GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Diploma Engineering		Branch	Automobile Engineering	
Semester	III		Version	1.0.0.0	
Effective from Academic Year	2019-20		Effective for the batch Admitted in	June 2018	
Subject code	1AU2303	Subject Name	AUTOMOBILE ELECTRICAL SYSTEM AND ELECTROMOBILE		

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:
None
Course Learning Outcomes:
After completion of this course, student will be able to ▪ Learn inspection of auto mobile electrical systems, maintain and installation of electrical system. ▪ Explain use of electrical system of automobile from engine start to running condition Understand. ▪ Future technology of Electric vehicle.

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 Electricity, Magnetism And Automobile Wiring	1.1 A short history of auto-electrical system, constructional and functional details of conductors, semiconductors and insulators. 1.2 Ohm's Law, EMF, potential difference and voltage drop, Series and parallel circuits, Effect of electric current, Measurement of DC-Current ,Voltage, & resistance, 1.3 Application & principle of Millimetres, 1.4 Meaning of magnetism and law of magnetism, 1.5 Symbols used in wiring, Types of wiring system, wiring harness, Different electrical system.	1a. Describe current, voltage, Magnetism, conductors, semi-conductors, Insulators & automobile wiring system. 1b. Explain Ohm's law, series and parallel circuits. 1c. Use various instruments for measuring current, voltage & resistance. 1d. Describe wiring harness, symbols for wiring.	10	7
Unit – II Automobile Battery	2.1 Types of battery (dry & wet batteries.), Construction of battery, Function of lead acid battery, 2.2 Various charging processes, Maintenance of battery. 2.3 Modern developments in battery, Procedure of commissioning of new Battery in vehicle. The various battery rating, Battery performance.	2a. Explain principle and construction of lead acid battery. 2b. Describe characteristics of battery, rating, capacity and efficiency of batteries. 2c. Describe Charging methods & Battery maintenance	10	8

Unit – III Ignition System	3.1 Types of ignition system and its layouts, wiring diagram. 3.2 Coil, Magneto & Capacitor discharge ignition system: construction and working. Comparison of systems. 3.3 H.T. Coil & Distributor: - Types, construction and working. 3.4 Distributor less electronic & direct ignition system, mechanical & electronic sparks advance mechanism. Hall Effect switch. 3.5 Spark plug: -construction, function, types.	3a. Explain wiring diagram of various Ignition System. 3b. Describe construction & working of different types of Ignition system. 3c. Describe various spark advance mechanism. 3d. Describe Principal of Hall effect switch.	10	8
Unit – IV Starting System	4.1.Principal of starter motor, 4.2.Constructional and functional details of starter, 4.3. Torque characteristic of starter, Starter drive mechanism: its types (bendix, and folothru & over running Clutch Drives, axial drive), construction, function and comparison of different drive mechanism. 4.4. Solenoid switch.	4a. Describe construction & working of Starter motor. 4b. Describe different types of Starting units & starter switch.	9	6
Unit – V Charging System	5.1 Necessity of charging system, 5.2 Introduction & basic principle of generators, Function, Circuit arrangement, 5.3 Working Principle of Alternator Charging System, Differences between Generator & Alternator, and Advantages of alternator over DC generator. 5.4 Advanced charging system technology & new developments, 5.5 Requirement of regulating current & voltage in alternator.	5a. Describe necessity, construction & working of various charging system. 5b. Describe voltage & current regulatory system.	6	6
Unit– VI Lighting System & Automobile Auxiliaries	6.1 Lighting Fundamentals, Lighting Circuits, Gas discharge & LED lighting, types of lamps. 6.2 Meaning of auxiliaries, Construction, function & circuit arrangement of various auxiliary units such as :- Horn, Wiper, Flashers, fuel gauge, temp gauge, oil pressure gauge, warning lights, Mechanical & digital Speedometer &odometer, Electrical Fan for cooling system, Wind shield washer & Defogger, car stereo.	6a. Explain functioning of various lighting and Auxiliaries units of automotive vehicle.	8	5

	6.3 Power window, central locking with remote control & without remote control, key less entry.			
Unit– VI Electro mobile	7.1 Fundamentals of EV'S. 7.2 History of EV'S, Configurations of electric vehicles, Performance of electrical vehicles. 7.3 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. 7.4 DC/DC convertor, Cell balancing Convertor, Drive use in EV'S.	7a. Explain the functioning and components of electrical vehicles.	7	5

List of Practical(Any seven)		
No.	Unit	Name of Practical
1	1	Introductory study of automobile electrical systems.
2	2	Study of automobile battery System
3	4	Study of electrical engine starting system.
4	4	Study of different types of battery charging system.
5	3	Study of different types of ignition systems.
6	6	Study of automobile lighting system.
7	6	Study of different types of gauges, sensors and meters of an automobile.
8	6	Study of various electrical equipments like Windscreen wipers, power windows, Rear wind shield glass heating system, Central Locking system.
9	7	Study of electrical vehicle systems.

List of Instruments / Equipment / Trainer Board	
1	Layout model of automobile wiring system
2	Demonstration model of Battery charging mechanism
3	Different types of Ignition systems

List of Reference Books			
No	Title of Reference Books	Authors	Publication
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
5	Tom Denton	Automobile Electrical & Electronics System	Arnold Publishers

Link of Learning Web Resource	
1	http://www.youtube.com/watch?v=a_nsgzlrZGU
2	http://www.youtube.com/watch?v=RzDqEorOXxk
3	http://www.youtube.com/watch?v=XDWGtWmB1D0

4	http://mail.faribault.k12.mn.us/~Mark_Lessman/S00CF9F37.4/STARTING%20SYSTEM.ppt
5	Howstuffworks.com
6	Wikipedia.com
7	https://www.proprofs.com/quiz-school/story.php?title=automobile-part-1-electrical-system (MOCK TEST)

CO'S AND PO'S MAPPING

PO'S		CO1	CO2	CO3
PO1	An ability to apply knowledge of mathematics and engineering science.	**NONE**	**SLI**	**MED**
PO2	An ability to demonstrate, develop and conduct experiments, as well as to analyze and interpret data.	**SLI**	**MED**	**SLI**
PO3	An ability to design a system component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	**SLI**	**MED**	**SUB**
PO4	An ability to perform with multidisciplinary teams.	**MED**	**MED**	**SUB**
PO5	Use of appropriate modern tool and application software that pertain to Automobile engineering technology systems.	**NONE**	**SUB**	**MED.**
PO6	An ability to identify, formulates, execute and solve engineering problems.	**SLI.**	**SUB**	**SUB**
PO7	An ability to communicate and present effectively in both verbal and written forms.	**SLI**	**MED.**	**SUB**
PO8	The broad education necessary to understand the impact of engineering solutions in global, economic, environmental and societal context.	**MED.**	**SUB.**	**SUB.**
PO9	Recognition of need for self-improvement, and an ability to engage in life-long learning.	**SLI**	**MED**	**MED**
PO10	Ability to aware about the contemporary issues.	**SLI**	**SLI**	**MED**
PO11	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	**SUB**	**MED.**	**SUB**
PO12	Demonstrate to analyse and apply unconventional processes, automation, robotics Nanotechnology, Computer-Aided-Design & Manufacturing and knowledge in Automobile Engineering, Thermodynamics, Refrigeration & Air Conditioning and Jet Propulsion & Rocket Engineering to analyse and solve complex problems and to work professionally in such systems and plants.	***SUB***	**MED.**	**SUB**