BBS College of Engineering and Technology Prayagraj
Lecture Plan

Department	Mechanical Engineering Department
Program/Year/Semester/Sec	B.Tech/2025/ 4th
Course Name/ Course Title	B.Tech/ **Engineering Mechanics and strength of Material**
Course Code	**BME402**
Name of Faculty	Mr Saurabh Kumar
Department of Faculty	Mechanical Engineering Dept.

Type of Course	Theory/Lecture
Contact hours	**60 hrs**

Course Outcomes (COs)	
At the end of this course students will demonstrate the ability to:	
CO1	Understand the force systems and application of force equilibrium to various two-dimensional problems.
CO2	Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles.
CO3	Determine the principal stresses and strains in structural members
CO4	Understand and determine the stresses, slope, and deflection of the transversely loaded members
CO5	Apply the concepts of stresses and strain in solving problems related to springs, buckling of columns and thin and thick cylinders

Unit	**Topic & sub – topic**	**Topics Covered**	**COs**	**Lectures proposed**	**Lecture delivered**	**Date**	**No. of students present (57)**	**Sign. of faculty**
	Unit -1: Introduction							
	All Newton's law		CO1	1				
	Review of two-dimensional force systems		CO1	1				
	Free body diagram		CO1	1				
	Equilibrium of force systems		CO1	1				
	laws of friction		CO1	1				
	equilibrium analysis of simple systems involving friction.		CO1	1				
	Trusses-Introduction, simple truss and solution of a simple truss,		CO1	1				
	methods of joints,		CO1	2				
	methods of sections.		CO1	2				
	Beam Introduction, shear force and bending moment		CO1	2				
	different equations of equilibrium		CO1	1				
	shear force and bending moment diagram for statically determined beams.		CO1	2				
				16				
2	**Unit-2: Centroid and moment of inertia:**							
	Centroid of plane, curve, area, volume and composite bodies,		CO2	1				
	moment of inertia of plane area,		CO2	1				
	parallel axis theorem, perpendicular axis theorem		CO2	2				
	concept and importance of principal moment of inertia.		CO2	1				
	Compound stress and strains:		CO2	1				
	Introduction, normal stress and strain, shear stress and strain,		CO2	1				
	stress on inclines sections, state of plane stress,		CO2	1				
	principal stress and strain, maximum shear stress,		CO2	1				

	Mohr's circle for plane stress,		CO2	1				
	theories of failure, strain energy, impact loads and stresses,		CO2	1				
	thermal Stresses, introduction to three-dimensional stresses.			1				
				12				
	Unit-3: Stresses in Beams:							
	: Pure Bending, normal stresses in beams		CO3	1				
	shear stresses in beams due to transverse and axial loads		CO3	2				
	composite beams.		CO3	2				
	cantilever and simply supported beams		CO3	1				
3	Macaulay's method,		CO3	2				
	area moment method, fixed and continuous beams.		CO3	1				
	Torsion: Torsion, combined bending and torsion of solid and hollow shafts		CO3	2				
	torsion of thin-walled tubes.			1				
				12				
	Unit-4: Helical and Leaf Springs:							
	: Deflection of springs, helical springs under axial load and under axial twist (for circular cross sections),		CO4	1				
	axial load and twisting moment acting simultaneously both for open and closed coiled springs		CO4	1				
	concept of laminated springs.		CO4	1				
4	**Columns and Struts:**		CO4	2				
	Buckling and stability			1				
	slenderness ratio, combined bending and direct stress, middle third and middle quarter rules,		CO4	2				
	struts with different end conditions, Euler's theory for pin-ended columns		CO4	2				
	effect of end conditions on column buckling, Ranking Gordon formulae.		CO4	2				
				12				
	Unit-5: Thin cylinders & spheres:							
	Introduction, difference between thin-walled and thick-walled pressure vessels, thin-walled spheres and cylinders,		CO5	2				
	hoop and axial stresses and strain, and volumetric strain.		CO5	2				
5	Thick cylinders: Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, compound cylinders,		CO5	2				
	stresses in rotating shafts and cylinders, stresses due to interference fits.		CO5	2				
				8				
	Total Lectures			**60**				

Text Books & References	
	Engineering Mechanics by S.S Bhavikatti,
	Engineering Mechanics by Dr D.S Kumar
	Mechanics of solid by R.K Rajput
	. Gere, Mechanics of Materials, Cengage learning.
	Bere, Johnston, Mechanics of Materials, McGraw Hill.

Signature of Faculty

Signature of HOD

Comments	