

Govt. Polytechnic Hamirpur (H.P.)
Lecture Planning (Theory)

Branch : Mechanical Engineering

Semester : 3rd

Subject : Engineering Material

Session : September – December, 2021

Teacher : Manoj Kumar

			Detail of Contents	Remarks
Sr. No.	No. of Lectures	Chapter/ Unit Description		
1.	5	General	Introduction to engineering materials, Classification of material, Properties of engineering materials- mechanical, thermal and electrical, Selection criteria for use in industry	Class test -1 will be in 3 rd week of October, 2021
2.	12	Ferrous Materials	Classification of iron and steel, Sources of iron ore and its availability, Manufacture of pig iron, wrought iron, Cast iron and steel (Flow Diagrams only), Types of Cast Iron: White, malleable, grey, mottled, modular and alloy and their usage, Steels and alloy steel, Classification of steels, Different manufacturing methods of steel, open hearth, Bessemer & electric arc, Availability, Properties and usage of steels. Specification as per BIS and equivalent standards, Effect of various alloying element like Cr, Ni, Co, V, Mo, Si, Mn, S on mechanical properties of steel, Use of alloy steels (high speed steel stainless steel, spring steel, silicon steel.	
3.	4	Non Ferrous Materials	Important ores and properties of aluminium, copper, zinc, tin, lead. Properties and uses of Al alloys, Copper alloys, Bearing metals, solders.	Class test -2 will be in 4 th week of November, 2021
4.	8	Composite, Ceramics and Plastics	Definitions, sources. Metal matrix composites, ceramic matrix composites, fibre reinforced composites, carbon – carbon composites. Engineering ceramics, natural and artificial ceramics. Various trade name of engineering plastics, thermosetting and thermoplastic. Plastic coatings. Fibers and their classification: inorganic and organic fibers. Engineering application of composites, ceramics and plastics. Introduction to smart/ intelligent materials.	
5.	4	Insulating Materials	Various heat insulating material and their usage like asbestos, glass wool, thermocole, cork, puf, china clay. Various electrical insulating material and their use like China clay, leather, bakelite, ebonite, glass wool, rubber, felt	House test will be in 2nd week of December, 2021
6.	2	Testing of Metals and Alloys	Identification tests: appearance, sound, spark, weight, magnetic, band microstructure, filing.	
7.	16	Fundamentals of Heat Treatment	Purpose of heat treatment. Theory of solid solution, Impact of cold and hot working on metal structure. Iron-Carbon Diagram, TTT Curve in steels and its importance. Basic idea about martensitic transformation. Various heat treatment processes- hardening, tempering, annealing, normalizing, case hardening. Types of heat treatment furnaces	


Teaching Resources:-

R1. *Material Sciences by R.K Rajput*

R2. *Materials science and Engineering by William D. Callister. Jr.*

R3. *Material Science by K.P.S Chauhan*

Signature of Teacher  14/10/2021


Signature of H.O.D.