

# 16AE301 AUTOMOTIVE COMPONENTS DESIGN

Hours Per Week :

L	T	P	C
2	1	-	3

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
30	15	-	2	40	2	3	2	-



## Course Description and Objectives:

This course describes the criteria in design of different automotive components. The course objective is to familiarize learners with various steps involved in the design process and to make them understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.

## Course Outcomes:

The student will be able to:

- select and design a suitable clutch for the drive system.
- select suitable gear ratio and number of speeds to design the gear box for any system.
- estimate the load, moment and stresses on frame members and suspension.
- estimate the load, moment and stresses on front axle and steering system.
- estimate the load, moment and stresses on final drive and rear axle.

## SKILLS:

- ✓ *Analyze the stress and strain on engine components: identify and quantify failure modes for engine parts.*
- ✓ *Calculate the stress distribution for axial and shear forces, bending moments and torques in objects with simple shapes using the "strength of materials" approach.*
- ✓ *Design engine components using Modelling software.*

**ACTIVITIES:**

- *Design a piston using modelling software*
- *Design of connecting rod using modelling software*
- *Design a piston head using modelling software*

**UNIT - 1****L-6, T-3**

**CONSIDERATIONS IN DESIGN :** Statistics in design, Design for natural tolerances, Statistical analysis, Mechanical reliability.

Design of clutches: Design requirements of friction clutches, Selection criterion, Torque transmission capacity, Lining materials, Design of single plate clutch, Multi-plate clutch and centrifugal clutch.

**UNIT - 2****L-6, T-3**

**BEVEL GEARS:** Types, Terminology of bevel gears, Force analysis, Beam strength and Wear strength of bevel gears, Effective load on gear tooth, Spiral bevel gears.

**WORM GEARS:** Terminology, Force analysis, Friction in worm gears, Vector method, Strength rating and wear rating of worm gears, Thermal considerations.

**GEAR BOX DESIGN:** Ray diagram, gear box configuration and design.

**UNIT - 3****L-6, T-3**

**DESIGN OF BRAKE:** Requirements of braking system, Mechanical, Hydraulic and Pneumatic brakes, Internal expanding shoe brake and disc brake.

**DESIGN OF LEVERS:** Types, Applications in Automobile, Design of levers:Rocker arm , Hand and foot levers.

**UNIT - 4****L-6, T-3**

**DESIGN OF STANDARD COMPONENTS:** Design of flat pulleys, Wire ropes, Selection and design of flat belts, V belts, Chains and sprockets, Crank case, Oil seals and gaskets, Engine mountings and Brackets, Torsion bar, Telescopic shock absorber

**UNIT - 5****L-6, T-3**

**ENGINE COMPONENT DESIGN:** Design of Piston, Piston pin, Connecting Rod, Crankshaft, Cylinder liner, Cylinder head, Inlet and exhaust valves

**DESIGN DATA BOOK:**

1. PSG Design data book.

