Runners and ingates for ferrous and non-ferrous alloys.
- 1.4: Importance and determination of dimensions of passages i.e gating ratio.

2.0 RISERING SYSTEM:**25Hrs.**

- 2.1 Function of risers/ feeders in compensating shrinkage in metals and alloys during solidification.
- 2.2 Riser types, shapes, sizes and locations.
- 2.3 Designing of risers using Cain's method, modulus method, Inscribed circle method.
- 2.4 Directional solidification: Use of padding, exothermic material, use of chills. Riser neck.

Text Books/Reference Books/ Other Books/E-material/Paper

Sr.No	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Metal casting	R. Heine & Rosenthall	TMH	-	-
2	Foundry Engineering	Howard F. Taylor	Wiley Eastern Ltd.	-	-
3	Test book of foundry technology	M.Lal & O.P. Khanna	Dhanpat Rai & Sons	-	-
8	Metal Casting Technology	P.C. Mukherjee	Oxford & IBH	-	-
9	Principal of foundry technology	P. L. Jain	-	-	-
10	Fundamental of metal casting	by P.C. Mukherji.	-	-	-

CC-VIII CASTING PROCESSES:

Course Type: Theory / Practical	Theory
Required/Elective	Required
Prerequisite	Information about sand casting technique
Teaching Scheme (Lecture/Practical/Tutorial/Drawing)	03/00/00/00 Hours
Total contact Hours (Lecture/Practical/Tutorial/Drawing)	50/00/00/00 Hours
Evaluation Scheme: Theory Theory Paper /Term Work/Oral/Practical	40/10/--/--

Course Objectives:

1. To study casting methods.
2. To study causes and remedies of casting defects.

Course Outcomes (COs):

Course Outcomes(COs): Upon completion of this course, students will be able to		Mapping with PO's
CF110.1	Select appropriate casting method for the components	1
CF110.2	Analyze casting defects & implement remedial measures in the foundry	1

Correlation matrix of Course outcomes with Programmed outcomes (CO-PO)

1=Low correlation, 2=Medium correlation, 3=High correlation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CF110.1	1	-	-	-	-	-	-	-	-	1	-
CF110.2	1	-	-	-	-	-	-	-	-	1	-

Course Content:**1.0 CASTING****35Hrs.**

- 1.1 Sand Casting,
- 1.2 Advantages of special casting techniques over sand casting method.
- 1.3 Plaster mold casting,
- 1.4 Permanent mold casting,
- 1.5 Die casting - Gravity and pressure die casting, Hot chamber and cold chamber.
- 1.6 Centrifugal casting,
- 1.7 Shell mold casting,
- 1.8 Investment casting,
- 1.9 CO₂ process of casting,
- 1.10 Continuous process.

2.0 CASTINGS DEFECTS:**15Hrs.**

Causes and remedies of following defects

- 2.1 Blow holes, Gas holes, Pin holes,
- 2.2 Scabs, Hot tears, Cold cracks, Shrinkage cavity.

Text Books/Reference Books/ Other Books/E-material/Paper

Sr.No	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Metal casting	R. Heine & Rosenthal	TMH	-	-
2	Foundry Engineering	Howard F. Taylor	Wiley Eastern Ltd.	-	

3	Test book of foundry technology	M.Lal& O.P. Khanna	Dhanpat Rai & Sons	-	-
4	Foundry Engineering	T.R. Banga, R.L. Agrawal & T. Manghnani	-	-	-
5	Foundry technology	K.P. Sinha& D.B. Goel	Standard Publishers & Distributors	-	-
6	Foundry Engineering	P.L. Jain	TMH	-	-
7	Applied metallurgy	S. Burton	-	-	-
8	Metal Casting Technology	P.C. Mukherjee	Oxford & IBH	-	-
9	Principal of foundry technology	P. L. Jain	-	-	-
10	Fundamental of metal casting	by P.C.Mukherji.	-	-	-

B) Practical

A. Advanced Sand Testing

50 Hrs.

1. Active Clay Percentage Test
2. Dead Clay Percentage Test
3. Rapid Drier Test
4. Sand Siever Test
5. Liquid Limit Test
6. Shatter Index Test
7. Moldability Test

B. Advanced Casting Techniques

50 Hrs.

1. Shell molding process
2. Gravity Die Casting
3. Centrifugal Casting
4. Pressure Die Casting
5. Lost Foam Casting
6. No bake process

B. Study of Furnaces

50 Hrs.

1. Cupola Furnace
2. Induction Furnace
3. Oil/Gas fired furnace
4. Pit type furnace

B) Project Work**50 Hrs.**

- 3) **Collecting References**
- 4) **Collecting Core sand samples from foundries**
- 3) **Analysis of Core sand properties and reporting**

INDUSTRIAL TRAINING:

The purpose of industrial training is to offer wide range of practical exposures to latest practices, equipment and techniques used in the field. This training programme will help the student in acquiring hands on experiences of various practices and events required to perform in different job situations. Through the industrial training the students are given an opportunity to develop psychomotor skills and problem solving ability.

The industrial Training has basically the following three components:

1. Orientation Programme
2. Industrial Training in the Industry
3. Report Writing and Evaluation

General Objectives: The student will be able to,

- Read and Interpret Drawing
- Observe different types of processes in ferrous / non-ferrous foundry.
- Study and develop methoding of casting.
- Identify casting defects and provides remedies.
- Study the available manuals.
- Develop history sheet for various processes/product.

Activities to be carried out during training:

1. Student should visit each section of the foundry/foundry department
2. Observe the processes, tools, machinery and equipment used
3. Observe testing of castings at each stage
4. Study drawings and interpret the drawings
5. Study the organisational structure of the company
6. Study the product development from raw material to finished goods
7. Observe safety norms adopted
8. Prepare a report on a case study which includes all the components referred above.

Training Report:

The students will have to go for industrial training in all the sections of foundry. After training the student is required to prepare a report on the following points:

- Details of the industry
- Layout of the foundry- different sections

- List of equipments in each section
- Organizational structure of the industry
- Description of major processes
- Quality measures adopted in the industry
- Safety norms and there implementation.