



Department of Automobile Engineering		LP: AE8012
B.E/B.Tech/M.E/M.Tech : B.E Automobile Engineering	Regulation:2018	Rev. No: 00
PG Specialisation : -		Date:
Sub. Code / Sub. Name : AE18012 - ENGINE AND VEHICLE MANAGAMENT SYSTEM		21/06/2017
Unit : I		

Unit-I Syllabus: INTRODUCTION

Microprocessor architecture, open and closed loop control strategies, PID control, Look up tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines and in the other parts of the automobile

Objective:

To make the students learn about the Fundamentals of electronics.

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Introduction to the syllabus Microprocessor architecture	1-Ch 3, Pg 91 -95 1-Ch 4, Pg 103 -135	PPT
2.	open and closed loop control strategies	1- Ch 4, Pg 138 - 141 1- Ch 2, Pg 56 - 60	PPT
3.	PID control	1-Ch 2, Pg 60-68	PPT
4.	Look up tables	1-Ch 4, Pg 141 - 143	PPT
5.	Introduction to modern control strategies	1-Ch 5, Pg 160-164	PPT
6.	Fuzzy logic control	1-Ch 5, Pg 160-164	PPT
7.	Adaptive control techniques	1-Ch 5, Pg 160-164	PPT
8.	Parameters to be controlled in SI engines	1-Ch 5, Pg 156 -160	PPT
9.	Parameters to be controlled in CI engines.and the other parts of the automobile	1-Ch 5, Pg 156 -160 1- Ch 20, Pg 861-879	PPT
Content beyond syllabus covered (if any): Hydraulics and Pneumatics, PLC Basics			

* Session duration: 50 minutes.



Sub. Code / Sub. Name: **AE8012** - ENGINE AND VEHICLE MANAGEMENT SYSTEM
Unit : II

Unit - II Syllabus: SENSORS

Inductive, Hall Effect, hot wire, thermistor, piezo electric, piezoresistive, based sensors. Throttle position, air mass flow, crank shaft position, cam position, engine and wheel speed, steering position, tire pressure, brake pressure, steering torque, fuel level, crash, exhaust oxygen level (two step and linear lambda), knock, engine temperature, manifold temperature and pressure sensors.

Objective

To understand and study about various sensors

Session No *	Topics to be covered	Ref	Teaching Aids
10.	Inductive, Hall effect sensors	1- Ch.6, Pg. 187 - 912 2- Ch.1, Pg 2-22	PPT
11.	Hot wire, thermistor, piezo electric sensors	1- Ch.21, Pg. 912-919 2- Ch.4, Pg 131-135	PPT
12.	Piezoresistive based sensors, Throttle position, air mass flow sensors	1- Ch.21, Pg. 919-920 2- Ch.5, Pg 192-197, 1- Ch. 6, Pg. 206-207 1- Ch. 6, Pg. 187-194	PPT
13.	Crank shaft position, cam position sensors	1- Ch. 6, Pg. 194-200 2- Ch.5, Pg 192, 226	PPT
14.	Engine and wheel speed, sensors, Steering position, tire pressure sensors	1- Ch. 6, Pg. 200 - 201 1- Ch. 21, Pg. 915-918	PPT
15.	EGO (exhaust oxygen level)- (two step and linear lambda), sensors	1- Ch. 6, Pg. 208-213	PPT
16.	Knock, engine temperature sensors	1- Ch. 6, Pg. 206-208	PPT
17.	Manifold temperature sensors.	1- Ch. 21, Pg. 925-926 2- Ch.5, Pg 192, 226 2- Ch.5, Pg 217, 226	PPT
18.	Manifold pressure sensors, Fuel level & crash sensor	1- Ch. 21, Pg. 915-920 1- Ch. 21, Pg. 922-936	PPT

Content beyond syllabus covered (if any):

Limit switch (Mechanical contact type sensor) basics

* Session duration: 50 mins.



