

ATC 125 - Automobile Engine Components Design
(02 credits – 50 marks)

Learning Objective:

1. To make the students understand the design concept and principles of various engine components.
2. These concepts and principles are familiarized for design of components.

Learning Outcomes:

1. Design the connecting rod, piston and its parts based on the engine specifications and also based on the engine application with balancing weight of crankshaft.

Course Content:

Module-I: Introduction to Design **05 hrs**

Stress, types of stresses, Engineering materials and their physical properties applied to design, selection of materials, Factor of safety, Theory of failures, Static load, dynamic load, failure modes, endurance limit, notch sensitivity, principles of design optimization.

Module-II: Design of Cylinder and Piston **07 hrs**

Choice of material for cylinder and piston, load on cylinder, stress in cylinder, piston friction, piston slap, load on piston, stresses in piston, design of cylinder, piston, piston pin, piston rings, piston failures, lubrication of piston assembly, types of tolerances and fits, design considerations for interference fits, surface finish, and surface roughness.

Module – III: Design of Connecting rod, Crankshaft **07 hrs**

Material for connecting rod, determining minimum length of connecting rod, small end and big end design, shank design, design of big end cap bolts, connecting rod failures, balancing of I.C. Engines, significance of firing order, material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations.

Module –IV: Design of Valves and Flywheel **05 hrs**

Design aspects of intake and exhaust manifolds, inlet and Exhaust valves, valve springs, tappets, valve train, Materials and design of flywheel, Design of Solid flywheel, Rimmed Flywheel, stresses in flywheel, Coefficient of fluctuation of speed, Coefficient of fluctuation of energy.

Module –V: Tutorials, Case studies and presentation based on Module I to IV **06 hrs**

References:

1. Design of Automotive Engines”, A.Kolchin and V.Demidov, MIR Publishers, Moscow (1984).
2. Design Techniques for Engine Manifolds, D.E. Winterborne and R.J.Pearson, SAE Int. Publisher, 1999.
3. The Internal Combustion Engine in Theory and Practice, C.F. Taylor, The M.I.T. Press, Cambridge, MA, 1985
4. Internal combustion engines fundamentals, J.B. Heywood McGraw-Hill, N.Y., 1988.
5. Diesel-Engine Management, H. Bauer, K.H. Dietsche, J. Crepin, F. Dinkler, Bosch-SAE Publishers, 1999.
6. Design of Machine Elements, V.B.Bhandari, Tata McGraw Hill publication, 3rd Edition, (2010), ISBN-10: 0070681791 ISBN-13: 9780070681798
7. Machine Design, P.Kannaiah, Scitech, (2010) ISBN 10: [8183711510](#) / ISBN 13: [9788183711517](#)