

Branch Name:	Automobile Engineering
Program Code:	ET408
Course Title:	Automobile Electrical and Electronic System
Course Code:	2ET4080303
Pre-requisite Course:	-----

Course Objectives:

1. Learn inspection of auto mobile electrical systems, maintain and installation of electrical system.
2. Explain use of electrical system of automobile from engine start to running condition Understand.
3. Future technology of Electric vehicle.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
1	Basic of Electricity and Auxiliaries system. • Basic electrical principles -Effects of current flow, and definition of electrical quantities like resistance, voltage, current, and power. - Differences between Conductors, insulators and semiconductors. • Fundamentals of automotive wiring, terminals, cables, color codes, harness design, fuses, relay and circuit breakers, and switches. • Construction and working of various electrical auxiliaries systems – - Windscreen washers and wipers, - Signalling circuits, - Horns, - Engine cooling fan motors, - electric window. • Construction and working of analog and digital gauges such as - Tachometers, - Odometers, - Speedometers, - Oil pressure gauges, - Coolant temperature gauge, - Fuel level gauge. • Automotive Lighting fundamentals, - Bulbs, - Headlight reflectors, - Headlight lenses, - Basic lighting circuit,	08	15
2	Automotive battery • Vehicle batteries various types of battery, Requirements of the vehicle battery, Choosing the correct battery, parameters affecting battery performance. • Lead-acid batteries Construction, working, chemical reaction during charging and discharging, Battery rating and efficiency. • Lithium-ion batteries Construction, working, comparison between lead acid batteries and lithium-ion batteries. • Lead-acid battery Waste, battery disposal, battery handling and storage.	08	20
3	Ignition system • Necessity and requirement of Ignition system in automobile vehicles. • Construction and working of breaker point ignition system, electronic ignition system and distributor less ignition system.	06	15

	- Construction, working and types of Spark plugs. - Working of Non–Contact–type Ignition Triggering devices. - Construction and working of Capacitive Discharge Ignition.		
4	Starting system - Necessity and requirements of the starting system. - Basic working of Starting system circuits. - Describe D.C motor characteristics. - Constructional and working principle of different starter motor - Pre-engaged starters, - Permanent magnet starters, - Various drive mechanisms of starter motor.	05	15
5	Charging system - Necessity of charging system. - Introduction & basic principle of generators, Function, Circuit arrangement. - Working Principle of Alternator Charging System, Differences between Generator & Alternator, and Advantages of alternator over DC generator. - Advanced charging system technology & new developments. - Requirement of regulating current & voltage in alternator.	06	15
6	Electro mobile - Fundamentals of EV'S. - History of EV'S, Configurations of electric vehicles, Performance of electrical vehicles. - Battery types and parameters, Traction batteries, Fundamental machine phenomena, Simple electric machines, DC Machines, Three phase AC machines, Induction machines, Permanent magnet machines, Switched reluctance machines, Power electronic switches - DC/DC convertor, Cell balancing Convertor, Drive use in EV'S.	09	20

List of Practical:

1. Draw and explain any one automotive wiring diagram of given vehicle electric & electronic system.
2. Identify and perform joining procedure of automotive wiring circuit with its cable size, color code and symbols used in a given vehicle electric & electronic system.
3. Prepare SOP (standard operating procedure) and perform visual inspection procedure for identify various battery rate and conditions.
4. Differentiate various spark plugs by constructional features & rating.
5. Dismantle/Assemble the given starter motor, enlist the parts, and explain the working of each component.
6. Identify, locate and functional details various sensors from engine, transmission, and electrical system in a particular vehicle.
7. Study of electrical vehicle systems.

Reference Books:

1. Automobile Electrical Equipments P. L. Kohli Tata McGraw-Hill Co, Ltd.
2. Automobile Engineering R.B.Gupta Satya Prakashan
3. Automobile Engineering, By K.M.Gupta Umesh Publication
4. Modern Electric, Hybrid Electric, and Fuel Cell Vehicles Mehrdad Ehsani, Texas A&M University, Yimin Gao, Texas A&M University, Sebastien E. Gay, Texas A&M University, Ali Emadi, Illinois Institute of Technology CRC PRESS

List of Open-Source Software/learning website:

1. <https://www.howacarworks.com>
2. <https://swayam.gov.in>
3. <https://auto.howstuffworks.com>
4. <https://nptel.ac.in>
5. <https://www.youtube.com/watch?v=TqQE0xkCJ8c>
6. <https://www.youtube.com/watch?v=QiBOTa8K4vI>
7. <https://www.youtube.com/watch?v=VOGu2Fft7WQ>

Course Learning Outcomes (CLO):

1. Explain basic electrical principles, construction and working of various electrical auxiliaries systems.
2. Interpret the purpose, construction and working of various types of automotive battery.
3. Explain construction and working of various automotive ignition systems.
4. Interpret necessity, construction & operation of various types of starter motor and charging system's components.
5. Explain basic working principles & applications of electronics in automotive systems.

Mapping of CLO with PO and PSO

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			L	M					L		M	M		M	
CLO2	L		L		M									M		
CLO3	M	L					M	L				L	M	M	H	
CLO4					M					L			L		L	
CLO5	M	M			M					L			M		M	

H: High, M: Medium, L: Low