

## **NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY**



SERGARH-756060, BALASORE (ODISHA)
(Approved by AICTE& affiliated to SCTE&VT, Odisha)

## **LESSON PLAN**

## **SUBJECT: TH -2 DESIGN OF MACHINE ELEMENTS**

## **CHAPTER WISE DISTRIBUTION OF PERIODS**

Sl.No.	Name of the chapter as per the Syllabus	No. of Periods as per the Syllabus	No. of period s actuall y
1	INTRODUCTION	12	12
2	DESIGN OF FASTENING ELEMENTS	12	12
3	DESIGN OF SHAFT AND KEYS	12	12
4	DESIGN OF COUPLING	12	12
5	DESIGN OF CLOSED COIL HELICAL SPRING	12	12
	TOTAL	60	60

Discipline: MECHANICAL ENGG.	Semester: 5TH	Name of the Teaching Faculty: ER.RANJIT GIRI		
Week	Class Day	Theory / Practical Topics		
	1 <sup>st</sup>	1.1 Introduction to Machine Design and Classify it.		
1 <sup>st</sup>	2 <sup>nd</sup>	1.1 Introduction to Machine Design and Classify it.		
	3 <sup>rd</sup>	1.2. Different mechanical engineering materials used in design with their uses and their mechanical and physical properties.		
	4 <sup>th</sup>	1.2. Different mechanical engineering materials used in design with their uses and their mechanical and physical properties.		
2 <sup>nd</sup>	1 <sup>st</sup>	1.3 Define working stress, yield stress, ultimate stress & factor of safety and stress –strain curve for M.S & C.I.		
	2 <sup>nd</sup>	1.3 Define working stress, yield stress, ultimate stress & factor of safety and stress –strain curve for M.S & C.I.		
	3 <sup>rd</sup>	1.4 Modes of Failure (By elastic deflection, general yielding & fracture)		
	4 <sup>th</sup>	1.4 Modes of Failure (By elastic deflection, general yielding & fracture)		
	1 <sup>st</sup>	1.5 State the factors governing the design of machine elements.		
3 <sup>rd</sup>	2 <sup>nd</sup>	1.5 State the factors governing the design of machine elements.		
3	3 <sup>rd</sup>	1.6 Describe design procedure.		
	4 <sup>th</sup>	1.6 Describe design procedure.		
4 <sup>th</sup>	1 <sup>st</sup>	2.1 Joints and their classification.		
	2 <sup>nd</sup>	2.2 State types of welded joints		
	3 <sup>rd</sup>	2.3 State advantages of welded joints over other joints.		
	4 <sup>th</sup>	2.4 Design of welded joints for eccentric loads.		
	1 <sup>st</sup>	2.5 State types of riveted joints and types of rivets		
5 <sup>th</sup>	2 <sup>nd</sup>	2.6 Describe failure of riveted joints.		
3	3 <sup>rd</sup>	2.7 Determine strength & efficiency of riveted joints.		
	4 <sup>th</sup>	2.8 Design riveted joints for pressure vessel		
	1 <sup>st</sup>	2.8 Design riveted joints for pressure vessel		
	2 <sup>nd</sup>	2.9 Solve numerical on Welded Joint and Riveted Joints.		
6 <sup>th</sup>	3 <sup>rd</sup>	2.9 Solve numerical on Welded Joint and Riveted Joints.		
	4 <sup>th</sup>	2.9 Solve numerical on Welded Joint and Riveted Joints.		
