

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VIII

AUTOMOBILE ENGINEERING

Subject Name: **AUTOMOTIVE ELECTRICALS AND ELECTRONICS**

Sr. No.	Course Contents	Total Hrs
1.	<u>Automobile Electrical Systems and electronics system :</u> Storage, Distribution systems & Generation of electric energy, Lighting system, 12 Volt & 24 volt systems. Insulation and earth (negative and positive earthing) system, types of cables used, colour codes, cable connectors, wiring, fuse system, circuit breakers, Relays, Switches. Layout and Wiring diagram for 2, 3 and 4 wheeler vehicles, Buses and Commercial vehicles.	4
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.	6
3.	Starting system – Principle, Starting torque, engine resistance torque, and power required for starting of engine. Starter motor and its circuit. Types of drive mechanisms: bendix drive, pinion type, axial sliding armature starter. Slipping and overrunning of clutches, automatic switches for starting, cold starting devices: Glow plug & choke.	8
4.	Charging system – Need. Charging circuit, Types of charging system: D.C. dynamo, AC dynamo, flywheel magneto charging system and Alternator (more emphasis on Alternators). Charging system controlling & regulator system: Relay/cut-out, voltage and current regulator, compensated voltage and current regulator, electronic regulator, regulator characteristics. Drive for Charging system.	8
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. Spark Plug, characteristics, material, types, plug fouling.	8
6.	Lighting system- Lighting system of vehicle, head lamp, tail lamp, brake lamp, parking lamp etc, other types of lamps used. Reflector purpose and design, head lamp angle and position, fog lamp, side indicator lamp, warning lights and flashers, instrument panel lights, body interior lights. Safety indicator lights. Engine compartment & Rear boot lamps.	8
7.	Horns- AC & DC horns, wind tone horn/air horns, electronic horn, reverse horn. Horn relay. Warning Buzzer. Sensors - Instrument Cluster panel, fuel gauges, oil temperature gauge, warning light sensors, coolant temperature gauge, speedometer, Odometer, tachometer, trip meter, oil level indicator, parking brake indicator, direction indicators.	6
8.	Electrical Equipments & Accessories - Windscreen wipers, windscreen washers, power windows, doors locks, Rear wind shield glass heating system. Rear view mirror Adjusting, Day light regulating system. Central Locking system. Convertible Mechanism.	3
9.	Electronic systems: for CRDI & MPFI engine injection system regulation, control & Management. ECU for Engine, ABS and On Board Diagnostic (OBD) systems. Electronic power steering.	3
10.	Electrical system for Climate Control system: Air conditioning, Heating &	2

	defrosters.	
11.	Testing Instruments: Ignition coil tester, Distributor tester, Battery tester, Timing devices, Inspection of electrical systems.	2
12.	Introduction to Microprocessors, Micro controllers, PLC - Structure and programming applications in Automobiles.	2

Text Books :

1. Automobile Electrical and Electronics, by A. L. Statini, Delmar Publications.

Reference Books:

1. Automotive Electrical Equipments, by P. L. Kohli, Tata McGraw Hill Pub. Co. Ltd.
2. Automobile Electrical & Electronic Systems, by Tom Denton, Allied Publishers Pvt. Ltd., Chennai.
3. Automobile Electrical & Electronic Equipments, by Young, Griffiths, The English Language Book Co., London.
4. Understanding Automotive Electronics, by Bechfold SAE Publications
5. Fundamentals of Automotive Electronics, by V.A.W. Hilliers, Hatchin, London
6. Automotive Computer & Control System, by Tomwather J. R., Cland Hunter, Prentice Hall NJ
7. Understanding Automotive Electronics, by William B. Ribbens, Allied Publishers Pvt. Ltd. Chennai
8. Automotive mechanics by W. Crouse, TMH