

B.E Semester: 7 Automobile Engineering
Subject Name: Automotive Sensors and its Applications (AE703-N-D)
[Dept. Elect.-3]

Course Objectives:

- The purpose of this course is to introduce machine tools in their proper perspective and present the necessary to grasp the subject
- To learn and apply the basic terminology associated with different fields of sensors and applications.
- To address the underlying concepts, methods and application of different sensors and applications.

B. Teaching / Examination Scheme:

Teaching Scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract./ Viva	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	5	4	3	70	30	20	30	150

C. Detailed Syllabus:

Unit No.	Details
1	Introduction of automobile system Current trends in automobiles with emphasis on increasing role of electronics and software, overview of generic automotive control ECU functioning, overview of typical automotive subsystems and components, AUTOSAR.
2	Engine management systems Basic sensor arrangement, types of sensors such as oxygen sensors, crank angle position sensors, Fuel metering/ vehicle speed sensors, flow sensor, temperature, air mass flow sensors, throttle position sensor, solenoids etc., algorithms for engine control including open loop and closed loop control system, electronic ignition, EGR for exhaust emission control.
3	Vehicle power train and motion control Electronic transmission control, adaptive power Steering, adaptive cruise control, safety and comfort systems, anti-lock braking, traction control and electronic stability, active suspension control.
4	Active and passive safety system Body electronics including lighting control, remote keyless entry, immobilizers etc., electronic instrument clusters and dashboard electronics, aspects of hardware design for automotive including electro-magnetic interference suppression, electromagnetic compatibility etc., (ABS) antilock braking system, (ESP) electronic stability
5	Automotive standards and protocols Automotive standards like CAN protocol, Lin protocol, flex ray, OBD-II, CAN FD, automotive

	Ethernet etc. Automotive standards like MISRA, functional safety standards (ISO 26262).
6	System design and energy management BMS (battery management system), FCM (fuel control module), principles of system design, assembly process of automotives and instrumentation systems.

Total hours (Theory): 48
Total hours (Practical): 32
Total hours:80

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1 st ,2 nd ,3 rd	Unit 1	15%	1
2	, 4 th ,5 th ,6 th	Unit 2	20%	2
3	7 th , 8 th ,9 th ,	Unit 3	20%	3
4	10 th , 11 th ,12 th	Unit 4	20%	4
5	13 th , 14 th ,15 th ,16 th	Unit 5	25%	5,6

E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

F. List of Practical:

Sr. No.	Title
1	Study of speedometer, Tachometer, Odometer, Trip odometer.
2	Study of battery/ charging system lamp, low oil pressure lamp, airbag lamp.
3	Study of oil pressure gauge and coolant temperature gauge.
4	Study of hand-brake lamp, door ajar lamp, high beam lamp, malfunction indicator lamp/ check engine lamp.
5	Study of fuel gauge and low fuel lamp.
6	Study of hand brake indicator, turn light and engine service indicator.

7	Study of wheel balancing instruments.
8	Study of automatic vehicular washing system.
9	Study of electronic engine management system.
10	Study of CAN protocol.
11	Study of safety and security systems of vehicle.
12	Study of heating and air-conditioning system of vehicle.

G. Text Books & Reference Books:

	A. Text Books:
1	Understanding Automotive Electronics by William B. Ribbens, Butterworth Heinemann Woburn, 6th ed., 2003
2	Sensors Applications, Sensors for Automotive Technology by Jiri Marek, Hans Peter Trah, Wiley, 1 st Edition
3	U.Kiencke, and L. Nielson, Automotive Control Systems, Springer Verlag Berlin, 2000
	B. Reference Books:
1	Automotive Electrical Equipment by Young A.P., Griffiths, ELBS & New Press, 1999. 4. Understanding Automotive Electronic by Bechhold, SAE, 1998.
2	Automotive computers and control system by Tom Weather Jr. & Cland C. Hunter, Prentice Hall Inc., New Jersey.
3	Automobile Electrical Equipment by Crouse W.H., McGraw Hill Co. Inc., New York, 1995.
4	Automotive Hand Book by Robert Boshe, Bentely Publishers, 5th ed. Germany, 2005.