	1 <sup>st</sup>	3.1 State function of shafts		
	2 <sup>nd</sup>	3.2 State materials for shafts		
7 <sup>th</sup>	3 <sup>rd</sup>	3.3 Design solid & hollow shafts to transmit a given power at given rpm based on a) Strength: (i) Shear stress, (ii) Combined bending tension; b) Rigidity: (i) Angle of twist, (ii) Deflection, (iii) Modulus of rigidity		
	4 <sup>th</sup>	3.3 Design solid & hollow shafts to transmit a given power at given rpm based on a) Strength: (i) Shear stress, (ii) Combined bending tension; b) Rigidity: (i) Angle of twist, (ii) Deflection, (iii) Modulus of rigidity		

1st 3.4 State standard size of shaft as per L.S.  2nd 3.5 State function of keys, types of keys & material of keys.  3rd 3.6 Describe failure of key, effect of key way.  4nd 3.7 Design rectangular sunk key considering its failure against shear  1st 3.8 Design rectangular sunk key by using empirical relation for given diamed 3.9 State specification of parallel key, gib-head key, taper key as per L.S.  3rd 3.10 Solve numerical on Design of Shaft and keys.  4nd 3.10 Solve numerical on Design of Shaft and keys.  1st 4.1 Design of Shaft Coupling  2rd 4.1 Design of Shaft Coupling  4nd 4.3 Types of Coupling  1st 4.3 Types of Coupling  1st 4.4 Design of Sleeve or Muff-Coupling.  4nd 4.4 Design of Sleeve or Muff-Coupling.  4nd 4.5 Design of Clamp or Compression Coupling  1st 4.5 Design of Clamp or Compression Coupling  1st 4.6 Solve simple numerical on above.  4nd 4.6 Solve simple numerical on above.  4nd 4.6 Solve simple numerical on above.  1st 5.1 Materials used for helical spring  2rd 5.2 Standard size spring wire. (SWG).  3rd 5.3 Terms used in compression spring.  1st 5.4 Stress in helical spring of a circular wire.  2rd 5.5 Deflection of helical spring of circular wire.  1st 5.6 Surge in spring  2rd 5.7 Solve numerical on design of closed coil helical compression spring.  5.7 Solve numerical on design of closed coil helical compression spring.	eth		T
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4th 3.7 Design rectangular sunk key considering its failure against shear  1st 3.8 Design rectangular sunk key by using empirical relation for given diame  2rd 3.9 State specification of parallel key, gib-head key, taper key as per I.S.  3.10 Solve numerical on Design of Shaft and keys.  4th 3.10 Solve numerical on Design of Shaft and keys.  1st 4.1 Design of Shaft Coupling  2rd 4.1 Design of Shaft Coupling  3rd 4.2 Requirements of a good shaft coupling  4th 4.3 Types of Coupling  1st 4.3 Types of Coupling  2rd 4.4 Design of Sleeve or Muff-Coupling.  3rd 4.4 Design of Sleeve or Muff-Coupling.  4th 4.5 Design of Clamp or Compression Coupling  1st 4.5 Design of Clamp or Compression Coupling  1st 4.5 Design of Clamp or Compression Coupling  1st 4.6 Solve simple numerical on above.  4th 6 Solve simple numerical on above.  4th 6 Solve simple numerical on above.  1st 5.1 Materials used for helical spring  2rd 5.2 Standard size spring wire. (SWG).  3rd 5.3 Terms used in compression spring.  1st 5.4 Stress in helical spring of a circular wire.  1st 5.5 Deflection of helical spring of circular wire.  1st 5.5 Deflection of helical spring of circular wire.  1st 5.5 Deflection of helical spring of circular wire.  5.7 Solve numerical on design of closed coil helical compression spring.		2 <sup>nd</sup>	3.5 State function of keys, types of keys & material of keys.
1st 3.8 Design rectangular sunk key by using empirical relation for given diame  2nd 3.9 State specification of parallel key, gib-head key, taper key as per I.S.  3rd 3.10 Solve numerical on Design of Shaft and keys.  4th 3.10 Solve numerical on Design of Shaft and keys.  1st 4.1 Design of Shaft Coupling  2nd 4.1 Design of Shaft Coupling  4rd 4.3 Types of Coupling  1st 4.3 Types of Coupling  2nd 4.4 Design of Sleeve or Muff-Coupling.  3rd 4.4 Design of Sleeve or Muff-Coupling.  4rd 4.5 Design of Clamp or Compression Coupling  1st 4.5 Design of Clamp or Compression Coupling  1st 4.5 Design of Clamp or Compression Coupling  2nd 4.6 Solve simple numerical on above.  4rd 4.6 Solve simple numerical on above.  1st 5.1 Materials used for helical spring  2nd 5.2 Standard size spring wire. (SWG).  3rd 5.3 Terms used in compression spring.  4rd 5.4 Stress in helical spring of a circular wire.  1st 5.4 Stress in helical spring of a circular wire.  1st 5.5 Deflection of helical spring of circular wire.  5.5 Deflection of helical spring of circular wire.  5.7 Solve numerical on design of closed coil helical compression spring.  5.7 Solve numerical on design of closed coil helical compression spring.		3 <sup>rd</sup>	3.6 Describe failure of key, effect of key way.
