

NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY SERGARH-756060, BALASORE (ODISHA) (Approved by AICTE& affiliated to SCTE&VT, Odisha)



LESSON PLAN

SUBJECT: TH-5(AUTOMOBILE COMPONENT DESIGN)

No. of No. of Periods periods SI.No. Name of the chapter as per the Syllabus as per actually the needed Syllabus 1 12 12 BASIC CONCEPET OF DESIGN 2 6 6 DESIGN OF MACHINE ELEMENT 3 10 11 **DESIGN OF SHAFT KEY & COMPONENT** 4 6 6 DESIGN OF LEVERS 5 10 11 Design of chassis component 7 16 18 DESIGN OF ENGINE COMPONENT **Total Period:** 60 64

CHAPTER WISE DISTRIBUTION OF PERIODS

Discipline: AUTOMOBILE ENGINEERING	Semester: 5th	Name of the Teaching Faculty: Er. SAROJ KUMAR PATRA
Week	Class Day	Theory / Practical Topics
1 st	1 st	Basic concepts of design
	2 nd	Introduction to design
	3 rd	Introduction to design
	4 th	Classification of design
	1 st	Stress analysis
2 nd	2 nd	Types of external loads
-	3 rd	Types of induced stresses: tensile, compressive, shear crushing & bearing
	4 th	bending, torsion, thermal stresses, creep, proof stresses resilience principal stresses.
	1 st	Stress- strain diagram for ductile & brittle material and its importance
3 rd	2 nd	Variable stresses machine parts, fatigue & endurance limit, stress-time diagrams for variable stresses.
3	3 rd	Working stresses for static load, variable or fatigue load
	4 th	Factor of safety, selection of factor of safety
	1 st	Introduction to theories of failure-maximum principal theory. Maximum shear stress theory, Distribution energy theory
th	2 nd	Selection of material and justifications of automobile components, advanced materials for automotive components

4		
	3 rd	
		.Concept of standardization, preferred numbers & inter chargeability in design practice.
	4 th	Common types of fasteners with their applications-through bolts, tap bolts, top bolts, studies cap screws and machine screws
	1 st	Bearings – classification, location in automobiles systems & selection of bearings.
5 th	2 nd	Post design aspects ergonomic aspect aesthetic consideration (shape, colour, surface finish) for automobile.
	3 rd	Post design aspects ergonomic aspect aesthetic consideration (shape, colour, surface finish) for automobile.
	4 th	CLASS TEST
6 th	1 st	Design of machine elements.
	2 nd	Design of socket & spigot type cotter joint
	3 rd	Design of socket & spigot type cotter joint
	4 th	Design of knuckle joint
7 th	1 st	Design of turnbuckle
	2 nd	Application of above machine elements in an automobile.
	3 rd	Application of above machine elements in an automobile.
	4 th	Design of shafts, keys &couplings
	1 st	Design of shaft for torsion, rigidity, bending, combined bending & torsion

