



INSTITUTE OF ENGINEERING & TECHNOLOGY(Polytechnic),JAGATPUR,CUTTACK
DEPARTMENT OF MECHANICAL ENGINEERING.

LESSON PLAN-2026 WINTER

Discipline : MECHANICAL ENGG	Semester : 5th	Name of the Teaching Faculty:- BHABANI SANKAR SAHOO
Subject: DESIGN OF MACHINE ELEMENTS(MEPC 303 TH:2)	No. of days/per week class allotted: 03	Semester From date: 01.07.2026 To Date: 05.11.2026 No. of Weeks: 15
Week	Class Day	Theory Topics
1st	1st	I. Introduction to Design: Machine Design philosophy and Procedures
	2nd	General Considerations in Machine Design;
	3rd	Fundamentals: Types of loads, concepts of stress, Strain .
2nd	1st	Stress – Strain Diagram for Ductile and Brittle Materials.
	2nd	Types of Stresses; Bearing pressure Intensity.
	3rd	Crushing; Bending and Torsion; Principal Stresses; Simple Numericals
3rd	1st	Creep strain and Creep Curve; Fatigue; S-N curve
	2nd	Endurance Limit; Factor of Safety, Stress Concentration
	3rd	Properties of Engineering materials
4th	1st	Designation of materials as per IS and introduction to International standards & advantages of standardization
	2nd	Use of design data book; Use of standards in design and preferred numbers series
	3rd	Theories of Elastic Failures; Principal normal stress theory; Maximum shear stress theory & Maximum distortion energy theory.
5th	1st	II. Design of simple machine parts: Cotter Joint
	2nd	Knuckle Joint
	3rd	Turnbuckle
6th	1st	Design of Levers: Hand/Foot Lever & Bell Crank Lever
	2nd	Design of C-Clamp; Off-set links; Overhang Crank; Arm of Pulley.
	3rd	Antifriction Bearings: Classification of Bearings; Sliding contact & Rolling contact; Terminology of Ball bearings
7th	1st	Life Load relationship, Basic static load rating and Basic dynamic load rating.
	2nd	limiting speed; Selection of ball bearings using manufacturer's catalogue.
	3rd	III. Design of Shafts, Keys, Couplings and Spur Gears: Types of Shafts; Shaft materials; Standard Sizes; Design of Shafts (Hollow and Solid) using strength and rigidity criteria
8th	1st	ASME code of design for line shafts supported between bearings with one or two pulleys in between or one overhung pulley
	2nd	Design of Sunk Keys; Effect of Key-ways on strength of shaft
	3rd	Design of Couplings – Muff Coupling,
9th	1st	Protected type Flange Coupling
	2nd	Bush-pin type flexible coupling;
	3rd	Spur gear design considerations; Lewis equation for static beam strength of spur gear teeth;

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10 th	1 st	Power transmission capacity of spur gears in bending
	2 nd	IV. Design of Power Screws: Thread Profiles used for power Screws - Relative merits and demerits of each
	3 rd	Torque required to overcome thread friction
11 th	1 st	Self-locking and overhauling property; Efficiency of power screws
	2 nd	Types of stresses induced
	3 rd	Design of Screw Jack.
12 th	1 st	Design of springs: Classification and Applications of Springs; Spring terminology; Materials and Specifications
	2 nd	Stresses in springs; Wahl's correction factor Deflection of springs; Energy stored in springs
	3 rd	Design of Helical Tension springs subjected to uniform applied loads like I.C. engine valves, Weighing balance, Railway buffers and Governor springs
13 th	1 st	Design of Helical Compression springs subjected to uniform applied loads like I.C. engine valves, Weighing balance, Railway buffers and Governor springs
	2 nd	Leaf springs: Construction and Application.
	3 rd	V. Design of Fasteners: Stresses in Screwed fasteners; Bolts of Uniform Strength
14 th	1 st	Design of Bolted Joints subjected to eccentric loading;
	2 nd	Merits and demerits of screwed joints
	3 rd	Design of Parallel and Transverse fillet welds; Axially loaded symmetrical section;
15 th	1 st	Merits and demerits of welded joints.
	2 nd	Ergonomics & Aesthetic consideration in design: Ergonomics of Design: Man-Machine relationship; Design of Equipment for control, environment & safety
	3 rd	Aesthetic considerations regarding shape, size, color & surface finish.

Learning Resources:

1. Machine Design – Sadhu Singh, Khanna Book Publishing Co., Delhi
2. Machine Design Data Book – Sadhu Singh, Revised Edition, Khanna Book Publishing Co., Delhi
3. Introduction to Machine Design – V.B.Bhandari, Tata Mc- Graw Hill, New Delhi.
4. Mechanical Engineering Design – Joseph Edward Shigley, Tata Mc- Graw Hill, New Delhi.
5. Machine design – Pandya & Shah, Dhanpat Rai & Son, New Delhi.
6. Machine design – R.K.Jain, Khanna Publication, New Delhi.
7. Design Data Book – PSG Coimbtore, PSG Coimbtore.
8. Hand Book of Properties of Engineering Materials & Design Data for Machine Elements – Abdulla Shariff, Dhanpat Rai & Sons, New Delhi.

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Prepared By
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