Lok Jagruti Kendra University
University with a Difference

Diploma
in
Automobile Engineering

LJ Polytechnic

Course Code:025010304

Automobile System

Programme / Branch Name			Diploma in Automobile Engineering			
Course Name	Automobile System				**Course Code**	025010304
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week					Evaluation Scheme				
L	**T**	**P**	**Total Teaching Hours**	**Total Credit**	**CA**	**CCE**	**SEE (TH)**	**SEE (PR)**	**Total**
3	0	2	5	4	10	40	50	50	150

Legends: L: Lectures T: Tutorial P: Practical
CA: Continuous Assessment (Attendance + Activity)
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisite

- ✓ Physics
- ✓ Automobile Powertrain
- ✓ Internal Combustion Engines

3. Rationale

The course aims to impart basic skills for understanding of various types of automotive systems such as brakes, suspension, steering and exhaust system of modern vehicles along with its working principle and recent advancements in technologies.

4. Objectives

- ✓ Understand the working and types of Braking System used in Automobile
- ✓ Understand the working and types of Steering and Suspension systems used in Automobile.
- ✓ Understand the types of Wheels and Tyres.
- ✓ Grasp the deep knowledge of Emission Control Systems used in Automobile
- ✓ Penetrate deep into Alternative Fuel Technology.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcome	% Weightage	Hours
1.	**Braking System**	1.1 Necessity of Braking System 1.2 Different types of Braking Systems. (Drum Brake, Disc Brake, Pneumatic Brake) 1.3 Function and types of Braking Mechanisms. 1.4 Brake Bleeding in Hydraulic Braking System 1.5 Antilock Braking System: - Purpose, arrangement and integral parts.	• Understanding necessity and types of Braking Systems used in Automobiles.	15	05
2.	**Steering and Suspension System**	2.1 Necessity of Steering System. 2.2 Steering geometry: - Castor, Camber, Toe In, Toe Out, Kingpin Inclination, Steering Axis Inclination. 2.3 Constructional details of Components of Steering System. 2.4 Construction, Working and Types of Steering Gearbox. 2.5 Power Steering system: - Hydraulic and Electronic Power Steering 2.6 Necessity of Suspension System. 2.7 Constructional details of Independent (Mac Pherson & Double Wishbone) and Rigid Suspension systems. 2.8 Constructional and functional detail of Leaf Spring and its types. 2.9 Constructional and functional detail of Telescopic Suspension System.	• Understanding the constructional and functional details of steering systems used in Automobile • Understanding the constructional and functional details of suspension systems used in Automobile	30	18
3.	**Wheels and Tyres**	3.1 Constructional details of types of Wheel Rims	• Describe the construction and	10	04

		(Spoke Wheel, Disc Wheel, Alloy Wheel) 3.2 Constructional details of types of Tyres (Bias, Radial, Radial-Belted) considering Tube type and Tubeless tyre along with tyre specifications 3.3 Tyre Retreading procedure. 3.4 Tyre Rotation and Factors affecting life of tyre	working of different types of wheels and Tyres used in Automobile.		
4.	**Emission Control Systems**	4.1 Principle of Production of CO, HC and NOx 4.2 Catalytic Converter 4.3 E. G. R System 4.4 Positive Crankcase Ventilation 4.5 Diesel Particulate Filter 4.6 Evaporative Emission Control System 4.7 High Altitude Compensation 4.8 Necessity and Working of Lambda Sensor. 4.9 Necessity and Working of M.A.P & M.A.F Sensor. 4.11 Selective catalytic Reduction. 4.12 Measurement Techniques of CO, HC and NOx 4.13 Muffler: - Necessity and Types of mufflers.	• Describe various Emission control systems used in Automobile	25	10
5.	**C.N.G and L.P.G System**	5.1 Components of C.N.G and L.P.G Kit. 5.2 Construction and Working of L.P.G Kit in Petrol Engines 5.3 Construction & working Conventional and Sequential C.N.G Kit 5.4 Bharat Stage Emission Norms 5.5 Recent Advancements in Technology for BS-VI Diesel Engines.	• Understanding the working of Alternate Fuel Technology in Automobile Internal Combustion Engines.	15	05
				Total Hours	**42**

6. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1.	Braking System	40	40	20	0	0	0
2.	Steering and Suspension System	35	50	15	0	0	0
3.	Wheels and Tyres	20	50	30	0	0	0
4.	Emission Control System	30	50	20	0	0	0
5.	C.N.G and L.P.G System	20	50	30	0	0	0

