

Course code.	Course Name	L-T-P Credits	Year of Introduction
IC367	Automobile Instrumentation	3-0-0-3	2016
Prerequisite : Nil			
Course Objective			
<ul style="list-style-type: none"> To understand the principles of conversion in design, construction and working of instrumentation and control systems in automobiles. To impart knowledge to graduating students on the basics of automobiles, control and design with the advanced sensors and microcontroller technology. To learn the standardization of communication protocol. To creates an awareness on Electronics Engineering and Information Technology related to vehicle concepts. 			
Syllabus			
Fundamentals of Automotive Electronics, Automobile Panel Meters and Sensor Design, Electronic Fuel Injection and ignition systems, Automobile chassis electronic control system, Automotive modelling and Vehicle control system, Indicating Instrumentation Design and Alarm Instruments.			
Expected Outcome			
The student will be able to apply the knowledge automotive instrumentation and will be equipped to take up the design and control of instrumentation related topics as part of their project works during higher semester of the course.			
Text book			
<ul style="list-style-type: none"> William B. Riddens, "Understanding Automotive Electronics", 5th Edition, (Butterworth Heinemann Woburn), (1998) 			
Reference books			
<ol style="list-style-type: none"> U.Kiencke, and L. Nielson, "Automotive Control Systems", Springer Verlag Berlin, 2000 Walter E, Billiet and Leslie .F, Foings, 'Automotive Electric Systems', American Technical Society, Chicago, 1971. Judge .A.W., ' Modern Electric Equipments for Automobiles', Chapman and Hall, London, 1975 Tom Weather Jr and Cland C. Hunter, "Automotive Computers and Control System", Prentice Hall Inc. New Jersey. Jiri Marek, Hans Petertrah, "Sensors Applications, Sensors for Automotive echnology" 1st Edition , Wiley 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Fundamentals of Automotive Electronics Open loop and closed loop systems components for electronic engine management.	2	15%
	Vehicle motion control, Digital cruise control.	2	
	<i>Current trends in modern Automobiles</i>	1	
II	Automobile Panel Meters and Sensor Design	3	15%
	Ergonomics – Panel Meters – Controllers – Sensor for Fuel Level in Tank, VehicleSpeed Sensor Design, Air Pressure Sensors.		
	Engine Oil Pressure Sensor Design, Engine Oil Temperature Sensor Design.	2	
	Moving Coil Instrument Design, Moving Iron Instruments, Balancing Coil Indicator Design, Ammeter and voltmeter – Odometer and Taximeter Design.	2	

FIRST INTERNAL EXAM			
III	Electronic Fuel Injection and ignition systems Introduction, Carburettor control system, throttle body ignition and multi port or point fuel injection, Advantages of electronic ignition system, Types of solid state ignition systems and their principle of operation, electronic spark timing control system	3	
	Engine control system: Engine cranking and warm up control, Acceleration enrichment – Deacceleration leaning and idle speed control, integrated engine control system, exhaust emission control system, Engine performance testing	4	
IV	Automobile chassis electronic control system Principle of electronic braking, automatic transmission electronic control circuit, cruise control circuit, the electronic steering control theory, ABS, ASR, ESP, and other electronic control method	4	15%
	Auto Body Electronic Control Technology: Automotive central locking and anti-theft system control technology, electronically controlled windows and doors and airbag technology, principle of control circuit components and characteristics.	3	
SECOND INTERNAL EXAM			
V	Automotive modelling and Vehicle control system Basic driveline equations, Modelling of neutral gear, State-space formulation, Driveline speed control, Driveline control for gear shifting.	3	20%
	Vehicle modelling, wheel model, tyre characteristics, complete vehicle model, validation of the model, velocity estimation.	3	
	Vehicle control system, Antilock Braking Systems (ABS), control cycles of ABS, road model, PID driver model, hybrid driver model, model of human information acquisition, complete driver model.	3	
VI	Indicating Instrumentation Design and Alarm Instruments Brake Actuation Warning System, Traficators, Flash System, Oil Pressure Warning System, Engine Overheat Warning System, Air Pressure Warning System, Speed Warning System, Door Lock Indicators, Gear Neutral Indicator, Horn Design, Permanent Magnet Horn, Air Horn, Music Horns.	3	20%
	Car Radio Stereo, Courtesy Lamp, Timepiece, Cigar Lamp, Car Fan, Windshield Wiper, Window Washer, Instrument Wiring System and Electromagnetic Interference Suppression, Wiring Circuits for Instruments, Electronic Instruments, Dash Board Illumination <i>Horn Switches, Dipper Switches, Pull and Push Switches, Flush Switches, Toggle Switches, Limit Switches, Ignition Key, Ignition Lock, Relay and Solenoid, Non – contact Switches</i>	4	
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks: 100

Exam Duration: 3 Hours

Part A

Answer any two out of three questions uniformly covering Modules 1 and 2. Each question carries 15 marks and can have not more than four sub divisions. (15 x 2 = 30 marks)

Part B

Answer any two out of three questions uniformly covering Modules 3 and 4. Each question carries 15 marks and can have not more than four sub divisions. (15 x 2 = 30 marks)

Part C

Answer any two out of three questions uniformly covering Modules 5 and 6. Each question carries 20 marks and can have not more than four sub divisions. (20 x 2 = 40 marks)

