GUJARAT TECHNOLOGICAL NIVERSITY

SUBJECT: DESIGN OF MACHINE ELEMENTS AND TRANSMISSION SYSTEMS

SUBJECT CODE: 2154104

B.E. 5th Semester

Type of course: Professional Core Course

Prerequisite: NA

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
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	1	0	4	70	20	10	30	0	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
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.	9	20%
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	9	20%
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	9	20%
4	GEARS AND BELT DRIVES:- Design of Spur and Helical Gear drives-Design of Belt drives-Flat and V Belts	9	20%

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	9	20%

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:

Upon completion of this course, the students can able

- To formulate and analyze stresses and strains in machine elements subjected to various loads.
- To analyze and design structural joints such as Riveted joints, welded joints, Bolts
- To analyze and design the components for power transmission like shaft and couplings.
- To analyze and design different types of gears and belts for engineering applications.
- To analyze and design mechanical springs and bearings.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.