B.E Semester: 8 Automobile Engineering
Subject Name: Automotive Embedded Systems (AE803-N-D)
[Dept. Elect.-5]

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 Automotive Embedded Systems.
• To address the underlying concepts, methods and application of Automotive Embedded Systems.

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	**Electronics in the Automobile** Introduction- Body and convenience electronics: vehicle power supply controllers and lighting modules, door control modules, Safety electronics: active safety systems: ABS, ASR, ESP passive safety systems: Restraint systems and their associated sensors in an automobile. Powertrain Electronics: Gasoline engine management, Infotainment electronics: Dashboard/instrument cluster, car audio, telematic systems navigation systems multimedia systems cross application technologies. 42V vehicle power supply system.
2	**Drive by Wire** Challenges and opportunities of X-by-wire: system & design requirements, steer-by-wire, brake-by-wire, suspension-bypwire, gas-by-wire , power-by-wire, shift by wire. L T P/ S SW/F W TOTAL CREDIT UNITS 3 1 0 0 4 Future of Automotive Electronics
3	**Hardware Modules** Basic sensor arrangement, types of sensors such as- oxygen sensors, crank angle position sensors- Fuel metering vehicle speed sensors and destination sensors, Attitude sensor, Flow sensor, exhaust temperature, air mass flow sensors. Throttle position sensor, solenoids, stepper motors, relays
4	**Electronic Ignition systems** Electronic ignition systems. Types of solid state ignition systems and their principle of operation Digital engine control system. Open loop and closed loop control system, Engine cranking and warm up control. Acceleration enrichment. Deceleration learning and ideal speed control Distributor less ignition – Integrated engine control system, Exhaust emission control engineering

5	**Embedded Systems** Automotive Embedded systems. PIC, Free scale microcontroller based system. Recent advances like GLS, GPSS, GMS. Multiprocessor communication using CAN bus. Case study- cruise control of car. Artificial Intelligence and engine management.

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

D. Lesson Planning:

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

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 ABS, ASR, ESP passive safety systems
2	Study of vehicle power supply system
3	Study of X-by-wire, steer-by-wire, brake-by-wire, suspension-bypwire, gas-by-wire , power-by-wire, shift by wire
4	Study of basic sensor arrangement
5	Study of Attitude sensor, Flow sensor, exhaust temperature, air mass flow sensors.

G. Text Books & Reference Books:

1	Embedded System Design: A unified Hardware / Software Introduction" – Frank Vahid and Tony Givargis, Wiley India Publishers.
2	A Practical Introduction to Hardware/Software Co-Design"- Patrick R. Schaumont, Springer Publishers.