

Lesson Plan

Name of the Subject : Engineering Mechanics (14BT10301)

Class & Semester : B.Tech. I Year (Civil & Mechanical Engineering)

S. No.	Topic	No. of periods	Book(s) followed	Topics for self-study
UNIT – I: Basic Concepts				
1	Axioms of Mechanics – basic quantities of mechanics and their units	2	T1	Visit http://www.engineeringvideos.org/mechanics and watch Introduction to Free Body. Diagrams Concurrent Forces-2D. Example Distributed Force-Hydrostatic Pressure on Wall. Introduction to Friction. Friction Example-Box on Ramp.
2	System of forces– Lami’s theorem	2	T1	
3	Moment of forces and its Application	3	T1	
4	Couples and Resultant of Force System	2	T1 & T2	
5	Concurrent force systems, parallel force systems	2	T1 & T2	
6	Non-concurrent force systems. Free body diagrams	2	T1 & R1	
7	Friction as a force – Laws of dry friction – Wedge, screw-jack, and differential screw-jack	7	T1, R1, & R2	
8	Introduction to Virtual work principle	4	T1, R1, & R2	
Total periods required:		24		
UNIT – II: STRUCTURAL ANALYSIS				
9	Types of Supports – Support reactions for beams with different types of loading, concentrated, uniformly distributed and uniformly varying loading	4	T1 & T2	2D Frame Analysis-Ladder.
10	Types of frames –perfect frames, Analysis of frames using method of joints	6	T1, T2 & R2	
11	Analysis of frames using method of sections	6	T1, T2 & R2	
Total periods required:		16		
UNIT-III: CENTROID, CENTER OF GRAVITY, MOMENTS OF INERTIA				
12	Centroids of simple figures by integration	2	T1, T2 & R1	Develop a simple method of locating the center of gravity of a human being. Develop a small, low-cost experimental set up to show usefulness of center of gravity calculation.
13	Centroids of Composite figures	3	T1, T2 & R1	
14	Centre of Gravity of bodies, Centre of Gravity of Composite figures	3	T1, T2 & R1	
15	Parallel axis and perpendicular axis theorems- Moments of Inertia of Composite Figures	3	T1, T2 & R1	
16	Mass Moment of Inertia of Simple solids, Moment of Inertia of composite masses	4	T1, T2 & R1	
17	Theorems of Pappus and Guldinus	3	T1, T2 & R1	
Total periods required:		18		
UNIT – IV: KINEMATICS				

18	Rectilinear and Curvilinear motion – Velocity and Acceleration	4	T1 & T2	Time-varying Acceleration. 1D Kinematics-Acceleration Depends on Position. Project 12-1D in R2.
19	Motion of a projectile	5	T1 & T2	
20	Normal and tangential accelerations	5	T1 & T2	
Total periods required:		14		
UNIT – V: KINETICS				
21	Analysis as particle and Analysis as a Rigid Body in Translation – Newton’s laws	6	T1, R1, & R2	Project 13-2D in R2. Project 14-1D in R2. Project 15-1D in R2. Project 16-2D in R2.
22	Work Energy Method – Equation for Translation, Work – Energy application to Particle Motion	5	T1, R1, & R2	
23	Impulse-Momentum Equation	5	T1, R1, & R2	
24	Fixed axis Rotation	2	T1, R1, & R2	
Total periods required:		18		
Grand total periods required:		90		

Text Books:

T1: S.S. Bhavikatti and K.G. Rajashekarappa, *Engineering Mechanics*, New Age International (P) Ltd., 3rd edition, 2008

T2: Basudeb Bhattacharya, *Engineering Mechanics*, Second Edition, Oxford University Press, 2nd Edition, 2014.

Reference Books:

R1: S. Timoshenko, Dh. Young, and J.V. Rao, *Engineering Mechanics*, Tata McGraw-Hill Publishing Company Limited, Revised 4th Edition, 2007.

R2: R.C. Hibbeler, *Engineering Mechanics Statics and Dynamics*, Prentice Hall, 8th Edition, 1998.

R3: K. Vijaya Kumar Reddy and J. Suresh Kumar, *Singer’s Engineering Mechanics – Statics and Dynamics*, BS Publications, 3rd Edition.