**METALLURGY DEPARTMENT**

Name of the teacher-PARASMITA BISWAL

Semester-6th

Number of classes per week :-14

From- Dt 16/01/2024 to dt 26/04/2024

Subject-Theory-2(mechanical metallurgy)

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| **Wk no** | **Class/Day** | **Lecture Topics to be covered** | **Theory topics :** |
| **Week -1** | Day-1 | Chapter-01: Introduction | Introduction |
| **Week -2** | Day-1 | Dislocation, types, its basic behavior & role in deformation. |
| Day-2 | Dislocation in various crystals, Source of dislocation |
| Day-3 | Twinning & deformation, Slip & Deformation. |
| Day-4 | Chapter-02: Deformation of metals | Elastic & plastic behavior of metals, Explain yielding criteria. |
| **Week -3** | Day-1 | Derivation of critically resolved shear stress |
| Day-2 | Details on deformation of monocrystalline aggregates. |
| Day-3 | Distinguish between proximate and ultimate analysis |
| Day-4 | Details on deformation of polycrystalline aggregates. |
| **Week -4** | Day-1 | Chapter-03 :Strengthening mechanism | Class test -01 Doubt clearing class |
| **Week -5** | Day-1 |  the role of grain boundary in strengthening |
| Day-2 | Hall Petch equation, Describe yield point phenomenon. |
| Day-3 | Strain-aging , Explain solid solution strengthening from fine particles |
| Day-4 |  Details about Fiber strengthening. |
| **Week -5** | Day-1 |  Martensitic strengthening , Explain strain hardening |
| Day-2 |  Bauschinger‘s effect.  |
| Day-3  | Chapter-04 : Fundamentals of Metal working |  Different metal working process, hot working and cold working of metals and alloys |
| Day-4  |  The advantages and disadvantages of hot and cold working |
| **Week -6** | Day-1 | Chapter-06 : Rolling |  Introduction on Rolling |
| Day-2 |  principles of rolling , Compare between hot rolling and cold rolling. |
| Day-3 |  The types of roll pass-open pass and box pass. |
| **Week -7** | Day-1 |  Different types of rolling detects and their control |
| Day-2 | Chapter-07 : Forging |  types of forging process, Describe the properties of forged products |
| Day-3 | the defects of forged products and their control |
| Day-4 | Chapter-08 : Extrusion |  the elementary principle of extrusion |
| **Week -8** | Day-1 |  the defects in extruded product |
| Day-2 | the manufacturing of seamless pipes |
| Day-3 | Work out simple extrusion pressure and ratio calculation. |
| **Week -9** | Day-1 | Chapter-09 : Wire drawing |  the elementary principle of wire drawing |
| Day-2 |  the defects of wire drawing |
| Day-3 |  | Doubt clearing class |
| Day-4 |  | Doubt clearing class |
| **Week -10** | Day-1 | Chapter-10 : Forming methods |  the elementary concept of deep drawing  |
| Day-2 |  different sheet metal forming - bending shearing aid blanking |
| **Week -11** | Day-1 | Chapter-11 : Recovery, recrystallization and grain growth | Defining recovery and its role and importance. |
| Day-2 | Defining recrystallisation and its role and importance. |
| Day-3 | Defining grain growth and its role and importance. |
| Day-4 | Defining recrystallisation and its role and importance. |
| **Week -12** | Day-1 | Advantages of recovery , recrystallisation and grain growth |
| Day-2 |  | Doubt clearing class |
| Day-3 |  | Important question Discussion |
| Day-4 |  | Class test -02 |
| **Week -13** | Day-1 |  | Important question Discussion |
| Day-1 |  | Important question Discussion |
| Day-1 |  | Doubt clear class |
| **Week -14** | Day-1 |  | Important question Discussion |
| Day-2 |  | Important question Discussion |
| Day-3 |  | Important question Discussion |

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|  |  | Introduction |
|  |  | Dislocation, types, its basic behavior |
|  |  | role in deformation. |
|  |  |  Dislocation in various crystals |
|  |  | Source of dislocation |
|  |  | Twinning & deformation. |
|  |  | Slip & Deformation. |
|  |  | Explain the elastic & plastic behavior of metals |
|  |  | Explain yielding criteria. |
|  |  |  yielding criteria. |
|  |  | Derive critically resolved shear stress |
|  |  | Explain deformation of polycrystalline aggregates. |
|  |  | Explain deformation of polycrystalline aggregates. |
|  |  | Class test -01 |
|  |  | Explain strengthening mechanism |
|  |  | Describe the role of grain boundary in strengthening |
|  |  | Define Hall Petch equation |
|  |  | Describe yield point phenomenon. |
|  |  | Explain strain-aging |
|  |  | Explain solid solution strengthening from fine particles |
|  |  | Describe fiber strengthening |
|  |  | Describe martensitic strengthening |
|  |  | Explain strain hardening |
|  |  | Describe Bauschinger‘s effect. |
|  |  | Describe yield point phenomenon. |
|  |  | Classify different metal working process. |
|  |  | Explain hot working |
|  |  | cold working of metals and alloys |
|  |  | State the advantages and disadvantages of hot working |
|  |  | State the advantages and disadvantages of cold working |
|  |  | Explain the following phenomena, Recovery |
|  |  | Recrystallization |
|  |  | Class test -02 |
|  |  | Explain principles of rolling |
|  |  | Compare between hot rolling and cold rolling. |
|  |  | Explain the following phenomena, grain growth |
|  |  | Explain the types of roll pass-open pass and box pass |
|  |  | State different types of rolling detects and their control |
|  |  | Doubt clearing class |
|  |  | Explain types of forging process |
|  |  | Describe the properties of forged products |
|  |  | Explain the defects of forged products and their control |
|  |  | Explain the defects of forged products and their control |
|  |  | Explain the elementary principle of extrusion |
|  |  | Classify the defects in extruded product |
|  |  | Explain the manufacturing of seamless pipes |
|  |  | Explain the elementary principle of wire drawing |
|  |  | Classify the defects of wire drawing |
|  |  | Describe the elementary concept of deep drawing |
|  |  | Describe the elementary concept of deep drawing |
|  |  | Explain different sheet metal forming - bending shearing aid blanking |
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**METALLURGY DEPARTMENT**

