**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY**

**(AUTONOMOUS)**

R.V.S. NAGAR, CHITTOOR- 517 127 (AP)

**Department of Mechanical Engineering**

**Lesson Plan for the academic year 2017-18**

**Course: II B. Tech, I Sem (MECH)**

**Subject: Engineering Metallurgy (14AME04)**

**Text Books:**

1. Introduction to physical metallurgy by Sidney H Avner.

2. Materials science and metallurgy for engineers by V.D Kodgire S. V. Kodgire

**References:**

1. Metallurgy and material science by R.K. Rajput.

2. Metallurgy and material science by V Raghavan.

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| **Sl. No.** | **Unit No.** | **Topic** | **No. hrs required** | **Cumulative hrs** |
| 1 | **Unit** – **I** | **STRUCTURE OF METALS:** | 1 | 1 |
| 2 | Mechanical properties of metals | 2 | 3 |
| 3 | Crystallization of metals | 1 | 4 |
| 4 | Effect of grain size and grain boundaries on the properties of Metals/Alloys | 1 | 5 |
| 5 | Imperfections | 2 | 7 |
| 6 | **EQUILIBRIUM DIAGRAMS:**  Definition of terms | 1 | 8 |
| 7 | solid solutions solubility and solutions types | 2 | 10 |
| 8 | Interstitial solid solutions | 1 | 11 |
| 9 | Substitution Solid solutions |
| 10 | FICK’s Law of diffusion | 1 | 12 |
| 11 | Hume Ruthery rules of solid solution |
| 12 | Cooling curves | 1 | 13 |
| 13 | Construction of equilibrium diagram | 1 | 14 |
| 14 | Gibbs phase rules | 4 | 18 |
| 15 | Types of phase diagrams |
| 16 | lever rule, invariant reactions | 1 | 19 |
| 17 | Coring and Miscibility. | 1 | 20 |
| 1 | **Unit** – **II** | **TRANSFORMATION IN SOLID STATE:**  Iron-Iron carbon equilibrium diagram | 3 | 23 |
| 2 | Relationship between equilibrium diagrams and properties of alloys | 1 | 24 |
| 3 | Effect of alloying elements on Iron-Iron carbon system | 1 | 25 |
| 4 | TTT diagrams | 2 | 27 |
| 1 | **Unit** – **III** | **CAST IRONS AND STEELS:** | 1 | 28 |
| 2 | Structure and properties of white cast iron | 1 | 29 |
| 3 | Structure and properties of Malleable cast iron, | 1 | 30 |
| 4 | Structure and properties of Grey cast iron, | 1 | 31 |
| 5 | Structure and properties of Spheroidal graphite cast iron, | 1 | 32 |
| 6 | Alloy cast irons | 1 | 33 |
| 7 | Classification of steels | 1 | 34 |
| 8 | Structure and properties of plain carbon steels | 1 | 35 |
| 9 | Low alloy steels | 1 | 36 |
| 10 | Hadfield manganese steel |
| 11 | Tool and die steels. | 1 | 37 |
| 1 | **Unit** – **IV** | **NON-FERROUS METALS AND ALLOYS:** | 1 | 38 |
| 2 | Structure and properties of copper and its alloys | 2 | 40 |
| 3 | Structure and properties of Aluminium and its alloys | 2 | 42 |
| 4 | **HEAT TREATMENT OF FERROUS AND NON-FERROUS ALLOYS:** | 1 | 43 |
| 5 | Annealing | 2 | 45 |
| 6 | Normalizing | 1 | 46 |
| 7 | Hardening | 1 | 47 |
| 8 | Tempering | 1 | 48 |
| 9 | Hardenability | 1 | 49 |
| 10 | Surface hardening | 2 | 51 |
| 11 | Age hardening treatment | 1 | 52 |
| 1 | **Unit** – **V** | **CERAMIC MATERIALS:** | 1 | 53 |
| 2 | Crystalline ceramics | 1 | 54 |
| 3 | Glasses ceramics | 2 | 56 |
| 4 | Ceramic tools, Cermets. | 1 | 57 |
| 5 | **COMPOSITE MATERIALS:** | 1 | 58 |
| 6 | Classification of composites | 1 | 59 |
| 7 | Various methods of component manufacture of composites | 3 | 62 |
| 8 | Particle reinforced materials | 1 | 63 |
| 9 | Fiber reinforced materials | 1 | 64 |
| 10 | Metal ceramic mixtures | 2 | 66 |
| 11 | Metal-matrix composites |
| 12 | Carbon-Carbon composites. |

**Faculty HOD**