

ED5253 INTEGRATED MECHANICAL DESIGN

DETAILED SYLLABUS

OBJECTIVE

To know the integrated design procedure of different machine elements for mechanical applications.

UNIT I FUNDAMENTALS AND DESIGN OF SHAFTS

Phases of design – Standardization and interchangeability of machine elements - Process and Function Tolerances– Individual and group tolerances– Selection of fits for different design situations– Design for assembly and modular constructions– Concepts of integration BIS,ISO, DIN, BS, ASTM Standards. Oblique stresses– Transformation Matrix– Principal stresses– Maximum shear stress - Theories of Failure – Ductile vs. brittle component design - Analysis and Design of shafts for different applications – integrated design of shaft, bearing and casing– Design for rigidity

UNIT II DESIGN OF GEARS AND GEAR BOXES

Principles of gear tooth action – Gear correction – Gear tooth failure modes – Stresses and loads – Component design of spur, helical, bevel and worm gears – Design for sub assembly– Integrated design of speed reducers and multi-speed gear boxes – application of software packages.

UNIT III BRAKES & CLUTCHES

Dynamics and thermal aspects of brakes and clutches – Integrated design of brakes and clutches for machine tools, automobiles and mechanical handling equipments.

UNIT IV INTEGRATED DESIGN

Integrated Design of systems consisting of shaft, bearings, springs, motor, gears, belt, rope, chain, pulleys, Cam & Follower, flywheel etc. Example - Design of Elevators, Escalators, Gear Box, Valve gear Mechanisms, Machine Tools

REFERENCES

1. Alexandrov, M., Materials Handling Equipments, MIR Publishers, 1981.
2. Boltzharol, A., Materials Handling Handbook, The Ronald Press Company, 1958.
3. Maitra G.M., "Hand Book of Gear Design", Tata McGraw Hill, 1985.

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Notes
Syllabus
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4. Newcomb, T.P. and Spur, R.T., "Automobile Brakes and Braking Systems", Chapman and Hall, 2nd Edition, 1975.
5. Norton L. R., "Machine Design – An Integrated Approach" Pearson Education, 2005
6. Prasad. L. V., "Machine Design", Tata McGraw Hill, New Delhi, 1992.
7. Shigley, J.E., "Mechanical Engineering Design", McGraw Hill, 1986.