Syllabus for Diploma Engineering

Automobile Engineering

Semester – IV

Subject Name: Automobile Component Design

Subject Code: 09AE0401

Diploma branch in which subject is offered:- Automobile Engineering

Objective:
This subject will make students well versed with concept of design of different components like piston, gear, gearbox, piston pin, connecting rod, crank shaft, etc. and how to standardize this design.

Credits Earned: 05

Course Outcomes:
After learning the course the students should be able to:

- Define various fundamental terminology used in designing.
- Demonstrate knowledge for selection and designing of different automobile components.
- Explain the step by step procedure for designing of various automobile components

Pre-requisite of course: Automobile Engine, Automobile Transmission, Applied Mechanics

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
4	2	0	5	50	30	20	25	25	150

Contents:

Sr. No.	Topics	Teaching hrs.	Weightage
1	**Introduction to design** Design and its types, General consideration, factors affecting the Design, General procedure in Machine Design, Material Selection for manufacturing various components of automobile Standardisation and its Importance, Various Standards and I.S codes, S. I. units and definitions of various fundamental and derived quantities Mass, Weight, Inertia, Force, Couple, Moment of Inertia, Torque, Power, Work,	10	23

	Energy, Stress, Strain, Young Modulus, Shear Modulus, Bearing Stress, Factor of Safety, Limit, Fit and Tolerances, Types of loads, stress and strain		
2	**Design of Piston** Piston nomenclature, Function of Piston, Design considerations for Piston, Materials for Piston, Design of Piston head, rings, pin, skirt and barrel.	06	14
3	**Design of Connecting rod** Connecting rod nomenclature, Function of Connecting rod Shape of Connecting rod, Length of Connecting rod, Forces on Connecting rod, Material for Connecting rod, Design considerations for Connecting rod, Design of cross-section of Connecting rod: I-section & Circular, Design of Crank pin, Design of Big end cap & bolts	08	18
4	**Design consideration for Crank shaft** Crankshaft nomenclature, Function of crankshaft, Types of crankshaft, Materials and manufacturing processes for crankshaft Bearing pressure and stresses in crankshaft, Design considerations for crankshaft	06	15
5	**Design of Clutch** Function of clutch, Types of clutch, Materials for friction surfaces Design considerations for friction clutch, Design of clutch: (i) Single plate (ii) Multi-plate	06	15
6	**Design considerations for Gear** Gear terminology, Types of gears, Design consideration for gear drive, Relation between number of teeth speed and torque in meshing gears, Calculation of number of teeth and torque transmitted	08	15

References:

a) List of Books

1. Strength (Mechanics) of Materials by B.C.Punamia, Arun Kr. Jain
2. Strength of Materials by S. Ramamurtham
3. Strength of Materials by R.S.Khurmi
4. Machine Design by R. K. Jain
5. A Text Book of Machine Design by R S Khurmi & J K Gupta
6. Machine Design by Dr Sadhu Singh
7. Automobile Design Problems by K. M. Agrawal

b) List of Major Equipment/ Instrument

Charts of Pistons, Connecting Rods, Crank shafts, Clutch Plates, Different types of Flywheels, Gears and Gear Boxes for better understanding of various terminologies related to automobile components.

Models of Pistons, Connecting Rods, Crank shafts, Clutch Plates of different vehicles, different types of gears etc.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
35%	40%	25%	0	0	0

Suggested List of Experiments:

1. Report writing on general considerations of design
2. Basic Design of Piston
3. Basic Design of Connecting rod
4. Basic Design considerations for crank shaft
5. Basic Design of clutches
6. Basic Design considerations for gear drive to compute the gear teeth, speed and torque

Instructional Method:

a) Power point presentation showing various nomenclature of different components of engine and transmission system to design various dimensions.
b) Chart showing various nomenclatures of different components of engine transmission system.
c) Assignments during tutorials for basic design of different components of engine and transmission system