LESSON PLAN 2023-24

SUBJECT :ENGINEERING MATERIAL (3RD SEM)

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Class No.	Topic	Subtopics	Teaching Aids/Activities
Unit 1: Engineering Materials and their Properties (5 Classes)			
1	Introduction to Materials	Classification: Ferrous, Non-Ferrous, Alloys	PPT, Chart
2	Classification of Materials	Ferrous vs Non-Ferrous, Alloy concept	Material samples, Diagram
3	Properties of Materials	Physical, Chemical, Mechanical	PPT, Flashcards
4	Performance Requirements	Strength, durability, wear, corrosion resistance	Real-life cases
5	Reliability and Safety	Failure prevention, safety applications	Videos, Group Discussion
Unit 2: Ferrous Materials and Alloys (5 Classes)			
6	Characteristics of Ferrous	Properties and industrial relevance	PPT, Material samples
7	Carbon Steel Classification	Low, Medium, High carbon steel	Composition table
8	Alloy Steel Types	Tool steel, stainless steel, high/low alloy	Samples, Diagrams
9	Alloying Elements	Effects of Cr, Mn, Ni, V, Mo	Charts, Discussion
10	Applications	Industrial use of various steels	Case studies, Quiz
Unit 3: Iron – Carbon System (8 Classes)			
11	Phase Diagram Basics	Cooling curves, solidification	Diagram, Whiteboard
12	Fe-C Diagram Overview	Eutectic, Eutectoid, Hypo, Hyper	Handouts, Chart
13	Micro-constituents	Pearlite, Austenite, Cementite	Microscope visuals
14	Eutectic Reactions	Lever rule, calculations	Problem set
15	Cooling Rate	Effect on structure and phases	Graphs, Animations
16	Interpretation Techniques	Reading and analyzing Fe-C diagram	Worksheet
17	Applications	Heat treatment linkage, structural steel	Industry examples
18	Recap & MCQ	Fe-C review	MCQs, Group quiz
Unit 4: Crystal Imperfections (10 Classes)			
19	Crystals & Lattices	Ideal crystals, BCC, FCC, HCP	Models, Diagrams
20	Crystal Classification	Cubic, tetragonal, hexagonal systems	Ball-stick models
21	Point Defects I	Vacancies, interstitials	Charts, Images
22	Point Defects II	Impurities and substitutional defects	Case examples
23	Line Defects	Edge and screw dislocations	Diagrams, Animation
24	Surface & Volume Defects	Grain boundaries, porosity	PPT, Micrographs
25	Slip Deformation	Slip planes, dislocation movement	Simulation video

26	Twinning	Mechanism, effects	Animation, Chalkboard
27	Defects and Properties	Mechanical effect, hardness, brittleness	Comparative analysis
28	Summary & Quiz	Crystal Imperfection Review	Worksheet, Test
Unit 5: Heat Treatment (10 Classes)			
29	Introduction to HT	Need and scope	Video, Flowchart
30	Annealing	Process, effect	Case example
31	Normalizing & Hardening	Procedures and difference	Chart, Material pieces
32	Tempering	Purpose, cooling rate	Diagram, Q&A
33	Stress Relieving	Application & benefits	Flow diagram
34	Surface Hardening I	Carburizing – method and effect	Video
35	Surface Hardening II	Nitriding – advantages and limitations	Comparison table
36	HT Effects on Steel	Structural, property changes	Before-after samples
37	Hardenability	Jominy end quench test, factors	Test video
38	Recap & Problem Solving	Summary and questions	Group Activity, Quiz
Unit 6: Non-Ferrous Alloys (10 Classes)			
39	Aluminum Alloys	Duralumin, Y-Alloy	Alloy samples
40	Copper Alloys I	Cu-Al, Cu-Sn	Charts
41	Copper Alloys II	Babbitt, Phosphor bronze, Brass	Sample display
42	Copper-Nickel Alloys	Marine application	Industry videos
43	Lead, Zinc, Nickel Alloys	Characteristics and usage	Case study
44	Low Alloy Materials	P-91, P-22 for high temp use	Diagrams, Power plant application
45	High Alloy Materials	Duplex and super duplex stainless steels	Comparative charts
46	Ferrous vs Non-Ferrous	Comparison	Venn diagram
47	Industrial Application	Non-ferrous metals in aerospace, marine	Industry examples
48	Recap & Quiz	Objective test	MCQ, Worksheet
Unit 7: Bearing Materials (3 Classes)			
49	Classification	Overview of bearing types	Bearing samples
50	Properties and Uses	Tin, Lead, Copper, Cadmium-based	Composition table
51	Summary & Applications	Industrial use and case examples	Quiz
Unit 8: Spring Materials (3 Classes)			
52	Classification & Types	Iron-based and copper-based springs	Real springs
53	Properties & Applications	Stress-strain behavior	Load testing video
54	Recap and Quiz	Summary	MCQs
Unit 9: Polymers (3 Classes)			
55	Thermoplastics vs Thermosets	Properties, usage	Plastic samples, Chart
56	Elastomers	Rubber, Silicone, usage	Stretch demo

57	Summary & MCQ	Quiz and feedback	Group quiz
Unit 10: Composites and Ceramics (3 Classes)			
58	Composites	Particulate, fiber-reinforced	Samples, Videos
59	Ceramics	Classification and applications	Ceramic tiles, potteries
60	Final Review & Mock Test	All topics recap	Mock test paper