2nd 3.9 State specification of parallel key, gib-head key, taper key as per I.S.  3rd 3.10 Solve numerical on Design of Shaft and keys.  4th 3.10 Solve numerical on Design of Shaft and keys.  1th 4.1 Design of Shaft Coupling 2nd 4.1 Design of Shaft Coupling 3rd 4.2 Requirements of a good shaft coupling 4th 4.3 Types of Coupling 1rd 4.4 Design of Sleeve or Muff-Coupling. 3rd 4.4 Design of Sleeve or Muff-Coupling. 3rd 4.5 Design of Clamp or Compression Coupling 1rd 4.5 Design of Clamp or Compression Coupling 1rd 4.6 Solve simple numerical on above. 3rd 4.6 Solve simple numerical on above. 4th 4.6 Solve simple numerical on above. 1rd 5.1 Materials used for helical spring 2nd 5.2 Standard size spring wire. (SWG). 3rd 5.3 Terms used in compression spring. 4th 5.3 Terms used in compression spring. 1rd 5.4 Stress in helical spring of a circular wire. 3rd 5.5 Deflection of helical spring of circular wire. 3rd 5.5 Deflection of helical spring of circular wire. 3rd 5.6 Surge in spring 2nd 5.7 Solve numerical on design of closed coil helical compression spring.		4 <sup>th</sup>	3.7 Design rectangular sunk key considering its failure against shear
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3.10 Solve numerical on Design of Shaft and keys.  4th 3.10 Solve numerical on Design of Shaft and keys.  1tt 4.1 Design of Shaft Coupling 2th 4.1 Design of Shaft Coupling 4th 4.3 Types of Coupling 4th 4.3 Types of Coupling 2th 4.4 Design of Sleeve or Muff-Coupling. 3th 4.5 Design of Sleeve or Muff-Coupling. 4th 4.5 Design of Sleeve or Muff-Coupling. 4th 4.5 Design of Clamp or Compression Coupling 1tt 4.5 Design of Clamp or Compression Coupling 2th 4.6 Solve simple numerical on above. 4th 4.6 Solve simple numerical on above. 4th 4.6 Solve simple numerical on above. 1tt 5.1 Materials used for helical spring 2th 5.3 Terms used in compression spring. 4th 5.3 Terms used in compression spring. 4th 5.3 Terms used in compression spring. 4th 5.5 Deflection of helical spring of a circular wire. 3th 5.5 Deflection of helical spring of circular wire. 4th 5.5 Deflection of helical spring of circular wire. 5th 5th Surge in spring	9 <sup>th</sup>	2 <sup>nd</sup>	3.9 State specification of parallel key, gib-head key, taper key as per I.S.
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10 <sup>th</sup> 2 <sup>nd</sup> 4.1 Design of Shaft Coupling 3 <sup>rd</sup> 4.2 Requirements of a good shaft coupling 4 <sup>th</sup> 4.3 Types of Coupling 1 <sup>st</sup> 4.3 Types of Coupling 2 <sup>nd</sup> 4.4 Design of Sleeve or Muff-Coupling. 3 <sup>rd</sup> 4.4 Design of Sleeve or Muff-Coupling. 4 <sup>th</sup> 4.5 Design of Clamp or Compression Coupling 1 <sup>st</sup> 4.6 Solve simple numerical on above. 3 <sup>rd</sup> 4.6 Solve simple numerical on above. 4 <sup>th</sup> 4.6 Solve simple numerical on above. 1 <sup>st</sup> 5.1 Materials used for helical spring 2 <sup>nd</sup> 5.2 Standard size spring wire. (SWG). 3 <sup>rd</sup> 5.3 Terms used in compression spring. 4 <sup>th</sup> 5.3 Terms used in compression spring. 1 <sup>st</sup> 5.4 Stress in helical spring of a circular wire. 1 <sup>st</sup> 5.5 Deflection of helical spring of circular wire. 1 <sup>st</sup> 5.6 Surge in spring 2 <sup>nd</sup> 5.7 Solve numerical on design of closed coil helical compression spring.		4 <sup>th</sup>	3.10 Solve numerical on Design of Shaft and keys.
