



C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology and Engineering
DEPARTMENT OF: - Mechanical Engineering
SEMESTER: -VII
CODE: - 4TE07MDE1
NAME: – Machine Design-II

Teaching and Evaluation Scheme:-

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme								
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total	
							Sessional Exam		University Exam		Internal		University		
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr		
4TE07MDE1	Machine Design-II	3	0	2	5	4	30	1.5	70	3	---	20	30	150	

Objectives:

- To develop competency for system visualization and design.
- To enable student select materials and to design internal engine components.
- To introduce student to optimum design and use optimization methods to design mechanical components.
- To enable student to design gears and machine tool gearbox.
- To enable student to design material handling systems.
- To develop analytical abilities for providing solutions to engineering design problems.
- Use design data book to standardize component dimensions.
- To learn to use standard practices and standard data.
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Prerequisite:

- Basic and analytical knowledge of Strength of materials, Machine Design and Industrial Drafting and Manufacturing Process, Machine design-I ,Engineering Mathematics, TOM, IC Engine

Course Outline:

Sr. No.	Course Content	Hours
1	<p>Design of Gears: Design consideration of gears, material selection, types of gear failures</p> <p>Spur Gears and Parallel Axis Helical Gears: Speed ratios and number of teeth, Force analysis ,Tooth stresses , Dynamic effects , Fatigue strength, Factor of safety, Design of straight tooth spur & helical gears based on strength and wear considerations – Pressure angle in the normal and transverse plane, Equivalent number of teeth ,forces for helical gears.</p> <p>Bevel and Worm Gears: Straight bevel gear: Tooth terminology, tooth forces and stresses, equivalent number of teeth, Estimating the dimensions of pair of straight bevel gears, Worm Gear: Merits and demerits, terminology, Thermal capacity, forces and stresses, efficiency, estimating the size of the worm gear pair</p>	12
2	<p>Design of Gear Boxes: Geometric progression ,Standard step ratio ,Ray diagram, kinematics layout, Design of sliding mesh gear box ,Constant mesh gear box, Design of multi speed gear box..</p>	06
3	<p>Design of I.C. Engine components</p> <p>Introduction to selection of material for I. C. engine components, Design of cylinder and cylinder head, construction of cylinder liners, design of piston and piston-pins, piston rings, design of connecting rod, design of crank-shaft and crank-pin, Design of valve gear system.</p>	10
4	<p>Design Principles of Material Handling Systems</p> <p>System concept, basic principles, objectives of material handling system, unit load and containerization. Belt conveyors, Flat belt and troughed belt conveyors, capacity conveyor, rubber covered and fabric ply belts, belt tensions, conveyor pulleys, belt idlers, tension take-up systems, power requirement of horizontal belt conveyors for frictional resistance of idler and pulleys, design of cranes and Design of hook</p>	10
5	<p>Optimum Design</p> <p>Objectives of optimum design, adequate and optimum design, Johnson’s Method of optimum design, primary design equation, subsidiary design equations and limit equations, optimum design with normal and redundant specifications of simple machine elements like: tension bar, transmission shaft, helical spring and pressure vessel</p>	07

Learning Outcomes:

- The students will learn to make proper assumptions, perform correct analysis while designing specific mechanical components.
- The student will understand the difference between component level design and system level design.
- Ability to design various mechanical systems like gears, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
- Ability to learn optimum design principles and apply it to mechanical components.
- Ability to to handle system level projects from concept to product.
- Able to use design data books and different codes of design.

Books Recommended:

1. Machine Design by **Khurmi & Gupta**. S. Chand publication.
2. Machine Design by **Pandya and shah** , Charotar Publishing House.

3. Design of Machine Elements by **V. B. Bhandari**, Tata McGraw Hill Publishing Co.1994
4. Design of Machine Elements by **C. S. Sharma & Kamlesh Purohit**, Prentice Hall of India Pvt. Ltd.
5. Machine Design by **P. C. Sharma and D. K. Aggarwal**, S.K. Kataria & Sons 2009
6. Material Handling Equipment by **Rudenko M.I.R.** publishers, Moscow
7. Mechanical System Design, by **Farzad haideri**, Nirali Prakashan.
8. Engineering Optimization: Theory and Practice by **Singiresu S. Rao**, John Wiley & Sons.
9. Belt Conveyors by **Mulani, I. G.**

Reference Books:-

1. P.S.G Design data book (PSG college of engg. & Tech.).DPV Printers,Coimbatore,2000
2. Machine Design by **R.C.Patel and A.D.Pandya** Vol-1 and Vol-2,C.Jamnadas & Co.1992
3. Machine Design – An Integrated Approach by **Robert L Norton**, Pearson Education.2005
4. Machine elements : life and design, by **Boris M. Klebanov, David M. Barlam**, Frederic E. Nystrom.
5. Mechanical Engineering Design, by **Joseph Edward Shigley and Charles R. Mischke**, McGraw Hill International Edition,
6. Machine Design, by **R. K. Jain** , Khanna publications.