8 th 2 rd Design of shaft for torsion, rigidity, bending, combined bending & torsion 3 rd Compression of solid & hollow shafts 4 th Design of propeller shaft, whirling & critical speed 9 th 1 st Design of propeller shaft, whirling & critical speed 3 rd Design of propeller shaft, whirling & critical speed 3 rd Design of propeller shaft, whirling & critical speed 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 10 th 2 nd Design of coupling-muff, flange and bush pin type flexible 10 th 2 nd Design of levers. 11 th Design of levers. 2 nd 2 nd Design of levers. 11 th Rocker arm 11 th Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 11 th Design of chastis component.			
8" 3"d Compression of solid & hollow shafts 4 th Design of propeller shaft, whirling & critical speed 9 th 1 st Design of propeller shaft, whirling & critical speed 3 rd Design of propeller shaft, whirling & critical speed 3 rd Design of propeller shaft, whirling & critical speed 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 2 nd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 3 rd Design of levers. 3 rd Design of levers. 3 rd Pesign of levers. 3 rd Rocker arm 11 th Hand lever 2 nd Pedals for rectangular cross-section & fulcrum Pinonly 3 rd Pedals for rectangular cross-section & fulcrum Pinonly		2 nd	
Image: compression of solid & hollow shafts 4 th Design of propeller shaft, whirling & critical speed 1 st Design of propeller shaft, whirling & critical speed 2 nd Types of keys design of sunk rectangular key, woodruff key. Effect of keyways on shaft 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 10 th 1 st 2 nd Design of coupling-muff, flange and bush pin type flexible 10 th Design of coupling-muff, flange and bush pin type flexible 2 nd Design of levers. 2 nd Design of levers. 3 rd Design of levers. 3 rd Rocker arm 11 th Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly	8 th		Design of shaft for torsion, rigidity, bending, combined bending &torsion
Image: compression of solid & hollow shafts 4 th Design of propeller shaft, whirling & critical speed 1 st Design of propeller shaft, whirling & critical speed 2 nd Types of keys design of sunk rectangular key, woodruff key. Effect of keyways on shaft 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 10 th 1 st 2 nd Design of coupling-muff, flange and bush pin type flexible 10 th Design of coupling-muff, flange and bush pin type flexible 2 nd Design of levers. 2 nd Design of levers. 3 rd Design of levers. 3 rd Rocker arm 11 th Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly		3 rd	
Image: section of propeller shaft, whirling & critical speed 1 st Design of propeller shaft, whirling & critical speed 2 nd Period propeller shaft, whirling & critical speed 3 rd Period propeller shaft, whirling & critical speed 4 ^{rh} Design of coupling-muff, flange and bush pin type flexible 4 ^{rh} Design of coupling-muff, flange and bush pin type flexible 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed		3	Compression of solid & hollow shafts
Image: section of propeller shaft, whirling & critical speed 1 st Design of propeller shaft, whirling & critical speed 2 nd Period propeller shaft, whirling & critical speed 3 rd Period propeller shaft, whirling & critical speed 4 ^{rh} Design of coupling-muff, flange and bush pin type flexible 4 ^{rh} Design of coupling-muff, flange and bush pin type flexible 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 10 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed 11 ^{rh} Period propeller shaft, whirling & critical speed		th	
yeth 1st Design of propeller shaft, whirling & critical speed 2nd Types of keys design of sunk rectangular key, woodruff key. Effect of keyways on shaft 3rd Design of coupling-muff, flange and bush pin type flexible 4th Design of coupling-muff, flange and bush pin type flexible 10th 1st CLASS TEST 2nd Design of levers. Types of levers. 3rd Design of levers. 3rd Rocker arm 11th 1st Pedals for rectangular cross-section & fulcrum Pinonly 3rd Pedals for rectangular cross-section & fulcrum Pinonly		4'''	Design of propellar shaft whisling & stitical speed
gth Design of propeller shaft, whirling & critical speed 2 nd Types of keys design of sunk rectangular key, woodruff key. Effect of keyways on shaft 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 10 th 1 st 2 nd Design of coupling-muff, flange and bush pin type flexible 10 th 1 st 2 nd Design of levers. 2 nd Design of levers. 3 rd Types of levers 4 th Rocker arm 11 th Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly			Design of propener shart, whitning & critical speed
g th 2 nd Types of keys design of sunk rectangular key, woodruff key. Effect of keyways on shaft 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 10 th 1 st 2 nd Design of coupling-muff, flange and bush pin type flexible 10 th 1 st 2 nd CLASS TEST 2 nd Design of levers. 3 rd Types of levers 4 th Rocker arm 11 th Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly		1 st	
