

## STRUCTURAL MECHANICS

Week	Period	Topics	Subtopics	Methodology
1 <sup>st</sup>	1 <sup>st</sup>	1.1. Explain the necessity to know about the mechanical properties of materials 1.2. Define the following terms: (a) Stress, tensile stress, compressive strain, shear stress	1.1-1.2(a)	Lecture & Discussion
	2 <sup>nd</sup>	1.2.(b)Hooke's law, modulus of elasticity and modulus of rigidity 1.3. Express stress-strain diagram of mild steel and concrete	1.2(b)-1.3	Lecture & Discussion
	3 <sup>rd</sup>	1.4. State the meaning of the followings: (a)Elasticity, proportional limit, yield point, ultimate stress, breaking stress, proof stress, working stress and factor of safety	1.4(a)	Lecture & Discussion
	Practical	Draw stress-strain curve of mild steel with test results		
2 <sup>nd</sup>	1 <sup>st</sup>	1.4. (b)Strength, stiffness, toughness, ductility, malleability, brittleness, creep, fatigue failure, resilience, modulus of resilience, thermal stress in simple bar and poissons ratio	1.4(b)	Lecture & Discussion
	2 <sup>nd</sup>	1.5. Compute stress, strain, modulus of elasticity and modulus of rigidity	1.5	
	3 <sup>rd</sup>	1.6. Solve problems involving resilience, thermal stress and poissons ratio	1.6	Lecture & Discussion
	Practical	Determine the hardness of mild steel plate		
3 <sup>rd</sup>	1 <sup>st</sup>	1 <sup>st</sup> Quiz Test		Question & Answer
	2 <sup>nd</sup>	1.7. Compute stress develop in composite bar under tension and compression 2.1. Define the following terms: a. work b. power c. energy	1.7-2.1	
	3 <sup>rd</sup>	2.2. Specify the units of the followings: a. work b. power c. energy 2.3. Describe work done in rotation and represent by area	2.2-2.3	Lecture & Discussion
	Practical	Determine the stiffness of mild steel plate		
4 <sup>th</sup>	1 <sup>st</sup>	2.4. Mention the different kinds of energy 2.5. Explain the relations of potential energy and kinetic energy 2.6. Solve problems involving work, power and energy	2.4-2.6	Lecture & Discussion
	2 <sup>nd</sup>	3.1. Explain the laws of forces 3.2. Define the following terms: a. force; b. coplanar force; c. non-coplanar force; d. concurrent force; e. resultant force	3.1-3.2	Lecture & Discussion
	3 <sup>rd</sup>	1 <sup>st</sup> Class test		Question & Answer
	Practical	Determine the compressive stress of a timber specimen		
	1 <sup>s</sup>	3.3. Mention the parallelogram laws of forces 3.4. State the meaning of composition and resolution of forces	3.3-3.4	Lecture & Discussion
	2 <sup>nd</sup>	3.5. Compute the resultant force of a. Triangle of force	3.5	Lecture & Discussion

5th		b. Polygon of force c. Converse law of triangle and polygon laws of forces graphically		
	3 <sup>rd</sup>	3.6. Explain Lami's theorem 3.7. Solve problems on Lami's theorem	3.6-3.7	Lecture & Discussion
	Practical	Determine the brittleness of cast iron		
6th	1 <sup>st</sup>	4.1. define the term moment 4.2. Differentiate moment with force	4.1-4.2	
	2 <sup>nd</sup>	4.3. Explain Varignon's principle of moment 4.4. Distinguish like and unlike parallel forces 4.5. State the meaning of couple	4.3-4.5	Lecture & Discussion
	3 <sup>rd</sup>	2 <sup>nd</sup> Quiz test		Question & Answer
	Practical	Show the resultant of force by using the force board		
7th	1 <sup>st</sup>	4.6. Mention the properties of couple 4.7. Solve problems on moment of couple	4.6-4.7	Lecture & Discussion
	2 <sup>nd</sup>	5.1. State the meaning of friction and static & dynamic friction 5.2. Mention the laws of static friction 5.3. Explain angle of friction and co-efficient of friction	5.1-5.3	Lecture & Discussion
	3 <sup>rd</sup>	5.4. Compute friction of a body on horizontal planes 5.5. Compute friction of a body on inclined planes 5.6. Compute frictional force acting on a ladder	5.4-5.6	Lecture & Discussion
	Practical	<b>Review of classes</b>		
8 <sup>th</sup>	<b>Mid Term Examination</b>			
9 <sup>th</sup>	1 <sup>st</sup>	6.1. Explain the terms: centroid and center of gravity 6.2 State the axis of symmetry	6.1-6.2	Lecture & Discussion
	2 <sup>nd</sup>	6.3. Compute the center of gravity by the method of moment of the following sections: a. Rectangular b. Circular c. Semi-circular d. Hollow e. I-shaped f. T-shaped g. L-shaped	6.3	Lecture & Discussion
	3 <sup>rd</sup>	7.1. State 1 <sup>st</sup> and 2 <sup>nd</sup> moment of area 7.2. Explain the meaning of radius of gyration	7.1-7.2	Lecture & Discussion
	Practical	Prove the Lami's theorem by using the force board		
10th	1 <sup>st</sup>	<b>3<sup>rd</sup> Quiz test</b>		Question & Answer
	2 <sup>nd</sup>	7.3. Mention the theorems of moment of inertia 7.4. Compute the moment of inertia of plane area about any axis of the following sections: a. Rectangular	7.3-7.4	Lecture & Discussion

		<ul style="list-style-type: none"> <li>b. Circular</li> <li>c. Semi-circular</li> <li>d. Hollow</li> <li>e. I-shaped</li> <li>f. T-shaped</li> <li>g. L-shaped</li> </ul>		
	3 <sup>rd</sup>	8.1. State about the laws of motions 8.2. Explain the term circular motion	8.1-8.2	Lecture & Discussion
	Practical	Determine the co-efficient of friction of timber, concrete and mild steel		Question & Answer
11 <sup>th</sup>	1 <sup>st</sup>	8.3. Define the terms: torsion and torsion stress 8.4. Mention the assumptions of torsion stress	8.3-8.4	Lecture & Discussion
	2 <sup>nd</sup>	8.5. find the relation between torsion stress and strain 8.6. express the derivation of the formula for finding torque	8.5-8.6	Lecture & Discussion
	3 <sup>rd</sup>	8.7. Determine the relations among torsion, horse power and velocity of shaft 8.8. Solve problems involving torsion	8.7-8.8	Lecture & Discussion
	Practical	Determine reactions of a beam by using spring balance		
12 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup> class test		
	2 <sup>nd</sup>	9.1. Define the term beam 9.2. List different kinds of beams	9.1-9.2	Lecture & Discussion
	3 <sup>rd</sup>	9.3. State the meaning of load 9.4. Mention various kinds of load on beams	9.3-9.4	Lecture & Discussion
	Practical	Practical test		Question & Answer
13 <sup>th</sup>	1 <sup>st</sup>	9.5. State the meaning of shear force and bending moment 9.6. Differentiate between shear force and bending moment	9.5-9.6	Lecture & Discussion
	2 <sup>nd</sup>	4 <sup>th</sup> Quiz Test		Question & Answer
	3 <sup>rd</sup>	9.7. Mention the sign conventions of shear force and bending moment 9.8. List the characteristics of shear force and bending moment diagram 9.9. Draw SF and BM diagram of simply supported beams with point load, distributed load and both	9.7-9.9	Lecture & Discussion
	Practical	Review of classes		