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

7. List of Practicals / Exercises

Sr. No	Practical / Exercises	Key Competency	Hours
1	Demonstrate construction and working of Hydraulic Braking System	Identify different parts of Hydraulic Brakes. Procedure of Brake Bleeding. Constructional details of Disc and Drum Brakes.	2
2	Demonstrate construction and working of Pneumatic Braking System	Identify different parts of Pneumatic Brakes. Procedure of Brake Bleeding. Constructional details of Relay Valve, Unloader Valve and Proportionating valve in Pneumatic Braking System.	2
3	Demonstrate construction and working of Hydraulic and Electronic Power Steering System.	Identify different parts of Hydraulic and Electronic Power Steering and its Working. Introduction to Sensors used in Electronic Power Steering.	2
4	Demonstrate construction and working of types of suspension systems and shock absorbers	Identify different parts of Suspension systems. Working of Telescopic Shock Absorber. Understand different type of suspension systems used as per class of vehicle and loading capacity.	2
5	Demonstrate construction and working of types of wheels and Tyres	Understand the difference between tube and Tubeless Tyres. Understand difference between different types of wheel rims and Tyres according to its mode of application and load carrying capacity.	2
6	Demonstration of Tyre Retreading Process.	Briefly understand the hot and cold tyre retreading process.	2
7	Demonstration of Exhaust Gas Recirculation system.	Understanding the location and working of E.G.R Valve. Different modes of actuation of E.G.R Valve i.e., Vacuum Operated E.G.R Valve, Servo Operated E.G.R Valve etc.	2
8	Demonstration of Catalytic Converter and Muffler	Understanding the location and working of Catalytic Converter. Identify the chemical processes taking place in Catalytic Converter. Understanding different noise control technique in Exhaust of Automobile	2
9	Demonstrate construction and working of L.P.G System	Briefly understand the location and working of different components of L.P.G kit and its fitment in Petrol Engines.	2
10	Demonstrate construction and working of Sequential C.N.G System	Briefly understand the location and working of different components of Sequential C.N.G kit and its fitment in Petrol Engines.	2

Total Hours **20**

8. Reference Books

1) Automobile Engineering Vol. I by Dr. Kirpal Singh, Standard Publishers (Text Book)
2) Automobile Engineering Vol. II by Dr. Kirpal Singh, Standard Publishers (Text Book)
3) Automobile Engineering by R.B Gupta, Satya Prakashan
4) Automobile Engineering Vol I by Anil Chhikara, Satya Prakashan
5) Automobile Engineering Vol II by Anil Chhikara, Satya Prakashan
6) Transmission and Power Train by William Crouse and Donald Anglin, Tata McGraw Hill
7) Automobile Technology by N.K Giri, Khanna Publishers
8) Automotive Mechanics by S. Srinivasan, Tata McGraw Hill

9) Automotive Power Transmission Systems by YI Zhang and Chris MI, Wiley Publications

9. Open Sources (Website, Video, Movie)

1) https://www.youtube.com/c/TheAutomotives
2) https://theautomobileengineers.blogspot.com/
3) https://www.youtube.com/c/LearnEngineering
4) http://auto.howstuffworks.com/
5) https://www.youtube.com/watch?v=-dJ7zNDVzvA
6) https://www.youtube.com/watch?v=iMqE-NCrWIg
7) https://www.youtube.com/watch?v=J9gELaeVTmQ
8) https://www.youtube.com/watch?v=Fkgp64e-nNQ
9) https://www.youtube.com/watch?v=svFm1m_R7H8
10) https://www.youtube.com/watch?v=6c4deRAhqcA
11) https://www.youtube.com/watch?v=ApuBEn2zct8
12) https://www.youtube.com/watch?v=mJO48tz0Vkk
13) https://www.youtube.com/watch?v=0n-DNaihuXE
14) https://www.youtube.com/watch?v=lJiznlz5buc
15) https://www.youtube.com/watch?v=W6dIsC_eGBI
16) https://www.youtube.com/watch?v=EkzaV3Or4WM
17) https://www.youtube.com/watch?v=ykAd7MLtj1M
18) https://www.youtube.com/watch?v=bEXlSoZPjjQ
19) https://www.youtube.com/watch?v=JotiMO3R8bQ
20) https://www.youtube.com/watch?v=xNEdBprw7Nw