



SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Narsapur, West Godavari District, A.P. 534280

DEPARTMENT OF MECHANICAL ENGINEERING

TEACHING PLAN

Course Code	Course Title	Sem ester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
20ME5T01	Design of Machine Elements	V	Mechanical Engineering	6	2024-2025	05-06-2024

COURSE OUTCOMES

1	Describe the Design Procedure and evaluate the size of simple mechanical components Subjected to static and dynamic loads considering theories of failure. [K4]
2	Design and Select a suitable Bearing for both static and dynamic loads. [K4]
3	Design of spur, helical, bevel gears based on contact and beam strength. [K4]
4	Design of shafts subjected to bending and axial loading and curved beams. [K4]
5	Design suitable power transmission system like belt drives, chain drives. [K4]

UNIT	Outcomes/ Bloom's Level	Topic No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
I	Describe the Design Procedure and evaluate the size of simple mechanical components Subjected to static and dynamic loads considering theories of failure. [K4]	1.1	Introduction a) Basic Procedure of Machine Design b) classification of machine design		1	Chalk & Talk, PPT, Videos Tutorials
		1.2	a) Classification of engineering materials, b) Selection of materials for engineering		1	
		1.3	Mechanical properties of materials. a) Manufacturing consideration in design. b) Manufacturing Processes like Casting, c) Forging. Mechanical working of Metals		1	
		1.4	a) Tolerances and fits–Types of Fits, b) Basis of Limit System, Indian Standard System of Limits and Fits. BIS codes of steels		1	
		1.5	Concept of Machine Design: a) Principal Stresses- Determination of Principal Stresses for a Member Subjected to Bi-Axial Stress b) Stress Strain Relation		1	
		1.6	Application of Principal Stresses in Designing Machine Members		1	
		1.7	Theories of failures- a) Maximum Principal or Normal Stress Theory (Rankine's Theory) b) Maximum Shear Stress Theory		1	

	(Guest's or Tresca's Theory)		
1.8	a) Maximum Principal Strain Theory (Saint Venant's Theory)b) Maximum Strain Energy Theory (Haigh's Theory)		1
1.9	Maximum Distortion Energy Theory (Hencky and Von Mises Theory).		1
1.10	Design of Simple Machine Parts: Impact and Shock Loading		1
1.11	Stress concentration – Stress concentration Factors		1
1.12	Fatigue Failure, Endurance Limit, Notch Sensitivity		1
1.13	Fatigue design under combined stresses: Soderberg Diagrams		1
1.14	Modified Goodman Diagrams		1
	Basics of GD&T		1
		TOTAL	15

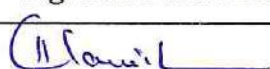
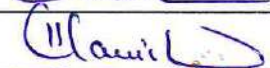


Unit -II BEARINGS

II	Design and Select a suitable Bearing for both static and dynamic loads. [K4]	2.1	SLIDING CONTACT BEARINGS Classification of Bearings, Hydrodynamic Lubricated Bearings,	T1,T2,T5	110	Chalk & Talk, PPT, Videos Tutorials, Model Based Learning	
		2.2	Properties of Sliding Contact Bearings, Materials used for Sliding Contact Bearings, Lubricants- Properties of Lubricants, Terms used in Hydrodynamic Journal Bearings		1		
		2.3	Bearing Characteristic Number and Bearing Modulus for Journal Bearings, Coefficient of Friction for Journal Bearings, Critical Pressure of the Journal Bearing, Sommerfeld Number		1		
		2.4	Heat Generated in a Journal Bearing, Design Procedure for Journal Bearings.		3		
		2.5	ROLLING CONTACT BEARINGS Introduction, Advantages and Disadvantages of Rolling Contact Bearings over Sliding Contact Bearings, Types of Rolling Contact and Radial Ball Bearings		1		
		2.6	Life of a Bearing, Basic Dynamic Load Rating of Rolling Contact Bearings, Dynamic Equivalent Load for Rolling Contact Bearings		1		
		2.7	Dynamic Load Rating for Rolling Contact Bearings under Variable Loads, Reliability of a Bearing,		1		
		2.8	Selection of Radial Ball Bearings.		1		
					TOTAL		10

