



Lok Jagruti Kendra University
University with a Difference

Diploma in Automobile Engineering



Course Code: 025010604

Advance Automobile Electronics

Programme / Branch Name			Diploma in Automobile Engineering			
Course Name	Advance Automobile Electronics					Course Code 025010604
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
2	0	4	6	4	10	40	50	100	200

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 Electrical System
- ✓ Basic Automobile Electronics

3. Rationale

The subject covers a wide range of topics related to automotive electronics, including electronic control systems, sensors and actuators, communication networks, power electronics, advanced driver assistance systems (ADAS), and emerging technologies in automotive electronics. By the end of the course, students will have a comprehensive understanding of these topics and will be able to diagnose and repair faults in these systems.

The subject also emphasizes the importance of safety and security in automotive electronics. Students will learn about various safety and security systems used in modern vehicles and will be able to diagnose and repair faults in these systems. Additionally, students will be trained on the proper handling and disposal of hazardous materials commonly found in automotive electronics systems.

Overall, the subject of Advanced Automotive Electronics is an important course for Diploma students of India who are interested in pursuing careers in the automotive industry. The skills and knowledge gained from this course will make students valuable assets to automobile manufacturers, dealerships, and repair shops.

4. Objectives

- ✓ Identify and describe the various components that make up automotive electronics systems and understand their functions.
- ✓ Use diagnostic tools to diagnose and repair faults in automotive electronics systems.
- ✓ Understand the principles of electronic control systems and their application in modern automobiles.
- ✓ Understand the principles of sensors and actuators used in automotive electronics systems and diagnose faults in them.
- ✓ Understand the principles of communication networks used in automobiles and diagnose faults in them.
- ✓ Understand the principles of power electronics used in automobiles and diagnose faults in them.
- ✓ Understand the principles of advanced driver assistance systems (ADAS) and diagnose faults in them.
- ✓ Understand the importance of safety and security in automotive electronics systems and be able to diagnose and repair faults in safety and security systems.

5. Contents

Unit No.	Topics	Sub-Topics	Learning Outcome	% Weightage	Hours
1.	Introduction to Automotive Electronics	1.1 Overview of automotive electronics 1.2 History of automotive electronics 1.3 Role of electronics in modern automobiles 1.4 Components of automotive electronics 1.5 Electronic control units (ECUs) 1.6 Sensors and actuators 1.7 Communication networks in automobiles	<ul style="list-style-type: none"> Understand the principles of automotive electronics and their application in modern automobiles. 	25	5
2.	Electronic Control Systems	2.1 Engine control systems 2.2 Transmission control systems 2.3 Chassis control systems 2.4 Safety and security systems 2.5 Diagnostic systems	<ul style="list-style-type: none"> Identify and describe the various components that make up automotive electronics systems and understand their functions. 	15	6
3.	Power Electronics in Automotive Applications	3.1 Introduction to power electronics 3.2 Power electronics for electric vehicles 3.3 Battery management systems 3.4 DC-DC converters 3.5 AC-DC converters 3.6 Motor control systems	<ul style="list-style-type: none"> Use diagnostic tools to diagnose and repair faults in automotive electronics systems. 	15	5
4.	Advanced Driver Assistance	4.1 Introduction to ADAS 4.2 Components of ADAS 4.3 Sensors used in ADAS	<ul style="list-style-type: none"> Understand the importance of safety 	15	7

	Systems (ADAS)	4.4 Camera-based systems 4.5 Radar-based systems 4.6 Lidar-based systems 4.7 ADAS applications	and security in automotive electronics systems and be able to diagnose and repair faults in safety and security systems.		
5.	Emerging Technologies in Automotive Electronics	5.1 Autonomous driving systems 5.2 Vehicle-to-vehicle communication 5.3 Vehicle-to-infrastructure communication 5.4 Cybersecurity in automotive electronics 5.5 Future trends in automotive electronics	<ul style="list-style-type: none"> Be prepared for careers in the automotive industry, particularly in the area of electronics and electrical systems, and contribute to the development of efficient and environmentally friendly automobiles. 	30	5

Total Hours 28

6. Suggested Specification Table with Hours

Unit No.	Chapter Name	Teaching Hours	Distribution of Topics According to Bloom's Taxonomy					
			R %	U %	Ap %	C %	E %	An %
1	Introduction to Automotive Electronics	5	20	40	20	0	20	0
2	Electronic Control Systems	6	20	30	30	0	20	0
3	Power Electronics in Automotive Applications	5	20	30	30	0	20	0
4	Advanced Driver Assistance Systems (ADAS)	7	25	25	30	0	20	0
5	Emerging Technologies in Automotive Electronics	5	20	30	30	0	20	0

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

7. List of Practical / Exercises

Sr. No	Practical / Exercises	Key Competency	Hours
1	Introduction to Automotive Electronics Components	Students will be able to identify and describe the various components that make up automotive electronics.	2
2	Use of Electronic Control Units (ECUs) in Automobiles	Students will be able to identify and describe different types of ECUs used in automobiles and their functions.	2
3	Communication Networks used in Automobiles	Students will be able to identify and describe different types of communication networks used in automobiles.	2
4	Use of Oscilloscopes for Sensor and Actuator Diagnostics	Students will be able to use oscilloscopes to diagnose faults in sensors and actuators.	2
5	Advanced Driver Assistance Systems (ADAS)	Students will be able to identify different types of sensors used in ADAS systems and their functions.	2
6	Power Electronics in Automobiles	Students will be able to identify and describe different types of power electronics used in automobiles.	2
7	Vehicle-to-Vehicle (V2V) Communication Testing	Students will be able to identify and describe the components of a V2V communication system.	2

Total Hours **14**

8. Reference Books

- 1) Automotive Electronics Handbook by Ronald K. Jurgen
- 2) Automotive Electronics and Computer Systems by Tom Denton
- 3) Automotive Electrical and Electronic Systems by Tony Tranter
- 4) Fundamentals of Automotive Electronics by V. N. Mittle and M. S. Srinivasan
- 5) Automotive Electronics: Principles, Diagnosis and Service by James D. Halderman
- 6) Automotive Electricity and Electronics by James D. Halderman and Chase D. Mitchell
- 7) Automotive Electrical Handbook by Jim Horner
- 8) Advanced Automotive Fault Diagnosis by Tom Denton
- 9) Electronic Engine Management and Driveline Controls by Peter A. F. Walters
- 10) Automotive Electrical and Electronics Lab Manual by K. Murali Krishna and V. P. Sreedhar.

9. Open Sources (Website, Video, Movie)

- 1) Automotive Electronics Tutorial - This website offers tutorials on various aspects of automotive electronics, including sensors, actuators, and control systems.
- 2) Automotive Electronics Design and Manufacturing - This video series by IEEE covers the design and manufacturing process of automotive electronics systems.
- 3) Automotive Electronic Control Systems - This video series by Free Learning covers the principles and functions of electronic control systems used in automobiles.
- 4) Automotive Networking and Communication Systems - This video series by EDX covers the basics of automotive networking and communication systems.
- 5) Automotive Electrical and Electronics Basics - This video series by AutoMate Training covers the basics of automotive electrical and electronics systems.
- 6) Diagnosing Automotive Electrical Problems - This video series by EricTheCarGuy covers the diagnostic process for identifying and repairing faults in automotive electrical systems.
- 7) Automotive Electronics and Communication Systems - This video series by Udemy covers the basics of automotive electronics and communication systems.