

# DESIGN OF MACHINE ELEMENTS-I

Written by Administrator  
Sunday, 01 November 2009 10:43 -

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**Subject Code**

:

**06ME52**

**IA Marks**

:

25

**No. of Lecture Hrs./ Week**

:

04

**Exam Hours**

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:

03

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

## PART - A

### Unit - 1

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**Introduction:** Definitions: Normal, Shear, Biaxial and Tri Axial Stresses, Stress Tensor, Principal Stresses. Engineering Materials and their Mechanical properties, Stress-Strain diagrams, Stress Analysis, Design considerations: Codes and Standards.

**5 Hours**

**Unit - 2**

**Design for Static & Impact Strength:** Static Strength: Static loads and Factor of Safety, Theories of failure. Maximum Normal Stress Theory, Maximum Shear Stress Theory, Distortion Energy Theory; Failure of Brittle Materials, Failure of Ductile Materials. Stress Concentration, Determination of Stress Concentration Factor. **Impact**

**Strength:**

Introduction, Impact Stresses due to Axial, Bending and Torsional loads, Effect of Inertia.

**7 Hours**

**Unit - 3**

**Design for Fatigue Strength:** Introduction- S-N Diagram, Low Cycle Fatigue, High Cycle Fatigue, Endurance Limit, Endurance Limit. Modifying Factors: Size effect, Surface effect, Stress Concentration effects. Fluctuating Stresses, Goodman and Soderberg relationship; Stresses due to Combined Loading, Cumulative Fatigue Damage.

**8 Hours**

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## Unit - 4

**Threaded Fasteners:** Stresses in Threaded Fasteners, Effect of Initial Tension, Design of Threaded Fasteners under Static, Dynamic and Impact loads, Design of Eccentrically loaded Bolted Joints.

**6 Hours**

## PART - B

## Unit - 5

**Design of Shafts:** Torsion of Shafts, Design for strength and Rigidity with Steady loading, ASME & BIS codes for Power Transmission shafting, Shafts under Fluctuating loads and Combined loads.

**7 Hours**

## Unit - 6

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**Cotter joint and Knuckle joints, Keys and Couplings:** Design of Cotter and Knuckle Joints, Keys: Types of keys, Design of Keys and Design of Splines.  
Couplings: Rigid and Flexible Couplings: Flange Coupling, Bush and Pin type Coupling and Oldham's Coupling.

**7 Hours**

### Unit - 7

**Riveted and Welded Joints:** Types, Rivet Materials, Failures of Riveted Joints, Joint Efficiency, Boiler Joints, Tank and Structural Joints, Riveted Brackets. Welded Joints – Types, Strength of Butt and Fillet welds, Eccentrically loaded Welded Joints.

**7 Hours**

### Unit - 8

**Power Screws:** Mechanics of Power Screw, Stresses in Power Screws, Efficiency and Self-locking, Design of Power Screw, Design of Screw Jack: (Complete Design).

**5 Hours**

## Design Data Hand Books:

1. **Design Data Hand Book** – K. Lingaiah, McGraw Hill, 2<sup>nd</sup> Ed. 2003.
2. **Design Data Hand Book** – K. Mahadevan and Balaveera Reddy, CBS Publication
3. **Machine Design Data Hand Book** – H.G. Patil, Shri Shashi Prakashan, Belgaum.
4. **PSG Design Data Handbook** PSG College of Technology, Coimbatore.

## Text Books:

1. **Mechanical Engineering Design:** Joseph E Shigley and Charles R. Mischke. McGraw Hill International edition, 6<sup>th</sup> Edition 2003.
2. **Design of Machine Elements:** V.B. Bhandari, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2<sup>nd</sup> Edition 2007.

## Reference Books:

1. **Machine Design:** Robert L. Norton, Pearson Education Asia, 2001.
2. **Design of Machine Elements:** M. F. Spotts, T. E. Shoup, L. E. Hornberger, S. R. Jayram and C. V. Venkatesh, Pearson Education, 2006.
3. **Machine Design:** Hall, Holowenko, Laughlin (Schaum's Outlines series) Adapted by S.K. Somani, Tata McGraw Hill Publishing Company Ltd., New Delhi, Special Indian Edition, 2008.
4. **Fundamentals of Machine Component Design:** Robert C. Juvinall and Kurt M Marshek, Wiley India Pvt. Ltd., New Delhi, 3<sup>rd</sup> Edition, 2007.

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