

**UNIT I****Chapter 1 : Design of Machine Tool Gear Boxes****1-1 to 1-61**

Syllabus : Introduction to machine tool gearboxes, design and its applications, basic considerations in design of drives, determination of variable speed range, graphical representation of speed and structure diagram, ray diagram, selection of optimum ray diagram, gearing diagram, deviation diagram. (Note: Full design problem to be restricted up to 2-stages only)

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UNIT II**Chapter 2 : Statistical Considerations in Design****2-1 to 2-37**

Syllabus : Frequency distribution , histogram and frequency polygon, normal distribution, units of central tendency and dispersion, standard deviation, population combinations, design for natural tolerances, design for assembly, statistical analysis of tolerances, mechanical reliability and factor of safety.

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UNIT III

Chapter 3 : Design of Belt Conveyor System for Material Handling 3-1 to 3-45

Syllabus : System concept, basic principles, objectives of material handling system, unit load and containerization, belt conveyors, flat belt and troughed belt conveyors, capacity of conveyor, rubber covered and fabric ply belts, belt tensions, conveyor pulleys, belt idlers, tension take-up systems, power requirement of horizontal belt conveyors for frictional resistance of idler and pulleys.

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UNIT IV

Chapter 4 : Design of Cylinders 4-1 to 4-35

Syllabus : Thin and thick cylinders, Lamé's equation, Clavarino's and Birnie's equations, design of hydraulic and pneumatic cylinders, auto-fretting and compound cylinders (no derivation), gasketed joints in cylindrical vessels (no derivation)

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Chapter 5 : Design of Pressure Vessels 5-1 to 5-32

Syllabus : Modes of failures in pressure vessels, unfired pressure vessels, classification of pressure vessels as per IS. 2825 - categories and types of welded joints, weld joint efficiency, stresses induced in pressure vessels, materials for pressure vessel, thickness of cylindrical shells and design of end closures as per code, nozzles and openings in pressure vessels, reinforcement of openings in shell and end closures - area compensation method, types of vessel supports (theoretical treatment only).

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UNIT V

Chapter 6 : Design of I.C. Engine Components

6-1 to 6-64

Syllabus : Introduction to selection of material for I. C. engine components, design of cylinder and cylinder head, construction of cylinder liners, design of piston and piston-pins, piston rings, design of connecting rod, design of crank-shaft and crank-pin. (Theoretical treatment only).

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UNIT VI

Chapter 7 : Optimum Design

7-1 to 7-37

Syllabus : Objectives of optimum design, adequate and optimum design, Johnson's method of optimum design, primary design equations, subsidiary design equations and limit equations, optimum design with normal specifications of simple machine elements : tension bar, transmission shaft, helical spring and pressure vessel, introduction to redundant specifications (theoretical treatment).



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