



## 16ME305 DESIGN OF TRANSMISSION ELEMENTS

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	30	20	40	5	5	5	3

### Course Description and Objective:

This course offers sound knowledge in designing of keys, shafts, couplings, belts, chain drives, bearings, gears and power screws. The objective of this course is to provide fundamentals for designing machine elements related to power transmission and selection of machine components from standard manufacturer's catalogs.

### Course Outcomes:

The student will be able to:

- design shafts and couplings.
- identify belts, chains and wire ropes from standard manufacturer's catalogs.
- specify lubrication requirements for journal bearings.
- design spur and helical gears under static and dynamic loadings.
- design power screws for various mechanical applications.

### SKILLS:

- ✓ Design keys and shafts.
- ✓ Select couplings as per load requirements.
- ✓ Analyze the forces on the gears, design and specify accordingly.
- ✓ Design screw jack and other power screw related devices.

**UNIT - 1**

L-9

**DESIGN OF KEYS; SHAFTS AND COUPLINGS :****DESIGN OF KEYS:** Types of keys, stresses developed in keys, key design.**DESIGN OF SHAFTS:** Materials used for shafts, Stresses in shafts, Shafts subjected to Combined bending, Twisting and axial loads; Design for strength and rigidity.**DESIGN OF COUPLINGS:** Rigid and flexible couplings, Design of Muff, split muff, flanged and bushed pin couplings.**UNIT - 2**

L-9

**BELTS; ROPES AND CHAINS:****DESIGN OF BELTS:** Selection of belt drive, working stresses in belts, belt selection from catalogues**DESIGN OF ROPES:** Classification of wire ropes, Designation of wire ropes, stresses in wire ropes, Design and selection of wire ropes from catalogues**DESIGN OF CHAINS:** Terms used in chain drives, Classification of chains, Power transmitted by chains, Design and selection of chain drive.**UNIT - 3**

L-9

**BEARINGS:****DESIGN OF SLIDING CONTACT BEARINGS:** Classification; Hydrodynamic and Hydrostatic Lubrication; McKee equation; Design of Journal bearings.**DESIGN OF ROLLING CONTACT BEARINGS:** Classification; Advantages and limitations of rolling contact bearings, Static load carrying capacity, Dynamic load carrying capacity, Life-load relationship, Selecting the bearing using manufacturers catalogue.**UNIT - 4**

L-9

**GEARS:****DESIGN OF SPUR GEARS:** Lewis Beam strength equation, Buckingham's equation; Wear strength, effective tooth load; estimation of module based on beam and wear strength.**DESIGN OF HELICAL GEAR:** Terminology of helical gear; Concept of virtual teeth; effective tooth load; estimation of module based on beam and wear strength.**UNIT - 5**

L-9

**POWER SCREWS:** Forms of threads, Multiple threaded screws, Terminology of power screws, Torque requirement Self locking screw, Efficiency of square threaded screw, Trapezoidal and acme threads, Collar friction torque, Design of screw and nut , Design of screw jack, Differential and compound screw.**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS:**

Total hours: 30

1. Types of keys 2. Couplings 3. Joints 4.Plummer block 5.Foot step bearing 6. Screw Jack.

**TEXT BOOKS :**

1. J.E. Shigley, "Mechanical Engineering Design", 9<sup>th</sup> edition, Tata McGraw Hill, 2013.
2. V.B. Bhandari, "Design of Machine Elements", 3<sup>rd</sup> edition, Tata McGraw Hill, 2010.

**DATA BOOKS :**

1. B. Mahadevan, "Design Data Hand Books for Mechanical Engineers.",4<sup>th</sup> edition, CBS Publishers, 2013.
2. "P.S.G. Design Data Book of Engineers", 1<sup>st</sup> edition, Kalaikathir Achagam Publishers, 2011.

**Note:** Design data books are permitted in the Examination.**REFERENCE BOOKS :**

1. Juvinell and Marshall, "Fundamentals of Machine Components", 5<sup>th</sup> edition, John Wiley and Sons, 2011.
2. R.S. Khurmi and J.K. Gupta, "Machine Design", 14<sup>th</sup> edition, S.Chand and Co., 2010.
3. R.L.Norton, "Machine Design -An Integrated Approach", 5<sup>th</sup> edition, Pearson Publications, 2013.

**ACTIVITIES:**

- o *Design and drawing of different types of keys*
- o *Design and drawing of couplings*
- o *Design and drawing of joints.*
- o *Design of a screw jack and prepare part and assembly drawings.*