

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI Automobile Engineering

Subject Name: **Automobile Component Design**

Subject Code: **160201**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No.	Course Contents	Total Hrs
1.	Design Considerations: Manufacturing and assembly considerations. Design of components for casting, welding, forging, hot & cold working, machining etc. Design for creep (thermal considerations). Wear considerations in design.	6
2.	Design of Bearings: Rolling Contact Bearing: Types of rolling contact bearings, static and dynamic load capacities, Equivalent bearing load, load life relationship, Bearing life, Load factor, Selection of bearings from manufacturers catalogue. Lubrication and mountings/dismounting of bearings, Oil seals and packing.	8
3.	Design of Gears: Design consideration of gears, material selection and Gear lubrication. Spur Gears: Force analysis, Number of teeth, Face width & Beam strength of gear tooth. Dynamic tooth load. Effective load on gear tooth. Estimation of module based on beam strength. Wear strength of gear tooth. Estimation of module based on wears strength. Spur gear design for maximum power transmission. Helical Gears: Virtual number of teeth, Tooth proportions, Force analysis, Beam strength & Wear strength of helical gears, Effective load on gear tooth, Design of helical gears.	20

	<p>Bevel Gears:</p> <p>Terminology of bevel gears, Force analysis, Beam strength of bevel gears, Wear strength of bevel gear, Effective load on gear tooth, Design of bevel gear.</p> <p>Worm Gears:</p> <p>Force analysis, Friction in worm gear, Vector method, Strength rating of worm gears, Wear rating of worm gear.</p>	
4.	<p>Design of Gearbox:</p> <p>Design considerations of gearbox, selection of proper gear ratios for an automobile gearbox. Design of splined shafts for gear box used in automobiles.</p>	4
5.	<p>Design of I.C. Engine Components :</p> <ul style="list-style-type: none"> - Engine power requirements, Selection of engine type, Stroke & Bore, compression ratio, clearance volume and swept volume, mean piston speeds. - Design of Piston & Piston pin: Materials used, design of piston crown, pin dimensions. - Design of Crankshaft & Connecting Rod - Forces, material, types, design criteria, dimensions etc. - Design of main journal bearing pin and connecting bearing pin of Crank shaft. - Main journal bearing and connecting bearing (small end & big end): Bearing materials, design criteria, types and dimensions. - Cylinder block dimension, Types of liner – Dry & Wet type liners. - Valve mechanism Design: Valve, rocker arm, Valve spring design, Push rod, cam shaft and cam follower etc. - Design of cylinder head: Stresses, materials, Combustion chamber design. - Flywheel types & construction, criteria of design for solid and rim type. - Concepts related to Balancing of engine - single and multi-cylinder. - Torsional vibrations and damping, inertia and gas pressure forces. - Selection of Engine layouts. - Design Criteria of intake manifold and exhaust manifold. 	26

Text Books:

1. Joseph E. Shigley & Larry D. Mitchell, “Mechanical Engineering Design”, Fourth Edition, McGraw-Hill International Book Company
2. Machine Design by R.S.Khurmi & J.K.Gupta, S.Chand & Co.

Reference Books:

1. Design of machine Elements by Bhandari , Tata McGraw-Hill Publishing Company Ltd
2. Machine Design by Sharma-Agarwal, S.K.Kataria & Sons
3. Machine Design by Sadhusingh, Khanna Publishers,
4. Transmission System Design by R.B.Patil, TechMax Pub., Pune.
5. Machine Design Vol-II & III by F.Haideri, Nirali Prakashan, Pune.
6. Bearing Manufacturers Catalogues
7. PSG Design Data Book.