11th  12th  12th  12th  13th  13th		1 <sup>st</sup>	4.1 Design of Shaft Coupling
11th  12th  12th  12th  13th  13th	10 <sup>th</sup>	2 <sup>nd</sup>	4.1 Design of Shaft Coupling
11th 4.3 Types of Coupling 2nd 4.4 Design of Sleeve or Muff-Coupling. 3rd 4.4 Design of Sleeve or Muff-Coupling. 4th 4.5 Design of Clamp or Compression Coupling 1rd 4.5 Design of Clamp or Compression Coupling 2nd 4.6 Solve simple numerical on above. 4th 4.6 Solve simple numerical on above. 4th 4.6 Solve simple numerical on above.  1st 5.1 Materials used for helical spring 2nd 5.2 Standard size spring wire. (SWG). 3rd 5.3 Terms used in compression spring. 4th 5.3 Terms used in compression spring.  1st 5.4 Stress in helical spring of a circular wire.  2nd 5.4 Stress in helical spring of a circular wire.  3rd 5.5 Deflection of helical spring of circular wire.  1st 5.6 Surge in spring 2nd 5.7 Solve numerical on design of closed coil helical compression spring.	10	3 <sup>rd</sup>	
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4th 4.5 Design of Clamp or Compression Coupling  1st 4.5 Design of Clamp or Compression Coupling  2nd 4.6 Solve simple numerical on above.  3rd 4.6 Solve simple numerical on above.  4th 4.6 Solve simple numerical on above.  4th 4.6 Solve simple numerical on above.  1st 5.1 Materials used for helical spring  2nd 5.2 Standard size spring wire. (SWG).  3rd 5.3 Terms used in compression spring.  4th 5.3 Terms used in compression spring.  1st 5.4 Stress in helical spring of a circular wire.  2nd 5.4 Stress in helical spring of a circular wire.  3rd 5.5 Deflection of helical spring of circular wire.  4th 5.5 Deflection of helical spring of circular wire.  1st 5.6 Surge in spring  5.7 Solve numerical on design of closed coil helical compression spring.	11th	2 <sup>nd</sup>	4.4 Design of Sleeve or Muff-Coupling.
12th 4.5 Design of Clamp or Compression Coupling  2nd 4.6 Solve simple numerical on above.  3rd 4.6 Solve simple numerical on above.  4th 4.6 Solve simple numerical on above.  1st 5.1 Materials used for helical spring  2nd 5.2 Standard size spring wire. (SWG).  3rd 5.3 Terms used in compression spring.  4th 5.3 Terms used in compression spring.  1st 5.4 Stress in helical spring of a circular wire.  2nd 5.4 Stress in helical spring of a circular wire.  3rd 5.5 Deflection of helical spring of circular wire.  4th 5.5 Deflection of helical spring of circular wire.  2nd 5.6 Surge in spring  2nd 5.7 Solve numerical on design of closed coil helical compression spring.	11	3 <sup>rd</sup>	4.4 Design of Sleeve or Muff-Coupling.