Unit –III GEARS						
III	Design of spur, helical, bevel gears based on contact and beam strength. [K4]	3.1	Classification of gears, Terminology of spur gears	T1,T2,T5	1	Chalk & Talk, PPT, Tutorials, Model based Learning
		3.2	Force analysis, Gear tooth failures, Beam strength of Gear teeth		1	
		3.3	Dynamic tooth load, wear tooth load, Lewis Equation.		1	
		3.4	Terminology of helical gears,		1	
		3.5	Force analysis, Beam strength of helical gears		1	
		3.6	Wear strength of helical gears, Lewis Equation		2	
		3.7	Classification of Helical gears, Terminology of Helical gears		1	
		3.8	Force analysis, Gear tooth failures, Beam strength of Gear teeth		1	
		3.9	Dynamic tooth load, wear tooth load, Lewis Equation.		2	
		3.10	Thermal design considerations of gears,		1	
		3.11	Design of Bevel gears.		1	
TOTAL					13	
UNIT –IV SHAFTS & CURVED BEAMS						
IV	Design of shafts subjected to bending and axial loading and curved beams. [K4]	4.1	Shafts: Introduction, Material Used for Shafts, Manufacturing of Shafts.	T1,T2,T5	1	Chalk & Talk, PPT, Animations
		4.2	Shafts subjected to Torsion & Bending		2	
		4.3	Shafts subjected to combined torsion and Bending Loads		2	
		4.4	Shafts subjected to fluctuating loads		2	
		4.5	Design of shafts based on rigidity		2	
		4.6	CURVED BEAMS: Introduction, stresses in curved beams.		1	
		4.7	Design of crane hooks and C – clamps for rectangular section		1	
		4.8	Design of crane hooks and C – clamps for circular section,		1	
		4.9	Design of crane hooks and C – clamps for trapezoidal section		1	
		4.10	Design of crane hooks and C – clamps for T –section and I- section.		1	
TOTAL					14	
Unit –V BELT AND CHAIN DRIVES						
V	Design suitable power transmission system like belt drives, chain drives. [K4]	5.1	Flat belt drives: Selection of a Belt Drive, Types of Belt Drives, Types of Belts, Material used for Belts	T1,T2,Tx5	1	Chalk & Talk, PPT, Tutorials, animations
		5.2	Power transmitted by a Belt. Ratio of Driving Tensions for Flat Belt Drive, Centrifugal Tension.		2	
		5.3	Condition for Transmission of Maximum Power.		1	

	5.4	V-belt drives: Introduction, Types of V - Belts Advantages and Disadvantages of V-belt Drive over Flat Belt Drive. Ratio of Driving Tensions for V-belt.	2
	5.5	Design of Flat belt Drive	2
	5.6	Design of V-belt Drive	2
	5.7	Design of Chain drives and Sprockets	2
	CBS	Design of belt drive for Continuously Variable Transmission (CVT)	1
		TOTAL	13
	CUMULATIVE PROPOSED PERIODS		Total
			65

Text Books:	
1	Bhandari V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill Book Co, 2017.
2	R.S. Khurmi, J.K.Guptha, "Machine Design", 14th Edition, S Chand publications, 2005.
3	P.C. Sharma., D.K. Agarwal, "Machine Design", 8th Edition, S.K.Kataria & Sons, 1997.
4	S MD Jalaludin, "Machine Design",3rd Edition, Anuradha Publishers, 2016.
5	Design Data: Data Book of Engineers- PSG College – Kalaikathir Achchagam, Coimbatore, 2012.
Reference Books:	
1	Schaum Series, "Machine design", 1st Edition, McGraw Hill Professional publications, 2017.
2	Pandya & shah, "Machine design", 20th Edition, Charotar Publishing House Pvt. Limited, 2015.
Web Details	
1	https://nptel.ac.in/courses/112/105/112105124/
2	https://nptel.ac.in/courses/112/105/112105125/

		Name	Signature with Date
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iv.	Programme Coordinator	Dr. A. GOPICHAND	


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