PLANNED SYLLABUS COVERAGE

"PVCNSSK" G.P Bilaspur	Department: Mechanical Engg. Subject – MATERIAL SCIENCE & ENGINEERING				
	Course - Diploma		Duration – 3 Years		
SYLLABUS COVERAGE	Total Periods -56		Theory –56 hours		

Sr No	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1	1-13	UNIT-I: Crystal structures and Bonds:	-Unit cell and space lattice: Crystal system: The seven basic crystal systems; Crystal structure for metallic elements: BCC, FCC and HCP; Coordination number for Simple Cubic, BCC and FCC; Atomic radius: definition, atomic radius for Simple Cubic, BCC and FCC (Formula for the above terms without Derivation); Atomic Packing Factor for Simple Cubic, BCC, FCC and HCP (derivations omitted) Bonds in solids: Classification-primary or chemical bond, secondary or molecular bond; Concept of Types of primary bonds: Ionic, Covalent and Metallic Bonds.	A Text Book of Material Science &Metallurgy –O.P. Khanna,		
2.	14-26	Unit-II: Phase diagrams, Ferrous metals and its Alloys	- Introduction of Isomorphs, eutectic and eutectoid systems; Iron-Carbon binary diagram; Iron and Carbon Steels; Iron ores–Pig iron: classification, composition and effects of impurities on iron ; Cast Iron: classification, composition, properties and uses; Wrought Iron: properties, uses/applications of wrought Iron; standard commercial grades of steel as per BIS and AISI; Alloy Steels – purpose of alloying; effects of alloying elements,	Material Science & Engineering– R.K.Rajput,		
3	27-36	-Unit-III: Non-ferrous metals and its Alloys:	-Important alloy steels: Silicon steel, High Speed Steel(HSS),heat resisting steel, spring steel, Stainless Steel(SS) Properties and uses of aluminum, copper, tin, lead, zinc, magnesium and nickel; Copper alloys: Brasses, bronzes – composition, properties and uses; Aluminum alloys: Duralumin, hindalium, magnelium – composition, properties and uses; Nickel alloys: Inconel, monel, nicrome – composition, properties and uses. Anti-friction/Bearing alloys: Various types of bearing, bronzes-Standard commercial grades as per BIS/ASME.	Material Science– R.S. Khurmi, S.Chand		

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Sr No	**Period Nos**	**Topic**	**Details**	**Instruction Reference**	**Additional Study Recommended**	**Remar**
4	37-46	Unit-III: Non-ferrous metals and its Alloys:	Properties and uses of aluminum, copper, tin, lead, zinc, magnesium and nickel; Copper alloys: Brasses, bronzes – composition, properties and uses; Aluminum alloys: Duralumin, hindalium, magnelium – composition, properties and uses; Nickel alloys: Inconel, monel, nicrome – composition, properties and uses. Anti-friction/Bearing alloys: Various types of bearing, bronzes-Standard commercial grades as per BIS/ASME.	A Text Book of Material Science &Metallurgy –O.P. Khanna,		
5	47-56	Unit-IV: Failure analysis & Testing of Materials:	Introduction to failure analysis; Fracture: ductile fracture, brittle fracture; cleavage; notch sensitivity; fatigue; concept of endurance limit; concept of creep; creep curve; creep fracture; Destructive testing: Tensile testing; compression testing; Hardness testing: Brinell, Rockwell; bend test; torsion test; fatigue test; creep test; Non-destructive testing: Visual Inspection; magnetic particle inspection; liquid penetrant test; ultrasonic inspection; radiography. Unit-V: (10Hrs) Corrosion & Surface Engineering: Nature of corrosion and its causes;;Electrolytes; Factors affecting corrosion: Environment, Material properties andphysical conditions; Types of corrosion; Corrosion control: Material selection, environment control; Surface engineering processes: Coatings and surface treatments; Cleaning and mechanical finishing of surfaces; Electroplating and Special metallic plating; Electro polishing and photo-etching;–Conversion coatings: Oxide, phosphate and chromate coatings; Thin film coatings: PVD and CVD; Hard-facing, thermal spraying and high-energy processes	Material Science & Engineering– R.K.Rajput, Material Science– R.S. Khurmi, S.Chand		

APPROVED	SIGN HOD
DATE :- 01/08/2025	