

III B.Tech I Semester

15AME26 - ELEMENTS OF MACHINE DESIGN

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Course Objective:

- The primary objective of this course is to demonstrate how engineering design is used for many principles learned in previous engineering science courses and to show how these principles are practically applied.
- This subject will help to the students to learn to analyze and design basic machine elements in mechanical systems.
- By this subject student will become familiar on design principles, materials selection, stresses developed in machine elements under different loads.
- The students will also get knowledge on design of the permanent and temporary joints.

UNIT I

Introduction: General considerations of design, design process. Selection of Engineering Materials - properties -Manufacturing considerations in the design. BIS codes of materials, preferred numbers and interchangeability.

Stresses In Machine Members: Simple stresses - Combined stresses - Torsional and bending Stresses - impact stresses - stress -strain relation - Various theories of failure - factor of safety.

Learning Outcome & Suggested Student Activities:

After completion of this unit students are capable to apply design procedures using theories of failure for different elements.

UNIT II

Design For Fluctuating Loads: Stress concentration -notch sensitivity - Design for fluctuating stresses - Endurance limit - Estimation of Endurance strength - Goodman's line - Soderberg's line. Design of components for finite and infinite life.

Learning Outcome & Suggested Student Activities:

After completion of this chapter students are able to design simple components under cyclic loading using Goodman's and Soderberg's criterions.

UNIT III :

Bolted Joints: Forms of screw threads, stresses in screw fasteners, Design of bolts with pre stresses, Design of bolted joints under eccentric loading, Bolts of uniform strength

Welded Joints: Weld Symbols, Strength of fillet welded joints, stresses in welded joints, Eccentric loading in welded joints.

Learning Outcome & Suggested Student Activities:

After completion of this unit students are able to design bolted joints with different configuration, eccentric loading design of bolted joints. Further students are able to design welded joints with direct loading and eccentric loading.

UNIT IV

Design of Cotters and Knuckle Joints: Design of Cotter joints: spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints

Design of Shafts: Design of solid and hollow shafts for strength and rigidity - Design of shafts for combined bending and axial loads - Standard shaft sizes.

Learning Outcome & Suggested Student Activities:

After completion of this unit students are able to design cotter joint, knuckle joint and shafts

UNIT V

Design Of Mechanical Springs: Stress and deflections of helical Springs-Springs for fatigue loading - Natural frequency of helical springs-Energy storage capacity- Helical Torsion springs- Design of leaf springs.

Learning Outcome & Suggested Student Activities:

After completion of this unit, students are able to design helical springs for two wheel vehicle and laminated springs for trucks.

TEXT BOOKS:

1. Machine Design, R.S. Kurmi and J.K. Gupta ,S.Chand Publishers, New Delhi.
2. Design of Machine Elements, V.B.Bhandari , TMH Publishers.
3. Machine Design, R.K.Jain, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. Machine Design, Sadhu Singh, Khanna Publishers, New Delhi.
2. Machine Design, Schaum series, TMH Publishers, New Delhi.
3. Mechanical Engineering Design, JosephE.Shigely, TMH Publishers, New Delhi.
4. Design of Machine Elements, M.F.Spotts, PHI Publishers, New Delhi.
5. Machine Design, Pandya and Shah, Charotar Publishers, Anand.
6. Machine Design, R.L. Norton, Tata McGrawHill Publishers.
7. Machine Design by Groover - CBS Publications.

NOTE: Design data books are not permitted in the examinations.

SUGGESTED LINKS:

<http://machinedesign.com/>

<http://www.youtube.com/watch?v=qVj4VvMmQjc&list=PL3D4EECEFAA99D9BE&index=6>

<http://www.youtube.com/watch?v=SLqkITQfN1I&list=PL3D4EECEFAA99D9BE&index=8>

<http://www.youtube.com/watch?v=Z38Aq9ykUCM&list=PL3D4EECEFAA99D9BE&index=16>

<http://www.youtube.com/watch?v=4nlQwVqruRo&list=PL3D4EECEFAA99D9BE&index=20>

<http://www.youtube.com/watch?v=PEKfS2Q1WqM&list=PL3D4EECEFAA99D9BE&index=19>

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