

**Subject Code: 01AE0501**
**Subject Name: Automotive Electrical & Electronics**
**B.Tech. III Year – (Sem-5) Automobile Engineering**
**Type of course:** Engineering

**Prerequisite:** Element of Electrical Engineering

**Rationale:** Understanding of application of electrical and electronic system in automobile vehicle

**Course Outcome:**

After learning the course the students should be able to:

1. Understand the basic auto electrical systems.
2. Understand the layout of wiring and connections of electrical systems in automobiles.
3. Understand the working of different electrical components used in automobiles.

**Teaching and Examination Scheme:**

Teaching Scheme (Hours)			Credits	Evaluation Scheme					Total Marks
Theory	Tutorial	Practical		Theory Marks			Practical Marks		
				ESE(E)	IA	CSE	Viva(V)	Term Work(TW)	
3	0	2	4	50	30	20	25	25	150

Sr No	Contents	Duration	Weightage
1	<b>Batteries and Accessories</b> Principle and construction of lead acid battery, characteristics of battery, rating capacity and efficiency of batteries, various tests on batteries, maintenance and charging. Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficar.	9	20
2	<b>Starting System</b> Condition at starting, behaviour of starter during starting, series motor and its characteristics, principle and construction of starter motor, working of different starter drive units, Starter motor requirements, care and maintenances of starter motor, Drive mechanisms, starter switches.	7	15
3	<b>Charging System</b> Generation of direct current, shunt generator characteristics, armature reaction, third brush regulation, cut out. Voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers, new developments.	4	10

<b>4</b>	<b>Fundamentals of Automotive Electronics</b> Current trends in automotive electronic engine management system, electromagnetic interference suppression, electromagnetic compatibility, electronic dashboard instruments, on board diagnostic system, security and warning system.	6	15
<b>5</b>	<b>Sensors and Actuators</b> Types of sensors: sensor for speed, throttle position, exhaust oxygen level, manifold pressure, crankshaft position, coolant temperature, exhaust temperature, air mass flow for engine application. Solenoids, stepper motors, relay.	13	25
<b>6</b>	<b>Safety and Security Systems</b> Keyless entry system, Antilock braking system, Air bag restraint system, Adaptive cruise control system, Voice warning system, Seat belt system, antitheft system.	5	15

R Level	U Level	A Level	N Level	E Level
20	20	30	20	10

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate**

### References

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.
2. Kholi.P.L. "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi, 1975.
3. Robert Bosch "Automotive Hand Book", SAE (5th Edition), 2000.
4. Ganesan V. "Internal Combustion Engines", Tata McGraw-Hill Publishing Co., New Delhi, 2003.
5. Crouse, W.H. "Automobile Electrical Equipment", McGraw-Hill Book Co., Inc., New York, 3rd edition, 1986.
6. Allan W. M. Bonnicksen, Automotive Computer Controlled Systems, Butterworth-Heinemann A division of Reed Educational and Professional Publishing Ltd
7. William B. Ribbens, Understanding Automotive Electronics, William B. Ribbens,-Sixth edition Elsevier Science 2003

### List of Experiments:

1. Introductory study of automobile electrical systems.
2. Study of automobile battery System.
3. Study of electrical engine starting system.
4. Study of different types of battery charging system.
5. Study of different types of ignition systems.
6. Study of automobile lighting system.
7. Study of different types of gauges, sensors and meters of an automobile.
8. Study of various electrical equipments like Windscreen wipers, power windows, Rear wind shield glass heating system, Central Locking system