9 th Types of keys design of sunk rectangular key, woodruff key. Effect of keyways on shaft 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 10 th 1 st 2 nd Design of levers. 3 rd Design of levers. 3 rd Types of levers. 4 th Rocker arm 11 th 1 st 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly			Design of propeller shaft, whirling & critical speed
9 th Types of keys design of sunk rectangular key, woodruff key. Effect of keyways on shaft 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 10 th 1 st 2 nd Design of levers. 3 rd Design of levers. 3 rd Types of levers. 4 th Rocker arm 11 th 1 st 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly		and	
g ^m 3 rd Design of coupling-muff, flange and bush pin type flexible 4 th Design of coupling-muff, flange and bush pin type flexible 10 th 1 st CLASS TEST 2 nd Design of levers. 2 nd 3 rd Types of levers. 4 th Rocker arm 11 th 1 st 4 th Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly	th	Z	Types of keys design of sunk rectangular key, woodruff key. Effect of keyways on shaft
Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible Image: segme of coupling-muff, flange and bush pin type flexible <th>9¹¹</th> <td></td> <td></td>	9 ¹¹		
4thDesign of coupling-muff, flange and bush pin type flexible10th1stCLASS TEST2ndDesign of levers.3rdTypes of levers4thRocker arm11th1stHand lever2ndPedals for rectangular cross-section& fulcrum Pinonly3rdPedals for rectangular cross-section& fulcrum Pinonly4thPedals for rectangular cross-section& fulcrum Pinonly		3 rd	
int Design of coupling-muff, flange and bush pin type flexible int int			Design of coupling-muff, flange and bush pin type flexible
int Design of coupling-muff, flange and bush pin type flexible int int		4 th	
10 th 2 nd Design of levers. 3 rd Types of levers. 4 th Rocker arm 11 th 1 st 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly		•	Design of coupling-muff, flange and bush pin type flexible
10 th 2 nd Design of levers. 3 rd Types of levers. 4 th Rocker arm 11 th 1 st 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly		ct	
10 th 2 nd Design of levers. 3 rd Types of levers 4 th Rocker arm 11 th 1 st 4 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Pedals for rectangular cross-section& fulcrum Pinonly 4 th Pedals for rectangular cross-section& fulcrum Pinonly		1"	CLASS TEST
10 th Design of levers. 3 rd Types of levers 4 th Rocker arm 11 th 1 st 2 nd Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Pedals for rectangular cross-section& fulcrum Pinonly			
10 3 rd Types of levers 4 th Rocker arm 11 th 1 st Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Image: Section Se		2 nd	
3 rd Types of levers 4 th Rocker arm 11 th 1 st 2 nd Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Image: Section	10 th		Design of levers.
Image: style Types of levers Image: style Image: style Image: style Rocker arm Image: style Image: style Image: style		ərd	
4 th Rocker arm 1 st Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Image: Comparison of the pedals for rectangular cross-section fulcrum Pinonly		3	Types of levers
Image: matrix for the second secon			
11 th 1 st Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Image: Section Sec		4 th	
11 th Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Image: Comparison of the pedals for rectangular cross-section fulcrum Pinonly			KOCKER arm
11 th Hand lever 2 nd Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Image: Comparison of the pedals for rectangular cross-section fulcrum Pinonly	11 th	1 st	
11 th Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Pedals for rectangular cross-section& fulcrum Pinonly			Hand lever
11 th Pedals for rectangular cross-section& fulcrum Pinonly 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th Pedals for rectangular cross-section& fulcrum Pinonly		and	
11 ^m 3 rd Pedals for rectangular cross-section& fulcrum Pinonly 4 th		2''	Pedals for rectangular cross-section& fulcrum Pinonly
Pedals for rectangular cross-section& fulcrum Pinonly 4 th			
4 th		3 rd	
			Pedals for rectangular cross-section& fulcrum Pinonly
		⊿ th	
		7	Design of chassis component

	1	
	1 st	
		Design of cloth- single plate & multi plate
	1.	
	2 nd	
12 th		Teeth calculation of gears for sliding mesh/constant mesh gear box of given data.
	1.	
	3 rd	
		Design of semi elliptical leaf spring, helical spring-torsion & compression
	th	
	4 th	
		Design of semi elliptical leaf spring, helical spring-torsion & compression
	. st	
	1 st	
		Design of engine components
	and	
	2 nd	
13 th		Data of engine specifications & calculation of cylinder dimensions for given
	3 rd	
	3	Design of pulinder head this/mass ? helts
		Design of cylinder head thickness & bolts
	4 th	
	4	Design of valve seat & valve lift
	1 st	
	1	Design of piston crown by bending strength & thermal considerations
th	2 nd	
	-	CLASS TEST
14 th		
	3 rd	
		Design of piston rings & skirt length
	4 th	
		Design of piston rings & skirt length
	1 st	
		bending & shear considerations.
	.	
	2 nd	
15 th		Design of connecting rod cross-section(I-section
	rd	
	3 rd	
		Design of big end, cap &bolt.

4 th	
	Design of over hung crankshaft.