**USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY**

*Department of Mechanical Engineering*

**LESSON PLAN::C0301**

|  |  |
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| **Academic Year** : 2016-17 | **Sem**  : I |
| **Course**: Metallurgy and Material Science (MMS) |
| **Class** : II B.TECH  | **Section** : ME A&B |
| **Date of commencement of Class work** :13/06/2016 | **Date of end of Class work** : 08/10/2016 |
| **Prepared By**: Dr s.madhusudhan, Assistant Professor | **Approved By**: HOD |

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| **Lecture****No** | **Date (As per Academic calendar)** | **Topics to be covered** | **Actual****Dateof completion** | **Remarks** |
| 1 | **13.6.16** | **UNIT – I**Introduction |  |  |
| 2 | **14.6.16** | Bonds in Solids - Metallic bond |  |  |
| 3 | **15.6.16** | crystallization of metals |  |  |
| 4 | **16.6.16** | grain and grain boundaries |  |  |
| 5 | **17.6.16** | effect of grain boundaries on the properties of metal  |  |  |
| 6 | **18.6.16** | determination of grain size |  |  |
| 7 | **20.6.16** | Necessity of alloying, types of solid solutions |  |  |
| 8 | **21.6.16** | Hume Rotherys rules |  |  |
| 9 | **22.6.16** | Hume Rotherys rules |  |  |
| 10 | **23.6.16** | intermediate alloy phases |  |  |
| 11 | **24.6.16** | electron compounds |  |  |
| 12 | **25.6.16** | revision |  |  |
| 13 | **27.6.16** | revision |  |  |
| 14 | **28.6.16** | **UNIT –II** Experimental methods of construction of equilibrium diagrams |  |  |
| 15 | **29.6.16** | Isomorphous alloy systems |  |  |
| 16 | **30.6.16** | equilibrium cooling and heating of alloys |  |  |
| 17 | **01.7.16** | Lever rule, coring miscibility gaps |  |  |
| 18 | **02.7.16** | eutectic systems |  |  |
| 19 | **04.07.16** | congruent melting intermediate phases |  |  |
| 20 | **05.7.16** | peritectic reaction |  |  |
| 21 | **07.7.16** | Transformations in the solid state - allotropy |  |  |
| 22 | **08.7.16** | eutectoid |  |  |
| 23 | **09.7.16** | peritectoid reactions |  |  |
| 24 | **11.7.16** | phase rule, relationship between equilibrium diagrams and properties of alloys. |  |  |
| 25 | **12.7.16** | binary phase diagrams of Cu-Ni |  |  |
| 26 | **13.7.16** | binary phase diagrams of Al-Cu |  |  |
| 27 | **14.7.16** | binary phase diagrams of Bi-Cd,  |  |  |
| 28 | **15.7.16** | binary phase diagrams of Cu-An |  |  |
| 29 | **16.7.16** | binary phase diagrams of Cus-Sn |  |  |
| 30 | **18.7.16** | binary phase diagrams of Cus-Sn |  |  |
| 31 | **19.7.16** | binary phase diagrams of Fe-Fe3C |  |  |
| 32 | **20.7.16** | revision |  |  |
| 33 | **21.7.16** | **UNIT –III**introduction |  |  |
| 34 | **22.7.16** | Structure and properties of White Cast iron |  |  |
| 35 | **23.7.16** | Malleable Cast iron |  |  |
| 36 | **25.7.16** | grey cast iron |  |  |
| 37 | **26.7.16** | Spheriodal graphite cast iron |  |  |
| 38 | **27.7.16** | Alloy cast irons |  |  |
| 39 | **28.7.16** | Classification of steels |  |  |
| 40 | **29.7.16** | Classification of steels |  |  |
| 41 | **30.7.16** | structure and properties of plain carbon steels |  |  |
| 42 | **01.8.16** | structure and properties of plain carbon steels |  |  |
| 43 | **02.8.16** | Low alloy steels |  |  |
| 44 | **03.8.16** | Hadfield manganese steels |  |  |
| 45 | **04.08.16** | Hadfield manganese steels |  |  |
| 46 | **05.08.16** | tool and die steels |  |  |
| 47 | **06.8.16** | revision |  |  |
|  | **08.8.16 To13.8.16** | MID EXAMINATIONS-I |  |  |
