

Branch Name:	Electrical Engineering
Program Code:	ET109
Course Name:	Automobile Electrical System and Mechanisms (Professional Elective-I)
Course Code:	2ET1090509T
Pre-requisite Course:	-

Course Objectives:

1. The main objective of this course is to understand the construction and testing of lead acid battery, charging of batteries and selection of batteries for a vehicle.
2. To identify the type of starter motor and charging system.
3. To understand the cables and lighting system for a vehicle.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Introduction: Electrical Principles, Insulator, Conductor and semiconductor, Voltage, Current and resistance, Common circuit symbols for automobiles, Purpose of automotive electrical system, Layout of vehicle electrical circuit.	05	10
2	Batteries: Lead acid, Lithium-ion and Alkaline batteries, Construction and working, Battery rating, Determining battery capacity, Battery charging methods, Testing and maintenance, Battery failures.	08	18
3	Ignition System: Introduction, Construction and working of magneto coil & battery coil ignition systems, Spark plug types, Spark advance mechanisms, Electronic ignition systems, Transistorized ignition system, Solid state ignition systems, Capacitor discharge ignition system and Distributor less ignition system.	08	18
4	Starting/Charging System: Principle, Construction and working of starter motor, working of different starter drive units, Starting system in two wheelers. Alternators principle, Construction and working, Cut out relay, Current regulator and voltage regulator, Introduction to start/stop system, Integrated starter generator (ISA/ISG).	10	20
5	Lighting System: Details of head light and side light, LED lighting system, Headlight dazzling and preventive methods. Automatic headlight, Daytime running lamps, Adaptive brake lights, Instrument panel lighting.	07	17

6	Accessories and Wiring: Fuses, Cables, Connectors and selection, Multiplexing and de Multiplexing, Automotive wiring, Insulated and earth return system, Wiring diagrams, Symbols and standards, Horn, Wiper system, Power window and mirrors, Sun roof, Defrosters, Fuel gauges, Oil temperature gauge, Coolant temperature gauge, Speedometer, Odometer, Tachometer and central locking system.	07	17
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Text Books:

1. Barry Hollembeak, “Automotive Electricity and Electronics” Cengage Learning, Clifton Park, USA.
2. Kholi P L, “Automotive Electrical Equipment”, Tata McGraw Hill Co., Ltd., New Delhi, 2nd edition-2016.

Reference Books:

1. Joseph Bell, “Diesel Engineering: Electricity and Electronics”, Cengage Learning, New Delhi, 3rd edition- 2015.
2. Robert Bosch, “Automotive Hand Book” SAE, 3rd edition- 2017.
3. Tom Denton, “Automobile Electrical and Electronics systems”, Routledge Taylor & Francis Group London & New York, 2nd edition- 2019.
4. Automotive mechanics by W. Crouse, TMH, 4th edition- 2016.

ICT/MOOCs Reference:

1. <https://archive.nptel.ac.in/courses/112/103/112103262/>
2. <https://nptel.ac.in/courses/108106170>
3. <https://archive.nptel.ac.in/courses/108/106/108106182/>
4. <https://archive.nptel.ac.in/courses/108/103/108103009/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the construction and testing of lead acid battery, charging of batteries and selection of batteries for a vehicle.	2 Understanding
CLO2	Analyze the type of ignition system and advance and retarding of spark timing.	4 Analyzing
CLO3	Identify the type of starter motor and charging system. Selection of starter motor and alternator for a vehicle.	4 Analyzing
CLO4	Understand the cables and lighting system for a vehicle.	2 Understanding
CLO5	Evaluate the accessories, select cables and multiplexing.	5 Evaluating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	M	H	H	M		M		L	M	M		L	L	M	M	
CLO2	M	H	H	M	H					H		M	L	L	M	
CLO3	M	M	H	L						H		M	M		L	M
CLO4	H	M	H	H					M	M		L	L		M	H
CLO5	H	M	M	M					M	H	M	M	L		M	

H: High, M: Medium, L: Low