



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA 533003, Andhra Pradesh, India
DEPARTMENT OF MECHANICAL ENGINEERING

III Year-I Semester	L	T	P	C
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DESIGN OF MACHINE MEMBERS-I				

Course objectives:

- 1) To understand the materials and their properties along with manufacturing considerations.
- 2) To gain knowledge about the strength of machine elements.
- 3) To understand and apply the knowledge in designing the riveted and welded joints, keys, cotters and knuckle joints.
- 4) To understand and apply the knowledge in designing the shafts and shaft couplings.
- 5) To understand and apply the knowledge in designing the mechanical springs.

UNIT– I:

INTRODUCTION: General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design, tolerances and fits –BIS codes of steels- ASHBY Charts.

STRESSES IN MACHINE MEMBERS: Simple stresses – combined stresses – torsional and bending stresses – impact stresses – stress strain relation – various theories of failure – factor of safety – design for strength and rigidity – preferred numbers-concept of stiffness in tension, bending, torsion and combined situations static strength design based on fracture toughness.

UNIT– II:

STRENGTH OF MACHINE ELEMENTS: Stress concentration – theoretical stress concentration factor – fatigue stress concentration factor notch sensitivity – design for fluctuating stresses – endurance limit – estimation of endurance strength – Goodman’s line – Soderberg’s line –

UNIT– III:

RIVETED AND WELDED JOINTS – design of joints with initial stresses – eccentric loading.

Bolted joints – design of bolts with pre-stresses – design of joints under eccentric loading – locking devices both of uniform strength, different seals.

KEYS, COTTERS AND KNUCKLE JOINTS: Design of keys-stresses in keys-cotter joints-spigot and socket-sleeve and cotter-jib and cotter joints- knuckle joints.

UNIT– IV:

SHAFTS: Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code- Use of internal and external circlips- gaskets and seals (stationary & rotary).

SHAFT COUPLING: Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).



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UNIT– V: DEPARTMENT OF MECHANICAL ENGINEERING

MECHANICAL SPRINGS:

Stresses and deflections of helical springs – extension -compression springs – springs for fatigue loading, energy storage capacity – helical torsion springs – co-axial springs, leaf springs.

Note: Design data book is NOT Permitted in the examination

TEXT BOOKS:

1. Machine design / NC Pandya & CS Shah/Charotar Publishing House Pvt. Limited
2. Machine Design/V.B.Bhandari/ McGraw-Hill Education

REFERENCES:

1. Design of Machine Elements / V.M. Faires/McMillan
2. Machine design / Schaum Series/McGraw-Hill Professional
3. Machine Design/ Shigley, J.E/McGraw Hill.
4. Design data handbook/ K.Mahadevan & K. Balaveera Reddy/ CBS publishers.
5. Machine Design –Norton/ Pearson publishers

Course outcomes: At the end of the course, student will be able to

CO1: Judge about materials and their properties along with manufacturing considerations.

CO2: Gain knowledge about the strength of machine elements.

CO3: Apply the knowledge in designing the riveted and welded joints, keys, cotters and knuckle joints.

CO4: Apply the knowledge in designing the shafts and shaft couplings.

CO5: Apply the knowledge in designing the mechanical springs.