



**Diploma branch in which subject is offered:** - Automobile Engineering

**Objective:** The course aims to impart understanding of automotive electronics systems, sensors, actuators and testing skills to find the fault in working of them.

**Credits Earned: 05**

**Course Outcomes:**

After learning the course, the students should be able to:

- Understand the basic concepts of Automobile electronics
- Testing of sensors in automobile engineering
- Testing of actuators in automobile engineering
- Analyse use of computer and ECM in automobile engineering
- Identify different faults and error codes and solve them

**Pre-requisite of course:** Knowledge of basic concepts of electronics

**Teaching and Examination Scheme**

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
4	0	2	5	50	30	20	25	25	150

**Contents:**

Sr. No.	Topics	Teaching hrs.	Weightage
1	<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.	8	15
2	<b>Use of Diagnostic tools, equipment and techniques:</b> Diagnostic tools that connect to ECM, Digital Multi-meter, Oscilloscope, Circuit testing, Ignition system tests, Fault and error Codes, OBD II (On board diagnostic –II)	5	15



3	<b>Different ECM operated System:</b> Engine related systems. Ignition system, computer-controlled petrol fuelling injection systems, Engine management systems, Anti-lock braking systems, Traction control system, Stability Control system, air conditioning, computer-controlled diesel engine system	10	20
4	<b>Working and testing of Sensors:</b> Introduction of sensors and transducers Electromagnetic Sensors, Optical sensors, variable resistance type sensors, temperature sensors, Pressure sensors, variable capacitance sensors, Flow sensors, Piezoelectric sensors, Oxygen Sensor, Practical Importance of sensors	10	20
5	<b>Working and testing of Actuator:</b> Introduction of Actuators, Actuators operation, Petrol Injectors, Exhaust gas recirculation actuators/valves, Motors, Solenoids, ABS actuators, Idle speed control valves.	10	15
6	<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.	7	15

**References:**

**a) List of Books**

1. Automotive Computer Controlled Systems By Allan W. M. Bonnicks, Butterworth-Heinemann A division of Reed Educational and Professional Publishing Ltd
2. Ronald K Jurgen, "Navigation and Intelligent Transportation Systems – Progress in Technology", Automotive Electronics Series, SAE, USA, 1998
3. Ljubo Vlacic, Michel Parent and Fumio Harashima, "Intelligent Vehicle Technologies", Butterworth-Heinemann publications, Oxford, 2001.
4. Sensors and Transducers By Ronald K.Jurgen - SAE 2003
5. Automotive Technology By Jack Erjavec, Robert Scharff Delmar publications Inc 1992

**b) List of Major Equipment/ Instrument**

1. ECM/ ECU testing Kit
2. Logic gate kit
3. Analogue to digital convertor kit
4. Digital to analogue convertor kit
5. Car scanner
6. OBD-II Connector
7. Digital Multi-meter



8. Different sensor used in car
9. Different actuators used in car

**Suggested Theory distribution:**

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
35%	40%	25%	0	0	0

**Suggested List of Tutorials/Experiments**

1. Introductory testing of automobile electronic systems.
2. Testing of distributor less ignition system.
3. Testing of automotive air conditioning system.
4. Testing of automotive injection system.
5. Testing of ABS systems.
6. Testing of vehicle emission control and management systems.
7. Testing of safety sensors and actuators

**Instructional Method:**

1. Power point presentation showing various nomenclature of different components of engine and transmission system to design various dimensions.
2. Chart showing various nomenclatures of different components of engine transmission system.
3. Assignments during tutorials for basic design of different components of engine and transmission system