GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. SEMESTER: V
MECHANICAL ENGINEERING

Subject Name: **Machine Design - I**

Sr. No.	Course content
1	**Design Considerations**: Manufacturing and assembly considerations, Design of components for casting, Welding, Forging, hot and cold working, machining, Welding etc. Thermal considerations, Wear considerations in design, Contact Stresses, Standardization and preferred numbers. **Fatigue Loading:** Design for fluctuating stresses, Endurance limit, Estimation of Endurance strength, Goodman's line, Soderberg's line, Modified Goodman's line. Design for creep.
2	**Design of Springs:** Classification, Spring materials and its selection, Wahls' factor and its use in design of spring, Cylindrical helical spring with axial loading, Buckling of compression spring, Design of compression spring, design of leaf spring, Design of disc springs, Concentric spring, Design of spring for static and dynamic loading.
3	**Design of Pressure Vessels:** Classification of pressure vessels, Design of thick cylindrical and spherical shells subjected to internal pressure and external pressure, Compound cylinders subjected to internal and external pressure, Gaskets, gaskated joint, Design of interference joints – press / shrink fitted assemblies, Design of cylinder covers, Cover plates, pipes and pipe flanges for pipe joints.
4	**Power Transmissions Elements** : Transmission of power by Belt and Rope drives, Transmission efficiencies, Design of Belts Flat and V types, Design of Ropes, pulleys for belt and rope drives, Materials, Design of Chain drives and wire rope.
5	**Design of sliding and Journal bearing:** Method of lubrication, Hydrodynamic, Hydrostatic, boundary, etc., Minimum film thickness and thermal equilibrium, Selection of anti-friction bearings for different loads and load cycles, Design of thrust bearing, Rolling contact bearing, Ball bearing, Rolling contact bearing under variable loading, Mounting of the bearings, Method of lubrication, Selection of oil seals.
6	**Design of clutches and brakes:** Function , Classification, Material selection, Design of positive clutches, Friction clutches -cone, single, Multiple and centrifugal clutches, Design of band brake, External and internal shoe brakes, Internal expanding shoe brakes, Design of disc brakes.

Term Work:

Based on the above syllabus each student has to prepare assembly /details drawing and has to submit eight design reports and set of design problems.

Practical / Oral:

The candidate shall be examined on the basis of term-work.

Reference Books:

1. Design of Machine Elements by V.B. Bhandari, Tata McGraw Hill Publishing Co.
2. Machine Design by U.C. Jindal Pearson Education.
3. Design of Machine Elements by M.F.Spotts, T.E.Shoup, L.E.Hornberger, S.R.Jayaram and C.V. Venkatesh Pearson Education.
4. Mechanical Engineering Design by Josheph shighly, Tata McGraw Hill Book Co.
5. Design of Machine Elements by C.S.Sharma & Kamlesh Purohit, Prentice Hall of India Pvt. Ltd.
6. Mechanical System Design by Farazdak haideri Nirali Prakashan.