B.E Semester: VI

Automobile Engineering

Subject Name: Electrical and electronics for automobile system (AE602)

Course Objective:

- To present a problem oriented in depth knowledge of electrical and electronics for automobile system.
- To address the underlying concepts and methods behind electrical and electronics for automobile system.

Teaching / Examination Scheme:

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
AE602	Electrical and electronics for automobile system	3	0	2	5	4	3	70	30	20	30	150

Detailed Syllabus:

Topic no	Details
1	**Automobile Electrical Systems and electronics system :** 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 pararrel circuits, purpose of automotive electrical system, layout of an electrical system**.**
2	**Battery system:** 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.
3	**Starting system –** 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.
4	**Charging system –** 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.
5	**Ignition system –**

	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.
6	**Lighting system-** 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	**Accessories & dashboard instruments:** Introduction, direction indicators, windshield wiper, windshield washer, electric horns, heater, air conditioning, power window, 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.
8	**Electronic systems:** for CRDI & MPFI engine injection system regulation, control & Management. ECU for Engine, ABS and On Board Diagnostic (OBD) systems. Electronic power steering, vehicle tracking system.

Lesson Planning:

Sr.No.	Date/Week	Unit No.	% Weightage	Topic No:
1	1^{st} ,2^{ed} ,3^{ed}	Unit 1	20 % .	1,2
2	4^{th} ,5^{th} ,6^{th}	Unit 2	20 %	3
3	7^{th} ,8^{th} ,9^{th}	Unit 3	20 %	4
4	10^{th} ,11^{th} ,12^{th}	Unit 4	20 %	5,6
5	13^{th} ,14^{th} ,15^{th}	Unit 5	20 %	7,8

Instructional Method & Pedagogy:

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- 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.
- 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.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.
    - Study of Automobile electrical wiring.
    - Experiment on testing of battery.
    - Demonstration and experiment on ignition system.
    - Testing of starting motors.
    - Testing of generators.
    - Testing of regulators and cut – outs.
    - Demonstration and experiment on lighting system
    - Demonstration and experiment on automobile accessories
    - Demonstration and experiment on automotive dashboard instruments.

Practical / Oral: The candidate shall be examined on the basis of term-work.

Students Learning Outcomes

- The student can identify different areas of automobile electrical and electronics.
- Can find the applications of all the areas in day to day life.

Recommended Study Materials

Text & Reference Books:

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