

**B.E Semester: 6 Automobile Engineering**  
**Subject Name: Automotive Electrical System (AE603-N)**

**A. Course Objective:**

The course should enable the student to

- Understand construction and working of batteries and ignition system.
- Understand the construction and working of starting system.
- Know about the working of charging system
- Understand the construction and working of different accessories.

**B. Teaching / Examination Scheme:**

Teaching Scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

**C. Detailed Syllabus:**

Unit No.	Details
1	<b>Automobile Electrical Systems and electronics system</b> Electrical and electronic principles, insulator, conductor and semiconductor, voltage current and resistance, measurement of current, voltage and resistance, common circuit symbols for automobiles, series and parallel circuits, purpose of automotive electrical system, layout of an electrical system.
2	<b>Starting system</b> Requirement of starting system, starter motor capacity, starter system circuits, system layout, starting motor and types of starting motor, starting drives- bendix drives, overrunning clutch drive, starter switches, starting system in two wheeler, autostart circuit for two wheeler.
3	<b>Charging system</b> Charging system requirement, principles of operation of charging system Charging circuit, Types of charging system, DC generator, A.C. generator- operating principle, construction and working, cutout relay, current regulator and voltage regulator.
4	<b>Ignition system</b> Requirements. Types of Ignition systems: Ballast Resistance, Ignition coil characteristics, Cam angle & contact angle gap, spark advance mechanism, spark plug, ignition timing, multi-cylinder distributor, Distributor (contact breaker ignition system), limitations of coil ignition system, electronic ignition systems. Voltage and current required for Spark.
5	<b>Magneto Systems</b> Introduction, principal of magneto, classes of magneto, rotating magneto, camshaft magneto, flywheel magneto, polar inductor magneto.

6	<b>Lighting system</b> Lighting requirements and regulations, lighting circuit, wires and cables-current carrying capacities and sizes of cables, cable color code, cable connectors, fuses, headlights, automotive bulbs, headlamp layout system, and switches.
7	<b>Battery system</b> Various Types of Automotive batteries. Principles, Construction & working of lead acid battery, dry battery & Alkaline battery. Designations & Rating of Batteries. Performance tests: Battery Capacity, Efficiency, Gravimetric test and efficiency. Battery failures. Recharging: Electronic circuits, battery charging current, charging methodology & precautions.
8	<b>Accessories &amp; dashboard instruments</b> Introduction, direction indicators, windshield wiper, windshield washer, electric horns, heater, air conditioning, power window, Electronic power steering, central locking system, vehicle tracking system. Dashboard instruments: Instrument panel, instruments and their functions, speedometer, odometer, cooling water temperature gauge, lubricating oil pressure gauge and fuel gauge.

**Total hours (Theory):64**

**Total hours (Practical):32**

**Total hours:96**

#### D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup>	Unit 1	20%	1,2
2	4 <sup>th</sup> , 5 <sup>th</sup> , 6 <sup>th</sup>	Unit 2	20%	3
3	7 <sup>th</sup> , 8 <sup>th</sup> , 9 <sup>th</sup>	Unit 3	20%	4
4	10 <sup>th</sup> , 11 <sup>th</sup> , 12 <sup>th</sup>	Unit 4	20%	5,6
5	13 <sup>th</sup> , 14 <sup>th</sup> , 15 <sup>th</sup> , 16 <sup>th</sup>	Unit 5	20%	7,8

#### E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures. Suggested list of experiment is given below.

#### F. List of Practical:

1	Experiment on testing of battery.
2	Demonstration and testing on ignition system.
3	Demonstration and testing of starter motor.
4	Demonstration and testing of generators.
5	Demonstration and experiments on lighting system.
6	Demonstration and experiments on automobile accessories.
7	Demonstration and experiments on automotive dashboard instruments.
8	Study of electrical wiring layout.

#### G. Text Books & Reference Books:

	<b>A. Text Books:</b>
1	Automobile Electrical and Electronics, by A. L. Statini, Delmar Publications.
2	Automobile Engineering-I by P.S. Gill, S.K. Katriya and sons.
3	Automobile Technology by Dr. N.K. Giri, Khanna publishers.
4	Automobile Engineering vol I & II by K.M. Gupta, Umesh publications.
5	Automotive Electrical Equipments, by P. L. Kohli, Tata McGraw Hill Pub. Co. Ltd
6	Automobile Electrical & Electronic Systems, by Tom Denton, Allied Publishers Pvt. Ltd., Chennai
7	Automotive mechanics by W. Crouse, TMH