

Unit 1

Chapter 1 : Spur and Helical Gears 1-1 to 1-90

Syllabus : Introduction to gears : Material selection for gears, Modes of gear tooth failure, Gear Lubrication Methods.

Spur Gears : Number of teeth and face width, Force analysis, Beam strength (Lewis) equation, Velocity factor, Service factor, Load concentration factor, Effective load on gear, Wear strength (Buckingham's) equation, Estimation of module based on beam and wear strength, Estimation of dynamic tooth load by velocity factor and Buckingham's equation. AGMA (American Gear Manufacturing Association) approach of Gear design (Only mathematical relations, no numerical). Force analysis of Helical Gear, Beam Strength of Helical Gear, Wear strength and estimation of effective load based on Velocity factor (Barth factor) and Buckingham's equation. (No numerical on force analysis of helical)

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Unit 2

Chapter 2 : Bevel and Worm Gears 2-1 to 2-62

Syllabus : Types of Bevel gears, Terminology, Virtual number of teeth, and force analysis of Straight Bevel Gear. Design of Straight Bevel Gear based on Beam Strength, Wear strength and estimation of effective load based on Velocity factor (Barth factor) and Buckingham's equation. (Simple numerical to be taken no design calculations) Worm and worm gear terminology and proportions of worm and worm gears, Force analysis of worm gear drives, Friction in Worm gears, efficiency of worm gears, Worm and worm gear material, Strength and wear ratings of worm gears (Bending stress factor, speed factor, surface stress factor, zone factor) IS 1443-1974, Thermal consideration in worm gear drive. (Simple numerical to be taken no design calculations)

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Unit 3

**Chapter 3 : Sliding Contact and Rolling
Contact Bearings 3-1 to 3-83**

Syllabus : Sliding contact bearing (Theoretical treatment only) : Introduction to sliding contact bearing, classification, Reynolds's equation (2D), Petroff's equations, Sommerfeld number, Parameters of bearing design. Types of Rolling Contact Bearings and its selection, Static and Dynamic Load Carrying Capacities, Stribeck's Equation, Equivalent Bearing Load, Load - Life Relationship, Selection of Bearing Life, Selection of Rolling Contact Bearings from Manufacturer's Catalogue, Design for Cyclic Loads, Types of failure in rolling contact bearings - causes and remedies. (Simple Numerical treatment).

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| Chapter 4 : Design of Clutches and Brakes 4-1 to 4-66 | | | |
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| Brakes : Introduction, Types of brakes, Material, Design of band brake, external and internal shoe breaks, internal expanding shoe brakes, design of disc brakes. Application of brakes in automotive and industrial machinery sector. (Only Theoretical Treatment) | | | |
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Unit 6

Chapter 6 : Transmission system in Hybrid Electric Vehicle 6-1 to 6-14

Syllabus : Introduction, Types of Hybrid Electric Vehicles: Basic Classification, Basic Modes of Operation, Other Derivatives, Degree of Hybridization. Power Split Devices (PSD): Simple and EM compound PSD, HEV Component Characteristics: The IC Engine, Electric Machines, Battery, HEV Performance Analysis: Series HEV, Parallel HEV, HEV Component Sizing: General Considerations, Sizing for Performance, Optimum Sizing, Power Management: Control Potential, Control.