GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3144101
Semester – IV
Subject Name: Design of Machine Elements and Transmission System

Type of course: Engineering

Prerequisite: Zeal to learn the subject

Rationale: To introduce students to the design and theory of common machine elements and to give students experience in solving design problems involving machine elements.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	1	0	4	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	INTRODUCTION:- Fundamentals of Machine Design-Engineering Design, Phases of Design, Design Consideration - Standards and Codes - Selection of Materials –Design against Static and Dynamic Load –Modes of Failure, Factor of Safety, Principal Stresses, Theories of Failure-Stress Concentration, Stress Concentration Factors, Variable Stress, Fatigue Failure, Endurance Limit, Design for Finite and Infinite Life, Soderberg and Goodman Criteria.	09
2	DETACHABLE AND PERMANENT JOINTS:- Design of Bolts under Static Load, Design of Bolt with Tightening/Initial Stress, Design of Bolts subjected to Fatigue – Keys -Types, Selection of Square and Flat Keys-Design of Riveted Joints and Welded Joints	09
3	SHAFTS AND COUPLING:- Design of Shaft –For Static and Varying Loads, For Strength and Rigidity-Design of Coupling-Types, Flange, Muff and Flexible Rubber Bushed Coupling	09
4	GEARS AND BELT DRIVES:- Design of Spur and Helical Gear drives-Design of Belt drives-Flat and V Belts	09
5	SPRINGS AND BEARINGS:- Design of Helical Spring-Types, Materials, Static and Variable Loads-Design of Leaf Spring-Design of Journal Bearing -Antifriction Bearing-Types, Life of Bearing, Reliability Consideration, Selection of Ball and Roller Bearings.	09

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Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	**25**	**25**	**15**	**5**	**5**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Joseph Edward Shigley, Charles R. Mischke " Mechanical Engineering Design", McGraw Hill, International Edition, 1992.
2. Sharma. C.S. and Kamlesh Purohit, "Design of Machine Elements", Prentice Hall of India Private Limited, 2003.
3. Bhandari. V.B., "Design of Machine Elements", Tata McGraw-Hill Publishing Company Limited, 2003.
4. Robert L.Norton, "Machin Design – An Integrated Approach", Prentice Hall International Edition, 2000.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	To formulate and analyze stresses and strains in machine elements subjected to various loads.	25
CO-2	To analyze and design structural joints such as Riveted joints, welded joints, Bolts	25
CO-3	To analyze and design the components for power transmission like shaft and couplings.	25
CO-4	To analyze and design different types of gears and belts for engineering applications	25

List of Tutorials:

Tutorials can be planned as per the syllabus mentioned above.
Design calculations of various elements may be incorporated as per need.
Certain elemental drawings with design requirements may also become part of tutorials.

Major Equipment:

NA

List of Open Source Software/learning website:

https://nptel.ac.in/course.php
http://nptel.iitm.ac.in/courses.php