Name of the teacher-PARASMITA BISWAL

Semester-5th -Session-2022-23

From-

Subject-Theory-3(Heat treatment technology)

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| **Wk no** | **Class/Day** | **Theory topics :** |
| **Week -1** | Day-1 | Solid State Phase Transformation. |
| **Week -2** | Day-1 | Give an introduction to diffusion, state fick‟s law |
| Day-2 | Discuss the formation of austenite. |
| Day-3 | Explain the mechanism of formation‟ of austenite |
| Day-4 | Discuss austenitic grain size |
| **Week -3** | Day-1 | Explain the methods of determination of austenitic grain size. |
| Day-2 | State the importance of grain size |
| Day-3 | Explain the method of measurement of grain size. |
| Day-4 | Discuss the methods of control austenitic grain size. |
| **Week -4** |  | PUJA VACATION |
| **Week -5** | Day-1 | Discuss decomposition of austenite and pearlitic transformation |
| Day-2 | Explain the process of construction of T-T-T diagram and CCT diagram. |
| Day-3 | Discuss the TTT Diagram for hypo eutectoid, eutectoid and hyper eutectoid steel. |
| Day-4 | Explain bainitic transformation. |
| **Week 5** | Day-1 | Explain martensitic transformation. |
| Day-2 | Discuss annealing. |
| Day-3 | Explain stress relieving annealing. |
| Day-4  | Explain different types of annealing-01 |
| **Week -6** | Day-1 | Explain different types of annealing-02 |
| Day-2 | Discuss the process of hardening, normalising |
| Day-3 | Describe the factors affecting hardening process. |
| **Week -7** | Day-1 | Explain different methods of hardening. |
| Day-2 | Discuss quenching media and different types of quenchants. |
| Day-3 | Explain the tempering process for steel. |
| Day-4 | Discuss thermo-mechanical treatment of steel. |
| **Week -8** | Day-1 | Class test and revision class |
| Day-2 | Define hardenability |
| Day-3 | Hardenability , method of determination of hardenability Gross Man‟s critical diameter method &Jominey end quench method. |
| **Week -9** | Day-1 | Discuss the method of estimation of hardenability from chemical composition and fracture test. |
| Day-2 | Discuss the factors affecting hardenability: effect of austenitic grain size, carbon content, and alloying elements. |
| Day-3 | Discuss high frequency induction hardening -flame hardening,  |
| Day-4 | Discuss the methods of case depth measurement of steel. |
| **Week -10** | Day-1 | Explain different carburizing-processes of steel: pack carburizing, liquid carburizing,  |
| Day-2 | Discuss the post carburizing heat treatment. gas carburizing and vacuum carburizing. |
| Day-3 | Explain process of nitriding of steel. |
| Day-4 | Explain the process of cyaniding, carbo-nitriding of steel. |
| **Week -11** | Day-1 | Explain the plasma nitriding.salt bath nitro carburizing |
| Day-2 | Discussion on electron beam hardening, laser hardening. |
| Day-3 | Explain boronising, chromizing & Toyato diffusion process. |
| Day-4 | Discuss Age Hardening of Al-CU alloys. |
| **Week -12** | Day-1 | Discuss different alloy steels- low alloy and high alloy steels. |
| Day-2 | Class test and revision class |
| Day-3 | Discussion on martempering, austempering  |
| Day-4 | Discussion on subzero treatment |
| **Week -13** | Day-1 | Discuss die steel, high speed steel, high strength steel |
| Day-2 | Discussion on low alloy steels, stainless steels.  |
| Day-3 | Discuss the effect of alloying elements. |
| Day-4 | Discus the heat treatment of tool steel and stainless steel. |
| **Week-14** | Day-1 | Important question discussion  |
| Day-2 | Important question discussion  |
| Day-3 | Doubt clearing class |
| Day-4 | Class test covering entire syllabus |

**METALLURGY DEPARTMENT**

Name of the teacher-PARASMITA BISWAL

Semester-3rd -Session-2022-23

From-

Subject-Practical- FUEL TESTING & CHEMIICAL ANALYSIS LAB

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| week | Class day | Practical topics |
| **Week-3** |  | Proximate analysis of coal |
|  | Proximate analysis of coal |
|  | Proximate analysis of coal |
| **Week-3** |  | Proximate analysis of coal |
|  | Practical record checking |
| **Week-3** |  | Determination of flash point and fire point |
|  | Determination of flash point and fire point |
|  | Determination of flash point and fire point |
| **Week-3** |  | Determination of flash point and fire point |
|  | Practical record checking |
| **Week-3** |  | Determination of Fe in iron ore |
|  | Determination of Fe in iron ore |
|  | Determination of Fe in iron ore |
| **Week-3** |  | Determination of Fe in iron ore |
|  | Practical record checking |
|  | Determination of Cu, Zn in Brass |
|  | Determination of Cu, Zn in Brass |
| **Week-3** |  | Determination of Cu, Zn in Brass |
|  |  | Determination of Cu, Zn in Brass |
|  | Practical record checking |
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