Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NFMD507	Stainless Steel Technology	3	0	0	3

Prerequisites: Thermodynamics and Kinetics, Process Metallurgy, Mechanical Behavior Materials

Course Objective
• Equip students withfundamentals of different stainless steels • Equip students withsteelmaking of different stainless steels • Equip students with Mechanical properties and corrosion resistance
Learning Outcomes
• Application requirements for the different major grades of stainless steels • Commercially manufacturing and processing of different grades.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	I**ntroduction:** Importance of Stainless Steels, Effect of alloying elements, Production and consumption in India and world, Classification and major grades, Concept of Life-cycle costing.	5	Students will be able to understand the importance and basic classifications.
2	**Phase Transformationsfor SS**: Inadequacy of Fe - C diag., Relevance of Cr and Ni equivalents, Role of alloying elements and deformation, Mode of solidification, Role of segregation, Different transformations.	9	Students will know the necessity of developing suitable diagrams to learn the basics of solidification and phase transformation.
3	**Steelmaking, Refining, Casting and Processing of SS:** Raw materials, EAF, AOD / VOD, Ladle Refining, Vacuum treatment, Continuous casting, Hot rolling and Processing. Concept of product quality based on application requirements,	9	Students will know various production technologies to achieve the desired level of product quality.
4	**Mechanical Behaviour and Properties:** YS, UTS, Ductility, Toughness at normal, low and high temperatures, Role of temper embrittlement, Creep and Fatigue, Influence of different phases, Identification of suitable grade based on application requirements.	9	Students will learn mechanical behaviour of the different SS grades, and will be able to identify the suitable grade based on application requirements.
5	**Corrosion Resistance:**Different types: Mechanism and prevention of Galvanic, Pitting, Crevice, Stress Corrosion, Interpretation of PREN, MIC, Different corrosion testing procedures, Role of high temperature, precipitates, grades.	8	Students will learn about the different types of corrosion, and possible means for mitigation.
6	**Applications:** Advantages over other materials**.**	2	Students will know various specific applications.
	Total	**42**	

Text Books:

1. Bela Leffler, *Stainless Steels and their Properties*, Outokumpu Oy: n sivuilta, 1998.
2. M G Fontana, *Corrosion Engineering*, McGraw-Hill 1986.
3. A. Ghosh, *Secondary Steelmaking - Principles & Applications*, CRC Press, Florida, USA, 2001
4. M.M.Wolf, *Continuous Casting* , Vol.9 , Warrendale , PA, Iron & Steel Society, 1997.

Reference Books:

1. Santanu Ray, *Steel Quality: Role of Secondary Refining and Continuous Casting*, 2022.
2. 100 years of Stainless Steels: BSSA (UK)
3. Technical Handbook of Stainless Steels: The Atlas Steels, 2013.
4. OutokumpuStainless Steels Handbook, 2009.