

**GOVT. POLYTECHNIC, NAYAGARH**  
**3<sup>rd</sup> SEMESTER MECHANICAL**  
**ENGINEERING (2023-24)**

SUBJECT- ENGINEERING MATERIALS

TOTAL PERIODS-60

THEORY-4P/WEEK

NAME OF FACULTY : Himanshu Patra,PTGF (Mech)

Semester from :01/08/2023 to 30/11/2023

Sl No.	week	Day	Topics to be covered
1	1 <sup>st</sup>	1 <sup>st</sup> day	Material classification into ferrous and non ferrous category and alloys
		2 <sup>nd</sup> day	Properties of Materials: Physical and Chemical Mechanical
		3 <sup>rd</sup> day	Properties of Materials: Mechanical and Thermal properties
		4 <sup>th</sup> day	Material reliability and safety
Sl No.	week	Day	Topics to be covered
2	2 <sup>nd</sup>	1 <sup>st</sup> day	Characteristics and application of ferrous materials
		2 <sup>nd</sup> day	Classification, composition and application of low carbon steel,
		3 <sup>rd</sup> day	Classification, composition and application of medium carbon steel and High carbon steel
		4 <sup>th</sup> day	Alloy steel: Low alloy steel and high alloy steel
Sl No.	week	Day	Topics to be covered
3	3 <sup>rd</sup>	1 <sup>st</sup> day	Types of tool steel and stainless steel:Classification,Properties and uses
		2 <sup>nd</sup> day	Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo,
		3 <sup>rd</sup> day	Introduction to Iron – Carbon system
		4 <sup>th</sup> day	Concept of phase diagram
Sl No.	week	Day	Topics to be covered
4	4 <sup>th</sup>	1 <sup>st</sup> day	Concept of Cooling curves
		2 <sup>nd</sup> day	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
		3 <sup>rd</sup> day	Iron-Carbon diagram
		4 <sup>th</sup> day	Crystal defines and classification of crystals
Sl No.	week	Day	Topics to be covered
5	5 <sup>th</sup>	1 <sup>st</sup> day	Ideal crystal definition
		2 <sup>nd</sup> day	Classification of imperfection: Point defects and Line defects
		3 <sup>rd</sup> day	Types of surface defects and volume defects
		4 <sup>th</sup> day	Types and causes of point defects: Vacancies, Interstitials and impurities
Sl No.	week	Day	Topics to be covered
6	6 <sup>th</sup>	1 <sup>st</sup> day	Types and causes of line defects: Edge dislocation and screw dislocation
		2 <sup>nd</sup> day	Effect of imperfection on material properties

		3 <sup>rd</sup> day	Deformation by slip and twinning
		4 <sup>th</sup> day	Effect of deformation on material properties
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
7	7 <sup>th</sup>	1 <sup>st</sup> day	Introduction to Heat Treatment
		2 <sup>nd</sup> day	Purpose of Heat treatment
		3 <sup>rd</sup> day	Process of heat treatment: Annealing, Normalizing and Hardening
		4 <sup>th</sup> day	Tempering and stress relieving measures
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
8	8 <sup>th</sup>	1 <sup>st</sup> day	Surface hardening: Carburizing and Nitriding process
		2 <sup>nd</sup> day	Effect of heat treatment on properties of steel
		3 <sup>rd</sup> day	Hardenability of steel
		4 <sup>th</sup> day	Revision and Discussions with doubt clearance
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
9	9 <sup>th</sup>	1 <sup>st</sup> day	Introduction to Non-ferrous alloys
		2 <sup>nd</sup> day	Aluminum alloys: Composition, property and usage of Duralmin, $\gamma$ - alloy
		3 <sup>rd</sup> day	Copper alloys: Composition, property and usage of CopperAluminum, Copper-Tin, Babbit alloys
		4 <sup>th</sup> day	Copper alloys: Composition, property and usage of Phosperous bronze, brass, Copper- Nickel alloys
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
10	10 <sup>th</sup>	1 <sup>st</sup> day	Predominating elements of lead alloys, Zinc alloys and Nickel alloys
		2 <sup>nd</sup> day	Low alloy materials like P-91, P-22 for power plants
		3 <sup>rd</sup> day	High alloy materials like stainless steel grades of duplex, super duplex materials
		4 <sup>th</sup> day	Introduction to Bearing Material
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
11	11 <sup>th</sup>	1 <sup>st</sup> day	Classification, composition, properties and uses of Copper base bearing materials
		2 <sup>nd</sup> day	Classification, composition, properties and uses of Tin Base and Lead base, bearing materials

		3 <sup>rd</sup> day	Classification, composition, properties and uses of Cadmium base bearing materials
		4 <sup>th</sup> day	Doubt clearance
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
12	12 <sup>th</sup>	1 <sup>st</sup> day	Introduction to Spring materials
		2 <sup>nd</sup> day	Classification, composition, properties and uses of Ironbase Spring materials
		3 <sup>rd</sup> day	Classification, composition, properties and uses of copperbase Spring materials
		4 <sup>th</sup> day	Doubt clearance
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
13	13 <sup>th</sup>	1 <sup>st</sup> day	Introduction to Polymers
		2 <sup>nd</sup> day	Classification of Polymers and types
		3 <sup>rd</sup> day	Polymer reaction
		4 <sup>th</sup> day	Properties and uses of Plastics
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
14	14 <sup>th</sup>	1 <sup>st</sup> day	Properties and application of Thermosetting and Thermoplastic polymers
		2 <sup>nd</sup> day	Properties of Elastomers and types
		3 <sup>rd</sup> day	Uses of Elastomers
		4 <sup>th</sup> day	Introduction to composites and Ceramics
<b>Sl No.</b>	<b>week</b>	<b>Day</b>	<b>Topics to be covered</b>
15	15 <sup>th</sup>	1 <sup>st</sup> day	Classification, composition and properties of Composites
		2 <sup>nd</sup> day	Uses of particulate based and fibre reinforced composites
		3 <sup>rd</sup> day	Classification and uses of ceramics
		4 <sup>th</sup> day	Doubt clearance and Revision