Nature and Property Of Materials

SWAYAM Prabha Course Code – M03

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COURSE OUTLINE	This course introduces to the basics of metals and metallic alloys, polymers, composites and smart materials which have extensively broadened the scope of engineering design in the fields of Civil, Mechanical, Aerospace and other structural applications. After learning this course, students will be well-versed with the underlying principle governing the material properties and should be able to select proper material for their application

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1	M1L1	History and Evolution Of Materials
2	M1L2	Classification of Materials
3	M1L3	Advanced and Exotic Materials
4	M1L4	Mechanical Properties of Materials – I
5	M1L5	Mechanical Properties of Materials – II
6	M1L6	Mechanical Properties of Materials - III
7	M2L1	Bonding Between Atoms
8	M2L2	The Role Of Crystal Structure - I
9	M2L3	The Role Of Crystal Structure – II
10	M2L4	The Role Of Crystal Structure - III

11	M3L1	Metals – I (Ferrous alloys)
12	M3L2	Metals – II (Non-Ferrous alloys)
13	M3L3	Metals – III (Strengthening and Degradation)
14	M3L4	Ceramics - I
15	M3L5	Ceramics - II
16	M4L1	Polymers : Introduction and Classification
17	M4L2	Polymeric Structure
18	M4L3	Effects of Glass Transition Temperature
19	M4L4	Polymer Mechanical Properties
20	M5L1	Composites - I
21	M5L2	Composites – II
22	M5L3	Composites - III
23	M6L1	Smart Materials – 1 (Introduction)
24	M6L2	Smart Materials – 2 (Piezoelectricity)
25	M6L3	Smart Materials – 3 (Magnetostriction)
26	M6L4	Smart Materials – 4 (Smart Polymers)
27	M6L5	Smart Materials – 5 (SMA)
28	M7L1	Materials Selections in Engineering Design
29	M7L1	Numerical: Cantilever beam (High stiffness and light weight)
30	M7L1	Numerical: Cantilever beam (High strength and light weight)
31	M7L1	Numerical: Connecting Rod
32	M7L1	Numerical: Probe for Scanning Probe Microscope
33	M8L1	Optical Properties

34	M8L2	Optical Fibre
35	M8L3	Thermal Properties
36	M8L4	Numerical: Material Selection for Heat Exchanger
37	M8L5	Electric Properties - I
38	M8L6	Electric Properties - II
39	M8L7	Magnetic Properties
40	M8L8	Laboratory Demostration
41		