



R. K. Institute of Engineering and Technology
Approved by AICTE, New Delhi and Affiliated to SCIT & VIT, Odisha

MECHANICAL ENGINEERING

SEMESTER : 5th (SEC-B)

FROM :01/07/2026 TO :05/11/2026

NAME OF THE FACULTY : Dr. SIDHANTA S SAMAL

SUBJECT : DESIGN OF MACHINE ELEMENTS

TOTAL CLASS AVAILABLE IN SEMESTER: 45 nos

NO. OF PERIODS : 03/ WEEK

Class No.	Unit	Topic/Sub-topic	Teaching Method	Learning Outcome
1	I	Course Introduction, Machine Design Philosophy & Design Procedure	Lecture	Understand the design process and objectives
2	I	General Considerations in Machine Design	Lecture	Explain factors affecting machine design
3	I	Types of Loads, Stress & Strain	Lecture	Identify different types of loads and stresses
4	I	Stress-Strain Diagram for Ductile & Brittle Materials	PPT + Discussion	Interpret stress-strain curves
5	I	Bearing Pressure, Crushing, Bending & Torsion	Numerical	Solve basic stress problems
6	I	Principal Stresses & Simple Numericals	Problem Solving	Calculate principal stresses
7	I	Creep, Creep Curve, Fatigue & S-N Curve	Lecture	Explain creep and fatigue failure
8	I	Endurance Limit, Factor of Safety & Stress Concentration	Lecture	Apply design safety concepts
9	I	Engineering Materials & IS Designation	Lecture	Identify engineering materials and standards
10	I	Design Data Book, Standardization & Preferred Number Series	Demonstration	Use design data books effectively
11	I	Theories of Elastic Failure: Principal Stress & Maximum Shear Stress Theory	Lecture	Explain failure theories
12	I	Maximum Distortion Energy Theory, Revision & Unit Test-I	Test + Discussion	Assess Unit-I learning
13	II	Cotter Joint: Construction & Design	Lecture	Design cotter joints



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14	II	Knuckle Joint & Turnbuckle Design	Lecture	Design knuckle joints and turnbuckles
15	II	Design of Hand/Foot Lever & Bell Crank Lever	Numerical	Design levers
16	II	Design of C-Clamp, Offset Links, Overhang Crank & Pulley Arm	Lecture	Explain design procedures
17	II	Anti-friction Bearings: Classification & Terminology	Lecture	Classify bearings
18	II	Bearing Life, Load Rating, Limiting Speed & Selection Using Catalogue	Demonstration	Select suitable ball bearings
19	II	Design Examples & Unit Test-II	Tutorial + Test	Evaluate Unit-II concepts
20	III	Shafts: Types, Materials & Standard Sizes	Lecture	Classify shafts
21	III	Design of Solid & Hollow Shafts (Strength Criteria)	Numerical	Design shafts using strength criteria
22	III	Shaft Design Using Rigidity Criteria & ASME Code	Lecture	Apply ASME shaft design code
23	III	Design of Sunk Keys & Effect of Keyways	Lecture	Design keys and evaluate shaft strength
24	III	Muff Coupling & Protected Flange Coupling Design	Lecture	Design rigid couplings
25	III	Bush-Pin Flexible Coupling	Numerical	Design flexible couplings
26	III	Spur Gear Design, Lewis Equation & Power Transmission	Lecture + Numerical	Design spur gears
27	III	Revision & Unit Test-III	Test	Assess Unit-III learning
28	IV	Power Screws: Thread Profiles & Applications	Lecture	Compare thread forms
29	IV	Torque Required to Overcome Thread Friction	Numerical	Calculate screw torque
30	IV	Self-locking, Overhauling & Efficiency of Power Screws	Lecture	Explain screw efficiency
31	IV	Design of Screw Jack & Toggle Jack	Numerical	Design lifting devices
32	IV	Springs: Classification, Terminology, Materials & Specifications	Lecture	Identify spring types
33	IV	Stresses, Wahl's Factor, Deflection & Energy Stored in Springs	Numerical	Calculate spring parameters



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Class No.	Unit	Topic/Sub-topic	Teaching Method	Learning Outcome
34	IV	Design of Helical, Tension & Compression Springs	Problem Solving	Design helical springs
35	IV	Leaf Springs: Construction, Applications & Unit Test-IV	Lecture + Test	Explain leaf spring design
36	V	Fasteners: Stresses in Screwed Fasteners & Bolts of Uniform Strength	Lecture	Analyze stresses in fasteners
37	V	Design of Bolted Joints Subjected to Eccentric Loading	Numerical	Design bolted joints
38	V	Design of Parallel & Transverse Fillet Welds	Lecture	Design welded joints
39	V	Axially Loaded Symmetrical Sections	Numerical	Solve welded joint problems
40	V	Comparison of Screwed & Welded Joints	Discussion	Compare fastening methods
41	V	Ergonomics in Machine Design	Lecture	Explain human factors in design
42	V	Man-Machine Relationship, Safety & Environmental Considerations	PPT	Apply ergonomic principles
43	V	Aesthetic Considerations: Shape, Size, Colour & Surface Finish	Discussion	Explain aesthetics in product design
44	All Units	Comprehensive Revision & Design Problem Practice	Tutorial	Strengthen design skills
45	All Units	Final Model Test & Course Review	Test + Discussion	Evaluate complete course learning


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