

## **MM3202 : Mechanical Properties of Materials**

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### **Module Wise Lecture Plan**

No.	Topic	Date
<b>Module I → Stress-Strain Behaviour, Types/Modes of Loading and Ductility or Brittleness</b>		
1	Atomic Arrangement and Stereo-graphic Projection	
2	CRSS, Dimension of Materials and Defects	
3	Description of Stress-Strain Curves for Different Materials and Types/Modes of Loading	
4	Yielding Criteria of Materials	
<b>Module II → Slip Mechanisms: Dislocation and Twinning</b>		
5	Discussion on Slip and Slip Systems in Crystalline Solids	
6	Definition and observation of Dislocation, Burger Vectors and Types of Dislocation	
7	Motion of Dislocation –Part I	
8	Motion of Dislocation – Part II	
9	Motion of Dislocation – Part III	
10	Stress Field and Strain Energy of Dislocation	
11	Forces on Dislocations	
12	Dislocations in Face-centered Cubic Metals – Part I	
13	Dislocations in Face-centered Cubic Metals – Part II	
14	Thompson’s Tetrahedron and Stacking Fault Tetrahedra	
15	Dislocations in Hexagonal Close Packed Metals	
16	Dislocations in Body-Centered Cubic Metals	
17	Origin and Multiplication of Dislocations	
18	Twinning : Definition and Different Types of Twinning	
<b>Module III → Yield Point Phenomena in Metals and Alloys</b>		
19	Yield Point Phenomena and their Theoretical Background	
20	Yield Point Phenomena in Iron and Its Alloys	
21	Hydrogen Embrittlement - Solubility of Hydrogen in Metals	
<b>Module IV → Mechanisms of Strengthening in Metals</b>		
22	Strain Hardening (Work Hardening), Grain refinement strengthening: Bailey-Hirsh equation, Hall-Petch relationship and Grain boundary strengthening	
23	Solid-solution strengthening Precipitation strengthening and Dispersion Hardening	
<b>Module V → Fatigue Behaviour of Materials</b>		
24	Metallic Fatigue, Nature of Fatigue Failure and Structural Changes during Fatigue	
25	SN Curve, Low Cycle and High Cycle Fatigue	
26	Fatigue Design Approaches	
<b>Module VI → Creep Behaviour of Materials</b>		
27	Creep Definition and Discussion on Creep Curves	
28	Discussion on Creep Mechanisms and different Types of Creep	
29	Discussion on Deformation Maps	
<b>Module VII → Fracture Behaviour of Materials</b>		
30	Ductile and Brittle Fracture	
31	Fracture Mechanics	