

22ECPE613	AUTOMOTIVE ELECTRONICS	SEMESTER VI				
PRE-REQUISITE:		CATEGORY	PE	Credit		3
		Hours/Week	L	T	P	TH
			3	0	0	3
Course Objectives:						
1.	The student will come to know the various stimuli that are to be measured in real life instrumentation.					
2.	He will be able to select the right process or phenomena on which the sensor should depend on					
3.	Aware of the various sensors available for measurement and control applications.					
Unit I	INTRODUCTION	9	0	0	0	9
Evolution of electronics in automobiles – emission laws – introduction to Euro I, Euro II, Euro III, Euro IV, Euro V standards – Equivalent Bharat Standards. Charging systems: Working and design of charging circuit diagram – Alternators – requirements of starting system – Starter motors and starter circuits.						
Unit II	FUNDAMENTALS OF VIRTUAL INSTRUMENTATION PROGRAMMING	9	0	0	0	9
Ignition systems: Ignition fundamentals - Electronic ignition systems - Programmed Ignition – Distribution less ignition - Direct ignition – Spark Plugs. Electronic fuel Control: Basics of combustion – Engine fuelling and exhaust emissions – Electronic control of carburetion – Petrol fuel injection – Diesel fuel injection.						
Unit III	SENSOR AND ACTUATORS	9	0	0	0	9
Working principle and characteristics of Airflow rate, Engine crankshaft angular position, Hall effect, Throttle angle, temperature, exhaust gas oxygen sensors – study of fuel injector, exhaust gas recirculation actuators, stepper motor actuator, and vacuum operated actuator.						
Unit IV	ENGINE CONTROL SYSTEMS	9	0	0	0	9
Control modes for fuel control-engine control subsystems – ignition control methodologies – different ECU's used in the engine management – block diagram of the engine management system. In vehicle networks: CAN standard, format of CAN standard – diagnostics systems in modern automobiles.						
Unit V	CHASSIS AND SAFETY SYSTEMS	9	0	0	0	9
Traction control system – Cruise control system – electronic control of automatic transmission – antilock braking system – electronic suspension system – working of airbag and role of MEMS in airbag systems – centralized door locking system – climate control of cars.						
Total (45L)= 45 Periods						

Text Books:	
1.	Tom Denton, “Automobile Electrical and Electronics Systems”, Edward Arnold Publishers, 2000.
2.	William B. Ribbens, “Understanding Automotive Electronics”, 5th edition, Newnes Publishing, 2000.
Reference Books:	
1.	Barry Hollembeak, “Automotive Electricity, Electronics & Computer Controls”, Delmar Publishers, 2001.
2.	“Fuel System and Emission controls”, Check Chart Publication, 2000.
3.	Ronald. K. Jurgon, “Automotive Electronics Handbook”, McGraw-Hill, 1999.
4.	S.Gupta and J P Gupta , "PC Interfacing for Data Acquisition and Process Control" , Instrument Society of America,1994.
E-References:	
1.	https://nptel.ac.in/courses/107106088
2.	https://www.youtube.com/watch?v=2losZDDqctU
3.	https://www.renesas.com/in/en/application/automotive/chassis-safety

Course Outcomes: Upon completion of this course, the students will be able to	Bloom's Taxonomy Mapped
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CO1	Know the importance of emission standards in automobiles	L2
CO2	Understand the electronic fuel injection/ignition components and their function	L3
CO3	Choose and use sensors and equipment for measuring mechanical quantities, temperature and appropriate actuators.	L3
CO4	Diagnose electronic engine control systems problems with appropriate diagnostic tools.	L3
CO5	Understand the safety measures in chassis and vehicle.	L3

COURSE ARTICULATION MATRIX

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3
CO1	3	3	1	3	3	3	2				3	3	3		2
CO2	3	3	2	3	3	3	2				3	3	3		2
CO3	3	3	3	3	3	3	2				3	3	3		2
CO4	3	3	2	3	3	3	2				2	3	3		2
CO5	3	3	2	3	3	3	2				3	3	3		2
Avg	3	3	2	3	3	3	2				2.8	3	3		2
3/2/1 - indicates strength of correlation (3-High,2- Medium,1- Low)															