

| <b>Discipline</b> : Mechanical Engineering        | <b>Semester</b> : 3RD                                | <b>Namo of the faculty</b> : SUVENDU KUMAR PANDA                      |
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| <b>Subject</b> : Engineering Materials ( TH – 3 ) | <b>No. of days /per week class allotted: 4 p / w</b> | <b>Academic Session - 2022 -23</b>                                    |
| <b>WEEK</b>                                       | <b>PERIOD</b>  | <b>TOPIC</b>  |
| 1 <sup>st</sup>                                   | 1 <sup>st</sup>                                      | Unit 1 : Introduction   |
|   | 2 <sup>nd</sup>                                      | Material classification into ferrous and nonferrous category , alloys |
|   | 3 <sup>rd</sup>                                      | Properties of materials : mechanical, physical, chemical              |
|   | 4 <sup>th</sup>                                      | Performance requirements.   |
|   | 5 <sup>th</sup>                                      | Material reliability and safety                                       |
| 2 <sup>nd</sup>                                   | 1 <sup>st</sup>                                      | Unit 2 : Ferrous materials and alloys.                                |
|   | 2 <sup>nd</sup>                                      | Characteristics and application of ferrous materials                  |
|   | 3 <sup>rd</sup>                                      | Classification , composition , application of low carbon steel.       |
|   | 4 <sup>th</sup>                                      | Classification, composition, application of Medium carbon steel       |
| 3 <sup>rd</sup>                                   | 1 <sup>st</sup>                                      | Classification, composition, application of High carbon steel         |
|   | 2 <sup>nd</sup>                                      | Alloy steel   |
|   | 3 <sup>rd</sup>                                      | Low alloy steel   |
|   | 4 <sup>th</sup>                                      | high alloy steel  |
| 4 <sup>th</sup>                                   | 1 <sup>st</sup>                                      | tool steel  |
|   | 2 <sup>nd</sup>                                      | stainless steel   |
|   | 3 <sup>rd</sup>                                      | Tool steel  |
|   | 4 <sup>th</sup>                                      | Effect of various alloying elements such as Cr, Mn, Ni, V, Mo         |
| 5 <sup>th</sup>                                   | 1 <sup>st</sup>                                      | cooling curves  |
|   | 2 <sup>nd</sup>                                      | Concept of phase diagram  |
|   | 3 <sup>rd</sup>                                      | Crystal defines   |
|   | 4 <sup>th</sup>                                      | Features of Iron-Carbon diagram                                       |

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| 6 <sup>th</sup>  | 1 <sup>st</sup> | with salient micro-constituents of Iron and Steel |
|                  | 2 <sup>nd</sup> | classification of crystals                        |
|                  | 3 <sup>rd</sup> | crystal imperfections                             |
|                  | 4 <sup>th</sup> | Classification of imperfection                    |
| 7 <sup>th</sup>  | 1 <sup>st</sup> | Point defects                                     |
|                  | 2 <sup>nd</sup> | line defects                                      |
|                  | 3 <sup>rd</sup> | volume defects                                    |
|                  | 4 <sup>th</sup> | surface defects                                   |
| 8 <sup>th</sup>  | 1 <sup>st</sup> | Types and causes of point defects                 |
|                  | 2 <sup>nd</sup> | Vacancies   |
|                  | 3 <sup>rd</sup> | Interstitials and impurities                      |
|                  | 4 <sup>th</sup> | Types and causes of line defects                  |
| 9 <sup>th</sup>  | 1 <sup>st</sup> | Edge dislocation                                  |
|                  | 2 <sup>nd</sup> | screw dislocation                                 |
|                  | 3 <sup>rd</sup> | Effect of imperfection on material properties     |
|                  | 4 <sup>th</sup> | Deformation by slip and twinning                  |
| 10 <sup>th</sup> | 1 <sup>st</sup> | Deformation by slip and twinning                  |
|                  | 2 <sup>nd</sup> | Effect of deformation on material properties      |
|                  | 3 <sup>rd</sup> | Purpose of Heat treatment                         |
|                  | 4 <sup>th</sup> | Process of heat treatment: Annealing              |
| 11 <sup>th</sup> | 1 <sup>st</sup> | normalizing, hardening, tempering                 |
|                  | 2 <sup>nd</sup> | stress relieving measures                         |
|                  | 3 <sup>rd</sup> | Surface hardening: Carburizing and Nitriding      |
|                  | 4 <sup>th</sup> | Effect of heat treatment on properties of steel   |
| 12 <sup>th</sup> | 1 <sup>st</sup> | Hardenability of steel                            |

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|                  | 2 <sup>nd</sup> | Aluminum alloys: Composition, property  |
|                  | 3 <sup>rd</sup> | usage of Duralumin, $\gamma$ -alloy.  |
|                  | 4 <sup>th</sup> | Copper alloys: Composition, property and usage of Copper Aluminum, Copper-Tin, Babbit Phosperous bronze, brass, Copper-Nickel |
| 13 <sup>th</sup> | 1 <sup>st</sup> | Predominating elements of lead alloys, Zinc alloys and Nickel alloys  |
|                  | 2 <sup>nd</sup> | Low alloy materials like P-91, P-22 for power plants and other high temperature services                                      |
|                  | 3 <sup>rd</sup> | High alloy materials like stainless steel grades of duplex, super duplex materials etc.                                       |
|                  | 4 <sup>th</sup> | Bearing materials : classification , composition and properties.  |
| 15 <sup>th</sup> | 1 <sup>st</sup> | Spring materials : properties , composition and Polymers : elastomers.  |
|                  | 2 <sup>nd</sup> | Composites and ceramics : classification , properties.  |
|                  | 3 <sup>rd</sup> | Model Question-answer practice set-1  |
|                  | 4 <sup>th</sup> | Model Question-answer practice set-2  |

  
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