12th  2nd 4.6 Solve simple numerical on above.  4th 4.6 Solve simple numerical on above.  4th 4.6 Solve simple numerical on above.  1st 5.1 Materials used for helical spring  2nd 5.2 Standard size spring wire. (SWG).  3rd 5.3 Terms used in compression spring.  4th 5.3 Terms used in compression spring.  1st 5.4 Stress in helical spring of a circular wire.  2nd 5.4 Stress in helical spring of a circular wire.  3rd 5.5 Deflection of helical spring of circular wire.  4th 5.5 Deflection of helical spring of circular wire.  1st 5.6 Surge in spring  2nd 5.7 Solve numerical on design of closed coil helical compression spring.		4 <sup>th</sup>	4.5 Design of Clamp or Compression Coupling
13 <sup>th</sup> 4.6 Solve simple numerical on above.  4 <sup>th</sup> 4.6 Solve simple numerical on above.  1 <sup>st</sup> 5.1 Materials used for helical spring  2 <sup>nd</sup> 5.2 Standard size spring wire. (SWG).  3 <sup>rd</sup> 5.3 Terms used in compression spring.  4 <sup>th</sup> 5.3 Terms used in compression spring.  1s <sup>t</sup> 5.4 Stress in helical spring of a circular wire.  2 <sup>nd</sup> 5.5 Deflection of helical spring of circular wire.  4 <sup>th</sup> 5.5 Deflection of helical spring of circular wire.  1s <sup>th</sup> 5.6 Surge in spring  2 <sup>nd</sup> 5.7 Solve numerical on design of closed coil helical compression spring.		1 <sup>st</sup>	4.5 Design of Clamp or Compression Coupling
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14 <sup>th</sup> 2 st Stress in helical spring of a circular wire.  2 st Stress in helical spring of a circular wire.  3 st Stress in helical spring of circular wire.  4 st Stress in helical spring of circular wire.  4 st Stress in helical spring of circular wire.  5 Selfection of helical spring of circular wire.  1 st Stress in helical spring of circular wire.  5 Solve numerical on design of closed coil helical compression spring.	15	3 <sup>rd</sup>	5.3 Terms used in compression spring.
2 <sup>nd</sup> 5.4 Stress in helical spring of a circular wire.  3 <sup>rd</sup> 5.5 Deflection of helical spring of circular wire.  4 <sup>th</sup> 5.5 Deflection of helical spring of circular wire.  1 <sup>st</sup> 5.6 Surge in spring  2 <sup>nd</sup> 5.7 Solve numerical on design of closed coil helical compression spring.		4 <sup>th</sup>	5.3 Terms used in compression spring.
3 <sup>rd</sup> 5.5 Deflection of helical spring of circular wire.  4 <sup>th</sup> 5.5 Deflection of helical spring of circular wire.  1 <sup>st</sup> 5.6 Surge in spring  2 <sup>nd</sup> 5.7 Solve numerical on design of closed coil helical compression spring.		1 <sup>st</sup>	5.4 Stress in helical spring of a circular wire.
3 <sup>rd</sup> 5.5 Deflection of helical spring of circular wire.  4 <sup>th</sup> 5.5 Deflection of helical spring of circular wire.  1 <sup>st</sup> 5.6 Surge in spring  2 <sup>nd</sup> 5.7 Solve numerical on design of closed coil helical compression spring.	14 <sup>th</sup>	2 <sup>nd</sup>	5.4 Stress in helical spring of a circular wire.
1st 5.6 Surge in spring  2nd 5.7 Solve numerical on design of closed coil helical compression spring.		3 <sup>rd</sup>	5.5 Deflection of helical spring of circular wire.
2 <sup>nd</sup> 5.7 Solve numerical on design of closed coil helical compression spring.  5.7 Solve numerical on design of closed coil helical compression spring.		4 <sup>th</sup>	5.5 Deflection of helical spring of circular wire.
15 <sup>th</sup> 5.7 Solve numerical on design of closed coil belical compression spring		1 <sup>st</sup>	5.6 Surge in spring
15 <sup>th</sup> 5.7 Solve numerical on design of closed coil helical compression spring.		2 <sup>nd</sup>	5.7 Solve numerical on design of closed coil helical compression spring.
	15 <sup>th</sup>	3 <sup>rd</sup>	5.7 Solve numerical on design of closed coil helical compression spring.
5.7 Solve numerical on design of closed coil helical compression spring.		4 <sup>th</sup>	5.7 Solve numerical on design of closed coil helical compression spring.