

(ME 502) ADVANCED MECHANICAL ENGINEERING DESIGN

Objective of the Course :

To familiarize the students with the design of various transmission elements like shafts, belts, chains and different types of gears and bearings and also the use of design data book and standards.

UNIT - I

Introduction : Introduction to design, the engineering model, computer aided design and Engineering, materials, load analysis, stresses, strains, stress element representation for different types of loads, methodology for solving machine component problems.

UNIT - II

Failure Theories : Static failure theories-failure of ductile materials, failure of brittle materials, fracture mechanics, fatigue-failure theories, surface failures.

UNIT - III

Design of power transmission elements : Design of flat belts, v-belts, roller chains, Design of shafts for combined bending and twisting.

UNIT - IV

Design of Gears : Spur, Helical, and Bevel gears, Gear materials, forces, stresses, lubrication, design procedure considering Lewis beam strength, Buckingham dynamic load and wear load. Algorithms for the design procedure of different types of gears.

UNIT - V

Design of Bearings : Lubricants, hydrodynamic lubrication theory, design of Journal bearings. Rolling element bearings, selection of rolling element bearings, bearing mountings. Algorithms for the design procedure of bearings.

TEXT BOOKS:

1. Robert L. Norton, "Machine Design – An Integrated approach", 2nd Edition, Prentice-Hall, 1998.
2. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Component Design", 2nd Edition, John – Wiley & Sons, 2008.

REFERENCE BOOKS:

1. Manjula B. Waldron and Kenneth J. Waldron, "Mechanical Design: Theory Methodology", 1st Edition, Springer Verlag, New York, 1996.
2. V.B. Bhandari, "Design of Machine Elements", 3rd Edition, Tata Mc Graw Hill, 2010.
3. George Dieter, "Engineering Design – A materials and processing approach", 3rd Edition, Mc. Graw-Hill, 1999.