GUJARAT TECHNOLOGICAL UNIVERSITY

AUTOMOBILE ENGINEERING (02)
AUTOMOTIVE COMPUTER CONTROLLED SYSTEMS
SUBJECT CODE: 2160208
B.E. 6th SEMESTER

Type of course: Core course

Prerequisite: Basic knowledge of computer systems

Rationale: The course is designed to give fundamental knowledge of automotive electronics like electronic devices used in automobile, sensors, transducers, actuators, microcontrollers and microprocessors. Application of electronic devices and systems also included in this course.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks			Practical Marks			
L	T	P	C	ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction of common technology**: Engine related systems. Ignition system, computer controlled petrol fueling injection systems, Engine management systems, Anti-lock braking systems, Traction control system, Stability Control system, air conditioning, computer controlled diesel engine system	10	15
2	**Computer ECM:** Fundamental parts of computer, Principles of operation, Computer data, Computer interfaces, Computer memories, Adaptive operating strategy of the ECM,	8	8
3	**Digital Electronics:** Logic gates, truth tables, Application of Logic gates, Flip-Flop, Analogue to Digital Conversion, Digital to Analogue conversion, Digital Displays (LED Display and Liquid crystal displays)	7	6
4	**Sensors:** 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	9	14
5	**Actuators:** Introduction of Actuators, Actuators operation, Injectors, Exhaust gas recirculation actuators, motors, Solenoids, ABS actuators.	7	14
6	**Diagnostic tools, equipments and techniques:** 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)	4	8
7	**Additional Technology:** Computer performance, Supplementary restraint systems(SRS), Coded ignition key, Fault tracing, Precautions when working with computer controlled system	4	5

* To be covered in practical sessions only.

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**20**	**15**	**10**	**10**	**5**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

1. Automotive Computer Controlled Systems By Allan W. M. Bonnick, Butterworth-Heinemann A division of Reed Educational and Professional Publishing Ltd
2. Understanding Automotive Electronics By Willium B. Ribbens, Willium B. Ribbens,-Sixth edition Elsevier Science 2003
3. Sensors and Transducers By Ronald K.Jurgen - SAE 2003
4. Automotive Technology By Jack Erjavec, Robert Scharff Delmar publications Inc 1992

Course Outcome:

After learning the course the students should be able to:

1. Understand the basic concepts of Automobile electronics
2. Understand and function and application of sensors in automobile engineering
3. Understand and function and application of actuators in automobile engineering
4. Understand and function and application of computer and ECM in automobile engineering
5. Understand and identify different faults and error codes and solve them

List of laboratory experiments:

1. To understand and study of electronic control module
2. To demonstrate and study of Logic gates
3. To understand and study of different sensors used in automobile
4. To understand and study of different actuators used in automobile
5. To Understand function of analogue to digital convertor and digital to analogue convertor
6. To understand application of On board diagnostic tools
7. To understand different errors and faults of automobile computer controlled system

Design based Problems (DP)/Open Ended Problem:

Major Equipment:

- ECM/ ECU testing Kit
- Logic gate kit
- Analogue to digital convertor kit
- Digital to analogue convertor kit
- Car scanner
- OBD-II Connector
- Digital Multi-meter
- Different sensor used in car
- Different actuators used in car

List of Open Source Software/learning website:

1. http://nptel.ac.in/
2. www.learnerstv.com

Active learning assignments: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.