NATIONAL INSTITUTE OF TECHNOLOGY, HAMIRPUR (HP) – 177 005

B.Tech. Mechanical Engineering, First Year [1st Semester]

Sr. No.	Course No.	Subject	L	T	P	Hours	Credits
1.	PH-101	Engineering Physics	3	1	0	4	4
2.	MA-111	Engineering Mathematics – 1	3	1	0	4	4
3.	ME-101	Engineering Mechanics and Strength of Materials	3	1	0	4	4
4.	EE-101	Basic Electrical Engineering	3	1	0	4	4
5.	HS-101	Communication Skills	2	1	0	3	3
	CS-101	Computer Fundamentals & Programming	3	1	0	4	4
6.	PH-101 (P)	Engineering Physics Lab	0	0	2	2	1
7.	EE-101 (P)	Basic Electrical Engineering Lab.	0	0	2	2	1
8.	HS-101 (P)	Communication Skills Lab.	0	0	2	2	1
9.	CS-101 (P)	Computer Fundamentals & Programming	0	0	2	2	1
10.	WS-101	Workshop – I	1	0	3	4	3
					Total =	35	30

ME-101   ENGINEERING MECHANICS AND STRENGTH OF MATERIAL

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L   T   P   Cr
3   1   0   4

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1. **FORCE, MOMENT, C. G & MOMENT OF INERTIA:** Idealisation of Mechanics, Concept of Rigid Body and Elastic Body, Laws of Mechanics, Forces & System of Forces, Composition, Resolution & resultant of Forces, Laws of Forces, Lami's Theorem, Moment & Couples, Varignon's Theorem, Free Body Diagram, Centre of Gravity of a Lamina, Centroids of various Geometric Shapes, Moment of Inertia, Radius of Gyration, Parallel and Perpendicular Axis Theorem.

2. **FRAMES AND TRUSSES:** Introduction, Perfect Frame, Redundant Frame, Reactions of Supports, Plane Trusses, Space Trusses, Method of Joints, Method of Section, Graphical Method- Maxwell Diagram.

3. **SHEAR FORCE AND BENDING MOMENT:** Introduction, Types of Load – Concentrated, uniformly distributed, uniformly varying load and Combination of loads. Types of beams – Cantilever beam, simply supported beam, overhanging beam; Shear force and bending moment diagrams for the above beams with one type of loading and combination of loading. Point of contra flexure, Relationship between load, Shear force and bending moment.

4. **SIMPLE STRESSES AND STRAINS**: Stress & strain; Types of stresses and strains Elastic limit; Hooks law; Stress – strain diagram for ductile and brittle material, Factor of safety; Poisson's Ratio; Elastic constants; Young's modulus, Shear modulus & Bulk modulus. Relationship between elastic constants-Derivation, Thermal Stress & Strain, Stresses induced due to uniaxial stress, stresses induced by state of simple shear, stresses induced due to biaxial stress, Principal stresses, Mohr's circle and its construction.

5. **BENDING STRESSES**: Pure bending of beams, Bending Equation, moment of resistance, section modulus & neutral axis. Stress distribution diagram for Cantilever & simply supported beam, Concept of direct & transverse shear Stress, Concept of axial load, eccentric load, direct stresses, bending stresses, maximum and minimum stresses. Stress distribution diagram.

6. **TORSION OF CIRCULAR SHAFT**: Pure Torsion, Theory of Pure torsion, Derivation of Torsion equation for a circular shaft subject to torsion, assumptions, Maximum torque transmitted by a Solid shaft and hollow shaft-derivations, Polar modulus, torsion rigidity, Shear stress produced in the members, Comparison of hollow and solid shaft, Power transmitted by a shaft, Close coiled helical spring subjected to axial load and axial torque.

7. **STRESSES IN THIN CYLINDERS**: Thin cylinders subjected to internal pressures, Concept of stresses & strains, Hoop stress, Longitudinal stress, in a cylinder, effects of joints, change in diameter, length and internal volume; principal stresses in sphere and change in diameter and internal volume.

BOOKS RECOMMENDED:

1. Engineering Mechanics   : Timoshenko & Young, Mc Graw Hill
2. Engineering Mechanics   : Bhavikatti & Rajshekhrappa.
3. Engineering Mechanics   : Meriam
4. Strength of Materials   : R.K.Bansal
5. Mechanics of Materials   : E. J. Hearn
6. Strength of Materials   : Sadhu Singh
7. Engineering Mechanics   : Basu -Tata Mc Graw Hill