Name of Faculty : Mr. Shyam Singh
Discipline : Mechanical Engineering
Semester : IV
Subject : Material and Metallurgy
Lesson Plan Duration : 15 Weeks ( 9 January onwards)

| Week | Theory | | Practical Day | |
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| | Lecture Day | Topic ( Including assignment/test) | Practical Day | Topic |
| I | 1 | **1.Introduction:** Material, History of material origin, Scope of material science, Overview of different engineering materials and applications. | 1 | Classification of about 25 specimens of materials / machine parts into i) Metals and Non- Metals ii) Metals and Alloys iii) Ferrous and Non-Ferrous Metals iv) Ferrous and Non-Ferrous Alloys |
| | 2 | Classification of materials, Thermal properties | | |
| | 3 | Chemical & Electrical Properties | | |
| II | 4 | Mechanical Properties of various materials | 2 | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
| | 5 | Present and Future needs of materials, Overview of Biomaterials & Semiconducting materials. | | |
| | 6 | Various issues of materials, usage- Economical, Environment and Social | | |
| III | 7 | **Crystallography** Fundamental:-Crystal, Unit Cell, Space Lattice, arrangement of atoms in Simple Cubic Crystals, BCC,FCC and HCP Crystals | 3 | Given a set of specimen of Metals and Alloys( Copper, Brass, Aluminium, Cast Iron, HSS, Gun Metal);Identify and indicate the various properties possesed by them |
| | 8 | Number of atoms per unit cell | | |
| | 9 | Atomic Packing Factor | | |
| IV | 10 | Deformation:- Overview , Behaviour and its Mechanism | 4 | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
| | 11 | Behaviour of materals under load & stress strain | | |
| | 12 | Failure mechanism:- Overview of failure modes, fracture,fatigue and creep | | |
| V | 13 | **3.Metals and Alloys:** Introduction:- History and development of Iron & Steel, Different Iron Ores | 5 | Study of Heat Treatment Furnace |

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| | 14 | Raw materials in production of Iron & Steel, | | |
| | 15 | Basic process of Iron makingBasic process of Iron making | | |
| VI | 16 | Basic process of Steel making, | 6 | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
| | 17 | Classification of Iron And Steel. | | |
| | 18 | Cast Iron:- Different types of Cast Iron , manufacture and their usage | | |
| VII | 19 | Steels:- Steel & Alloy Steel, Classification of Plain Carbon Steel. | 7 | Study of a metallaurgical microscope and a specimen polishing machine |
| | 20 | Availability , properties & usage of different types of Plain Carbon Steels. | | |
| | 21 | Effect of various alloys on properties of steel, uses of alloy steel(HSS,SS) | | |
| VIII | 22 | Spring steel, silicon steel, | 8 | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
| | 23 | Non ferrous materials | | |
| | 24 | Properties and uses of light Metals and their alloys | | |
| IX | 25 | Properties and uses of White Metals and their alloys | 9 | To prepair specimen for microscopic examination and to examine the microstructure of the specimens of following materials:i)Brass ii)Copper iii)Malleable iv)GreyCI v)Low carbon steel vi) high carbon steel vii)HSS |
| | 26 | 4.**Theory of Heat Treatmen**t: Purpose of heat treatment, Solid solution and its types | | |
| | 27 | Iron Carbon Diagram | | |
| X | 28 | Formation and decompition of Austenite, | 10 | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
| | 29 | Martensitic Transformation-simplified transformation cooling curves | | |
| | 30 | Various Heat Treatment Processes-Hardening, Tempering, Annealing | | |

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| XI | 31 | Normalizing, case Hardening | 11 | To anneal a given specimen and find out difference in hardness as a result of annealing |
| | 32 | Surface Haedening | | |
| | 33 | Types of Heat Treatment Furnacesrequired for above operations(only basic idea) | | |
| XII | 34 | 5.Engineering Plastics: Important sources of plastics, Classification- thermoplastic and their uses | 12 | To normalize a given specimen and find out difference in hardness as a result of normalizing |
| | 35 | Thermosetting plastics and their uses | | |
| | 36 | Various Trade names of engg. Plastics, Plastic Coating | | |
| XIII | 37 | 6.Advanced Materials: Composites- Classification, Properties, application | 13 | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
| | 38 | Ceramics- Classification, Properties, application | | |
| | 39 | Heat Insulating Materials | | |
| XIV | 40 | 7.Miscellaneous Materials: Properties and uses of asbestos, Glass wool, Thermocole. | 14 | To harden and temper a given specimen and find out difference in hardness due to tempering |
| | 41 | Properties and uses of cork,mica. Overview of tool and die materials | | |
| | 42 | Materials for bearing metals | | |
| XV | 43 | Spring Materials | 15 | Final Viva- Voce |
| | 44 | Materials for nuclear energy | | |
| | 45 | Refractory materials | | |