

Program : <b>Diploma in Automobile Engineering</b>	
Course Code : <b>3053</b>	Course Title: <b>Automobile Electrical and Electronics Systems.</b>
Semester : <b>3</b>	Credits: <b>4</b>
Course Category: <b>Program Core</b>	
Periods per week: <b>4 (L:3, T:1, P:0)</b>	Periods per semester: <b>60</b>

### Course Objectives:

- To get in depth understanding about the concepts.
- To identify the purpose, design and operation of various automotive electrical and electronic components.

### Course Prerequisites:

Topic	Course code	Course Title	Semester
Basic knowledge about electrical engineering		Applied Physics II	2
Knowledge about working of engines		Basic Automobile Engineering	2

### Course Outcomes:

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Outline the working of automotive battery.	15	Understanding
CO2	Summarize the features of automotive charging and starting systems.	14	Understanding
CO3	Make use of the working of automotive ignition system.	15	Applying
CO4	Identify the need of lighting system and their accessories	14	Applying
	Series Test	2	

**CO – PO Mapping:**

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2	3						
CO3	3						
CO4	3						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

**Course Outline:**

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	<b>Outline the working of automotive battery</b>		
M1.01	Recall the basic terms relating to automotive electrical systems	3	Remembering
M1.02	Define the basic terms relating to automotive electronics	5	Remembering
M1.03	Summarize the principles of automotive battery.	5	Understanding
M1.04	Identify the various battery troubles.	2	Applying
<b>Contents:</b>			
Conductors, insulators, electric current, potential difference, power, electro motive force, resistance, Ohm's law, series and parallel circuits, electromagnetism, generation of ac and dc, capacitance, inductance.			
Semiconductors-construction, N-type, P-type, diodes-operation, types and applications, thermistors-construction and application, silicon-controlled rectifiers-construction and application, transistors-basic operation, types and application, transistor gates (basic understanding only), Overview of Integrated circuits.			
Battery-function, types-construction and principle of working of lead acid, Nickel-cadmium, Lithium-ion, battery designs-maintenance free, hybrid, recombination, absorbed glass mat, valve regulated, specific gravity, battery ratings, battery charging, jump starting, battery troubles.			
CO2	<b>Summarize the features of automotive charging and starting systems</b>		
M2.01	Illustrate the features of automotive alternator	4	Understanding
M2.02	Outline the various methods of alternator output control	3	Understanding

M2.03	Describe the features of starting system	3	Understanding
M2.04	Explain the working of various starting drives	4	Understanding
	Series Test I	1	

**Contents:**

Charging system-types, alternating current charging system operation, alternator construction, alternator components-rotor, stator, rectifier unit, alternator output control, alternator regulators.

Cranking circuit-parts, starting motor operation, types of motor-series, shunt, compound, permanent magnet, starter motor parts, gear reduction starters, starter drives -Bendix, axial starter, solenoid operated starters.

<b>CO3</b>	<b>Make use of the working of automotive ignition system.</b>		
M3.01	Recall the functions of ignition system	2	Remembering
M3.02	Outline the various types of ignition system	5	Understanding
M3.03	Summarize the different components of ignition system	5	Understanding
M3.04	Identify the need for ignition timing	3	Applying

**Contents:**

Ignition system - purpose and functions, types - contact breaker point type, distributor electronic ignition, distributor less electronic ignition - waste spark system, coil on plug system, capacitor discharged ignition system, ignition coil - operation and construction, triggering methods - Ignition Control Module and Power train Control Module, circuit operation - magnetic sensor, hall effect switch, optical sensors, spark plug-construction, ignition advance, ignition timing.

<b>CO4:</b>	<b>Identify the need of lighting system and their accessories.</b>		
M4.01	Explain the basics of automobile wiring	5	Understanding
M4.02	Summarize the constructional features of head light	3	Understanding
M4.03	Identify the need for headlight aiming	2	Applying
M4.04	Outline the various circuits in automobile	4	Understanding
	Series Test II	1	

**Contents**

Automotive wiring terminology, ground wires, battery cable, fuses and circuit protection devices, terminals and connectors, relays, wiring schematics and symbols.

Head light switch control, head light circuit, headlight types-sealed beam head lights, halogen head lights, composite head lights, high intensity discharge head lights, LED headlights, headlight dimmer switch, headlight aiming.

Other circuits (overview only)-Day time running lights, courtesy lights, blinker lights, dash board warning lamps, electronic speedometer, electronic odometer, electronic fuel gauges, rain sense wiper system, blower motor, power windows, power seats, outside folding mirrors, keyless entry, anti-theft system.

**Text /Reference:**

<b>T/R</b>	<b>BookTitle/Author</b>
R1	Automotive Technology: Principles, Diagnosis, and Service by James D. Halderman, Prentice Hall
R2	Automotive Technology: A Systems Approach by Jack Erjavec, Cengage Learning
R3	Automobile Electrical and Electronic Systems by Tom Denton, Elsevier
R4	Automobile Engineering Vol-2 by Kirpal Singh, Standard Publications
R5	Automobile Electrical Equipment by Kohli, Tata McGraw-Hill

**Online Resources:**

<b>Sl. No</b>	<b>Website Link</b>
1	<a href="https://library.automationdirect.com/basic-electrical-theory/">https://library.automationdirect.com/basic-electrical-theory/</a>
2	<a href="https://circuitglobe.com/lead-acid-battery.html">https://circuitglobe.com/lead-acid-battery.html</a>
3	<a href="https://studentlesson.com/charging-system-definition-functions-parts-working/">https://studentlesson.com/charging-system-definition-functions-parts-working/</a>
4	<a href="https://www.youtube.com/watch?v=W94iksaQwUo">https://www.youtube.com/watch?v=W94iksaQwUo</a>
5	<a href="https://www.youtube.com/watch?v=Nq5mnn9xMGM">https://www.youtube.com/watch?v=Nq5mnn9xMGM</a>