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| Discipline:**MECHANICALENGG** | Semester :**3rd** | Name of the Teaching Faculty: **NITYANANDA PATRA** |
| Subject:**ENGINEERING MATERIAL** | No. of days/per week class allotted:**04** | Semester From date : **15.09.2022** To Date:**22.12.2022** No. of Weeks:**15** |
| Week | Class Day | Theory / Practical Topics |
| 1ST | 1ST | Material classification into ferrous and non ferrous category and alloys |
|  | 2ND | Material classification into ferrous and non ferrous category and alloys |
|  | 3RD | Properties of Materials: Physical , Chemical and Mechanical Performance requirements |
|  | 4TH | Properties of Materials: Physical , Chemical and Mechanical Performance requirements |
| 2ND | 1ST | Material reliability and safety |
|  | 2ND | Characteristics and application of ferrous materials |
|  | 3RD | Classification, composition and application of low carbon steel, medium carbon steel and High carbon steel |
|  | 4TH | Alloy steel: Low alloy steel, high alloy steel, tool steel and stainless steel |
| 3RD | 1ST | Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo, |
|  | 2ND | Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo, |
|  | 3RD | Concept of phase diagram and cooling curves |
|  | 4TH | Concept of phase diagram and cooling curves |
| 4TH | 1ST | Concept of phase diagram and cooling curves |
|  | 2ND | Features of Iron-Carbon diagram with salient micro- constituents of Iron and Steel |
|  | 3RD | Features of Iron-Carbon diagram with salient micro- constituents of Iron and Steel |
|  | 4TH | Features of Iron-Carbon diagram with salient micro- constituents of Iron and Steel |
| 5TH | 1ST | Features of Iron-Carbon diagram with salient micro- constituents of Iron and Steel |
|  | 2ND | Features of Iron-Carbon diagram with salient micro- constituents of Iron and Steel |
|  | 3RD | Crystal defines, classification of crystals, ideal crystal and crystal imperfections |
|  | 4TH | Crystal defines, classification of crystals, ideal crystal and crystal imperfections |
| 6TH | 1ST | Classification of imperfection: Point defects, line defects, surface defects and volume defects |
|  | 2ND | Classification of imperfection: Point defects, line defects, surface defects and volume defects |
|  | 3RD | Types and causes of point defects: Vacancies, Interstitials and |

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|  |  | impurities |
|  | 4TH | Types and causes of line defects: Edge dislocation and screw dislocation |
| 7TH | 1ST | Effect of imperfection on material properties |
|  | 2ND | Deformation by slip and twinning |
|  | 3RD | Effect of deformation on material properties |
|  | 4TH | Effect of deformation on material properties |
| 8TH | 1ST | Purpose of Heat treatment |
|  | 2ND | Process of heat treatment: Annealing, normalizing, hardening,tampering, stress relieving measures |
|  | 3RD | Process of heat treatment: Annealing, normalizing, hardening,tampering, stress relieving measures |
|  | 4TH | Process of heat treatment: Annealing, normalizing, hardening,tampering, stress relieving measures |
| 9TH | 1ST | Surface hardening: Carburizing and Nitriding |
|  | 2ND | Surface hardening: Carburizing and Nitriding |
|  | 3RD | Effect of heat treatment on properties of steel |
|  | 4TH | Effect of heat treatment on properties of steel |
| 10TH | 1ST | Hardenability of steel |
|  | 2ND | Hardenability of steel |
|  | 3RD | Aluminum alloys: Composition, property and usage of Duralmin, y- alloy. |
|  | 4TH | Aluminum alloys: Composition, property and usage of Duralmin, y- alloy |
| 11TH | 1ST | Aluminum alloys: Composition, property and usage of Duralmin, y- alloy |
|  | 2ND | Copper alloys: Composition, property and usage of Copper-Aluminum, Copper-Tin, Babbit , Phosperous bronze, brass, Copper- Nickel |
|  | 3RD | Copper alloys: Composition, property and usage of Copper- Aluminum, Copper-Tin, Babbit , Phosperous bronze, brass,Copper- Nickel |
|  | 4TH | Predominating elements of lead alloys, Zinc alloys and Nickelalloys |
| 12TH | 1ST | Predominating elements of lead alloys, Zinc alloys and Nickelalloys |
|  | 2ND | Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc. |
|  | 3RD | Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc. |
|  | 4TH | Low alloy materials like P-91, P-22 for power plants and otherhigh temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc. |

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| 13TH | 1ST | Classification, composition, properties and uses of Copperbase, Tin Base, Lead base, Cadmium base bearing materials |
|  | 2ND | Classification, composition, properties and uses of Copperbase, Tin Base, Lead base, Cadmium base bearing materials |
|  | 3RD | Classification, composition, properties and uses of Copper |

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|  |  | base, Tin Base, Lead base, Cadmium base bearing materials |
|  | 4TH | Classification, composition, properties and uses of Iron- baseand Copper base spring material |
| 14TH | 1ST | Classification, composition, properties and uses of Iron-base and Copper base spring material |
|  | 2ND | Classification, composition, properties and uses of Iron- baseand Copper base spring material |
|  | 3RD | Properties and application of thermosetting and thermoplastic polymers |
|  | 4TH | Properties and application of thermosetting and thermoplastic polymers |
| 15TH | 1ST | Properties of elastomers |
|  | 2ND | Classification, composition, properties and uses of particulate based and fiber reinforced composites |
|  | 3RD | Classification, composition, properties and uses of particulate based and fiber reinforced composites |
|  | 4TH | Classification and uses of ceramics |

**Learning Resouces:**

1. A Textbook of Material Science and Metallurgy, byO PKhanna,DhanpatRai
2. Engineering materials and MetallurgbyR KRajput,S.Chand
3. Material science & process, byS K Hazrachoudhry, Imdian BookDistrubuting

 **NITYANANDA PATRA**