

LESSON PLAN

NAME OF FACULTY : Harpal Singh Kalra

DISCIPLINE: MECHATRONICS

SEMESTER: 3RD

SUBJECT: Essential Mechanics & Fluids (MT 203N)

LESSON PLAN DURATION: 15 WEEKS (FROM JULY, 2018 TO DEC, 2018)

WORK LOAD (LECTURE/PRACTICAL)PER WEEK (IN HOURS) : 3 LECTURE, 2 PRACTICAL

WEEK	THEORY		PRACTICAL	
	LECTURE DAY	TOPIC(INCLUDING ASSIGNMENT/TEST)	PRACTICAL DAY	PRACTICAL WORK
1ST	I	Introduction to Strength of material and Fluids concepts and their use in practical life	1ST	To perform Torsion test on mild steel specimen
	II	Overview to entire syllabus		
	III	Simple stresses & strains: Concept & types of Stresses and strains, Poison's ratio		
2ND	I	stresses and strain in simple and compound bars under axial loading	2ND	To perform tensile test in ductile and brittle materials and to draw stress-strain curve and to determine various mechanical properties
	II	stress strain diagrams, Hooks law, elastic constants & their relationships		
	III	temperature stress & strain in simple & compound bars under axial loading, Numerical.		
3RD	I	<b>Problem discussion of Part I of Unit I</b>	3RD	To perform any one hardness test (Rockwell, Brinell & Vicker's test) and determine hardness of materials.
	II	<b>Test of Part I of Unit I</b>		
	III	Compound stresses & strains: Concept of surface and volumetric strains, two dimensional stress system		
4TH	I	conjugate shear stress at a point on a plane, principle stresses & strains and principal planes	4TH	A simply supported beam is carrying point loads, Uniformly distributed load and uniformly varying loads. Draw the SFD and BMD for the beam.
	II	Mohr's circle of stresses, Numerical.		
	III	Numerical practice		
5TH	I	<b>Problems discussion Part II of Unit I</b>	5TH	To find the moment of inertia of fly wheel.
	II	<b>Test of Part II of Unit I</b>		
	III	Shear Force & Bending Moments: Definitions, SF & BM diagrams for		

		cantilevers, simply supported beams with or without over-hang		
6TH	I	calculation of maximum BM & SF and the point of contra flexure under concentrated loads	6TH	To perform Charpy and Izod impact test on steel specimen
	II	uniformly distributed loads over whole span or a part of it, combination of concentrated loads and uniformly distributed loads		
	III	Uniformly varying loads and application of moments, relation between the rate of loading, the shear force and the bending moments, Problems.		
7TH	I	Torsion of circular Members : Torsion of thin circular tube	7TH	To perform Double shear test on steel specimen
	II	Solid and hollow circular shafts Numerical.		
	III	Numerical on tapered shaft, stepped shaft & composite circular shafts, combined bending		
8TH	I	Practice of numerical on torsion, equivalent torque, effect of end thrust.	8TH	To perform Compression test on brick
	II	<b>Problems discussion of Unit II</b>		
	III	<b>Test of Unit II</b>		
9TH	I	Fluid Properties and Fluid Statics: Concept of fluid and flow, ideal and real fluids	9TH	Determination of coefficient of discharge of orifice meter
	II	Continuum concept, properties of fluids, Newtonian and non-Newtonian fluids.		
	III	Pascal's law, hydrostatic equation, hydrostatic forces on plane and curved surfaces		
10TH	I	stability of floating and submerged bodies, relative equilibrium. Problems.	10TH	Determination of coefficient of discharge of venturi meter
	II	Fluid Kinematics: Eulerian and Lagrangian description of fluid flow with Numerical		
	III	stream, streak and path lines; types of flows, flow rate and continuity equation with Numerical		

11TH	I	differential equation of continuity in cylindrical and polar coordinates with Numerical	11TH	Major losses in pipe flow
	II	rotation, vorticity and circulation, stream and potential functions, flow net. Problems.		
	III	<b>Problem discussion</b>		
12TH	I	<b>Test of Unit III</b>	12TH	Verification of Bernoulli's theorem
	II	Fluid Dynamics: Concept of system and control volume		
	III	Euler's equation with Numerical		
13TH	I	Bernoulli's equation, venturi meter, orifices with Numerical	13TH	Minor losses - expansion and contraction losses in pipes
	II	Orifice meter, mouthpieces, kinetic and momentum correction factors with Numerical		
	III	Impulse momentum relationship and its applications. Problems.		
14TH	I	Potential Flow: Uniform and vortex flow with Numerical	14TH	VIVA VOICE /FILE CHECKING
	II	flow past a Rankin half body, source, sink with Numerical		
	III	source-sink pair and doublet, flow past a cylinder with and without circulation. Problems.		
15TH	I	<b>Problem discussion</b>	15TH	VIVA VOICE /FILE CHECKING
	II	<b>Test of Unit IV</b>		
	III	<b>Final problem discussion</b>		