| 48 | **16.8.16** | **Unit-4:Reaction turbine**– mechanical details. |  |  |
| 49 | **17.8.16** | Principle of operation,thermodynamic analysis of a stag. |  |  |
| 50 | **18.8.16** | Degree of reaction –velocity diagram. |  |  |
| 51 | **19.8.16** | Parson’s reaction turbine.  |  |  |
| 52 | **20.8.16** | Condition for maximum efficiency. |  |  |
| 53 | **22.8.16** | Calculation of blade height. |  |  |
| 54 | **23.08.16** | **Steam condensers**- Requirements of steam condensing plant. |  |  |
| 55 | **24.08.16** | Classification of condenser. |  |  |
| 57 | **26.8.16** | Working principles. |  |  |
| 58 | **27.8.16** | Air leakage, sources and its affects. |  |  |
| 59 | **29.8.16** | Air pump- cooling water requirement. |  |  |
| 60 | **30.08.16** | Problems |  |  |
| 61 | **31.08.16** | Problems |  |  |
| 62 | **1.9.16** | Problems |  |  |
| 63 | **2.9.16** | revision |  |  |
| 64 | **3.9.16** | revison |  |  |
| 65 | **06.09.16** | **Unit-5**: Gas turbine plant – ideal cycle. |  |  |
| 66 | **07.9.16** | Essentialcomponents – parameters of performance.  |  |  |
| 67 | **8.9.16** | Actual cycle. |  |  |
| 68 | **09.9.16** | Regeneration. |  |  |
| 69 | **10.9.16** | Inter cooling  |  |  |
| 70 | **13.9.16** | Reheating. |  |  |
| 71 | **14.9.16** | Closed and semi-closed cycles – merits and demerits. |  |  |
| 72 | **15.9.16** | Types of combustion chambers. |  |  |
| 73 | **16.9.16** | revision |  |  |
| 74 | **17.9.16** | **UNIT 6: Jet propulsion:** Principle of operation. |  |  |
| 75 | **19.9.16** | Classification of jet propulsiveengines. |  |  |
| 76 | **20.9.16** | Working principles with schematic diagrams and representation on t-s diagram. |  |  |
| 77 | **21.9.16** | Thrust, thrust power and propulsion efficiency. |  |  |
| 78 | **22.9.16** | Turbo jet engines– schematic diagram. |  |  |
| 79 | **23.9.16** | Thermodynamic cycle. |  |  |
| 80 | **24.9.16** | Performance evaluation, thrust augmentation – methods. |  |  |
| 81 | **26.9.16** | **Rockets:** Application – working principle. |  |  |
| 82 | **27.9.16** | Classification |  |  |
| 83 | **28.9.16** | Propellant type –thrust. |  |  |
| 84 | **01.10.16** | Propulsive efficiency- specific impulse. |  |  |
| 85 | **03.10.16** | Solid and liquid propellant rocket engines. |  |  |
| 86 | **04.10.16** | Revision. |  |  |
| 87 | **05.10.16** | Revision |  |  |
| 88 | **06.10.16** | Revision |  |  |
| 89 | **07.10.16** | Revision |  |  |
| 90 | **08.10.16** | Revision |  |  |
|  | **10.10.16 To 15.10.16** |  Mid Exams-II |  |  |

**TEXT BOOKS:**

1. Introduction to Physical Metallurgy - Sidney H. Avener - McGrawHill

2. Essential of Materials science and engineering - Donald R.Askeland- Thomson

**REFERENCES:**

1. Material Science and Metallurgy - Dr. V.D.kodgire.
2. Materials Science and engineering - Callister & Baalasubrahmanyam

**List the Course Outcomes (Cos):**

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| Sub code | Sub Name | COs | Expected level of attainmentOn 5 scale |
|  | Metallurgy and Material Science (MMS) | 1. To understand the basic requirements for the formation of solid solutions and other compounds.2. To understand the regions of stability of the phases that can occur in an alloy system.3. To study the basic differences between cast irons and steels, their properties and practical applications.4. To understand the various heat treatment and strengthening processes used in practical applications | 3.53.53.53.5 |

**Signature of faculty Head of the Department**