### Name of Institute:IITE

### Name of Faculty: Mr. Monil Salot

**Course code: MME0501**

**Course name: Steel Making**

Pre-requisites: Mineral Processing, Introduction to Process Metallurgy, Iron Making

Credit points: 03

Offered Semester: 05

**Course Coordinator**

Full Name: Mr. Monil Salot

Department with sitting location: Metallurgical Engineering, Bhanwar Building, Lab-004 (GF)

Telephone: 9428600336

Email: monilsalot.mt@indusuni.ac.in

Consultation times: 3:45-4:20 PM

**Course Lecturer**

Full Name: Mr. Monil Salot

Department with sitting location: Metallurgical Engineering, Bhanwar Building, Lab-004 (GF)

Telephone: 9428600336

Email: monilsalot.mt@indusuni.ac.in

Consultation times: 3:45-4:20 PM

Students will be contacted throughout the Session via Mail with important information relating to this Course.

# Course Objectives

By participating in and understanding all facets of this Course a student will:

1. To impart the overall idea of how Steel is produced the history of Steel making.

2. To know about various techniques of raw material preparation for charging in iron making furnace,

3. To design construction and operation of iron making furnace and reactions occurring in the furnace,

# 4. To Understand reaction mechanism inside the blast furnace and post treatment to make steel.

# Course Outcomes (CO)

1. To apply the knowledge of various types of routes of iron making to practical scenarios.
2. To innovate the existing ideas and ways of making Steel and developing the technology to

make this process energy intensive and cost effective.

# Course Outline

Proposed course mainly deal with Reaction Mechanisms, Primary steel Making, Secondary and Quality Steel Making, Tools for Steel Making, and methods to produce clean castings and techniques for casting namely ingot and continuous.

# Method of delivery

* Face to face lectures,
* Numerical and Simulations in Tutorials,
* Model Making
* Video Lectures When and as necessary

# Study time

3 Lectures

# CO-PO Mapping (PO: Program Outcomes)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 1 | - | 2 | - | 1 | 1 | 3 | 1 | - | - | 2 | - |
| **CO2** | 3 | 3 | 2 | 1 | 2 | 2 | 2 | - | - | - | 3 | 1 |

1-Lightly Mapped 2- Moderately Mapped 3- Highly Mapped

# Blooms Taxonomyand Knowledge retention(For reference)

(Blooms taxonomy has been given for reference)



Figure 1: Blooms Taxonomy



Figure 2: Knowledge retention

# Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

|  |  |
| --- | --- |
| **General Graduate Qualities** | **Specific Department of \_\_\_\_\_\_Graduate Capabilities** |
| **Informed**  Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas. | **1 Professional knowledge, grounding & awareness** |
| **Independent learners**  Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others. | **2 Information literacy, gathering & processing** |
| **Problem solvers**  Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards. | **4 Problem solving skills** |
| **Effective communicators**  Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication. | **5 Written communication** |
| **6 Oral communication** |
| **7 Teamwork** |
| **Responsible**  Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities. | **10 Sustainability, societal & environmental impact** |

# Practical work:

NA

# Lecture/tutorial times

**Lecture Monday 12:10-1:20 pm Google Classroom**

**Lecture Tuesday 11:10-12:10 pm Google Classroom**

**Lecture Thursday 2:20-3:20 pm Google Classroom**

# Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

# Details of referencing system to be used in written work

Reference Books

1. A. W. Cramb, “Making, Shaping and Treating of Steels”, Association of Iron and Steel

Engineers, 11 th Edition, 1985, ISBN: 9780930767020.

2. R. G. Ward, “An Introduction to the Physical Chemistry of Iron and Steel Making”, Edward

Arnold Ltd, 1 st Edition, 1962, ASIN: B0007IZZGY.

3. V. A. Kudrin, “Steel Making”, Mir Publisher, 1 st Edition, 1985, ASIN: B0007BN3H4.

Web Resources

# Text books

Text Books

1. R. H. Tukary, “An Introduction to Modern Steel Making”, Khanna Publishers, 7 th Edition,

2000, ISBN: 9788174090263.

2. G. R. Bashforth, “The Manufacture of Iron and Steel: Vol I”, Chapman &amp; Hall, 3 rd Edition,

1964, OCLC: 439659739.

3. G. R. Bashforth, “The Manufacture of Iron and Steel: Vol II”, Nabu Press, Primary Source

Edition, 1964, ISBN: 9781295841929.

# Additional Materials

1. NPTEL MOOC Course on “Steel Quality: Role of Secondary Refining &amp; Continuous Casting”

(https://onlinecourses.nptel.ac.in/noc17\_mm10/preview)

# ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE 60 marks :(40 marks mid semester examination + 20 marks internal evaluation)

Breakup of 20 Marks: (05 marks as attendance bonus for all students having attendance > 80%) + (05 marks for presentation)+(10 marks for two assignment or case studies)

ESE: 40 Marks of End Semester Examination

# SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components For remedial and repeater remedial - CIE 60 marks (40 marks remedial mid semester examination + 20 marks for assignments or case studies, limited to minimum 04 assignments per course), and end semester repeater and remedial examination would be carried out centrally according to University Policy

# Practical Work Report/Laboratory Report:

NA

# Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

# Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

# Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

# University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

**Plagi**a**rism** - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person’s work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

***Do not copy the work of other students.***

***Do not share your work with other students (except where required for a group activity or assessment)***

***.***

# Course schedule (subject to change)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Week #** | **Topic & contents** | | **CO Addressed** | | **Teaching Learning Activity (TLA)** |
|  | Weeks 1 | Reaction Mechanics | | C01, C02 | | PPT- Online Platform |
| Weeks 2 | Reaction Mechanics and Slag Metal Understanding | | C01, C02 | | PPT- Online Platform |
| Week 3 | Reaction of de-Carburisation | | C01, C02 | | PPT- Online Platform |
| Week 4 | Reaction of Sulphur, Phospohorus | | C01, C02 | | PPT- Online Platform |
| Week 5 | Reaction of Sulphur, Phospohorus | | C01, C02 | | PPT- Online Platform |
|  | |  | | | | |
|  | Week 6 | Primary Steel Making F/Cs | C01, C02 | | PPT- Online Platform | |
| Week 7 | Primary Steel Making -BOF | C01, C02 | | PPT- Online Platform | |
| Week 8 | Primary Steel Making -BOF | C01, C02 | | PPT- Online Platform | |
| Week 9 | Primary Steel Making F/Cs | C01, C02 | | PPT- Online Platform | |
|  | Week 10 | Primary Steel Making- Electric | C01, C02 | | PPT- Online Platform | |
| Week 11 | Primary Steel Making- Electric | C01, C02 | | PPT- Online Platform | |
|  | Week 12 | Quality and Secondary Steel Making | C01, C02 | | PPT- Online Platform | |
|  | Week 13 | Quality and Secondary Steel Making | C01, C02 | | PPT- Online Platform | |
|  | Week 14 | Quality and Secondary Steel Making | C01, C02 | | PPT- Online Platform | |
|  | Week 15 | Ingot and Continous Casting | C01, C02 | | PPT- Online Platform | |
|  | Week 16 | Defects in Casting | C01, C02 | | PPT- Online Platform | |

**Program Map for Metallurgical Engineering Department (Mapped For Steel Making)**