Sub. Code / Sub. Name: **AE8012** - ENGINE AND VEHICLE MANAGEMENT SYSTEM
Unit : III

Unit - III Syllabus: SI ENGINE MANAGEMENT

Three way catalytic converter, conversion efficiency versus lambda. Layout and working of SI engine management systems like Bosch L-Jetronic and LH-Jetronic. Group and sequential injection techniques. Working of the fuel system components. Cold start and warm up phases, idle speed control, acceleration and full load enrichment, deceleration fuel cut off. Fuel control maps, open loop control of fuel injection and closed loop lambda control. Electronic ignition systems and spark timing control. Closed loop control of knock.

Objective

To know the various SI engine management techniques.

Session No *	Topics to be covered	Ref	Teaching Aids
19.	Three way catalytic converter, Conversion efficiency versus lambda.	1-Ch. 5, Pg. 162-167 1-Ch. 5, Pg. 162-167	PPT
20.	Layout and working of SI engine management systems,	2-Ch. 6, Pg. 269-270	PPT
21.	Bosch L-Jetronic and LH-Jetronic	2-Ch. 6, Pg. 271-273	PPT
22.	Group and sequential injection techniques	2-Ch. 7, Pg. -340-345	PPT
23.	Working of the fuel system components. Cold start and warm up phases, idle speed control	2-Ch. 7, Pg. -340-349 2-Ch. 6, Pg. 273-274	PPT
24.	Acceleration and full load enrichment Deceleration fuel cut off. Fuel control maps,	2-Ch. 6, Pg. 274-276 2-Ch. 6, Pg. 276-280	PPT
25.	Open loop control of fuel injection closed loop lambda control fuel injection	2-Ch. 6, Pg. 294-280	PPT
26.	Electronic ignition systems and spark timing control	2-Ch. 6, Pg. 279-310	PPT
27.	Closed loop control of knock.	2-Ch. 6, Pg. 283-287	PPT
Content beyond syllabus covered (if any): Bosch K-Jetronic and KL-Jetronic			

* Session duration: 50 mins.



Sub. Code / Sub. Name: AE8012 - ENGINE AND VEHICLE MANAGEMENT SYSTEM
Unit : IV

Unit -IV Syllabus: CI ENGINE MANAGEMENT

Fuel injection system parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced post injection and retarded post injection. Electronically controlled Unit Injection system. Layout of the common rail fuel injection system. Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valves,

Objective

To know the various CI engine management techniques.

Session No *	Topics to be covered	Ref	Teaching Aids
28.	Fuel injection system parameters affecting combustion	1- Ch 21, Pg 908-912	PPT
29.	Noise and emissions in CI engines	1- Ch 21, Pg 912-919	PPT
30.	Pilot, main injection, Advanced post-injection, Retarded post-injection,	1- Ch 21, Pg 915-926	PPT
31.	Electronically controlled Unit Injection system	1- Ch 21, Pg 910-912	PPT
32.	Layout of the common rail fuel injection system (CRDI)	6- Ch 01, Pg 33	PPT
33.	Working of components like fuel injector, fuel pump	4- Ch. 6, Pg. 202-204	PPT
34.	Rail pressure limiter,	4- Ch. 6, Pg. 195-209 6- Ch 5, Pg. 210-227	PPT
35.	Flow limiter , EGR valves	6- Ch 5, Pg. 228-239 4- Ch. 6, Pg. 209-230	PPT
36.	Fuel injection system components	4- Ch. 6, Pg. 231-234	PPT
Content beyond syllabus covered (if any):			
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* Session duration: 50 mins.



Sub. Code / Sub. Name: AE8012 - ENGINE AND VEHICLE MANAGEMENT SYSTEM
Unit : V

Unit - V Syllabus: VEHICLE MANAGEMENT SYSTEMS

ABS system, its need, layout and working. Electronic control of suspension – Damping control, Electric power steering, Supplementary Restraint System of air bag system – crash sensor, seat belt tightening. Cruise control. Vehicle security systems alarms, vehicle tracking system. On board diagnostics. Collision avoidance Radar warning system.

Objective

To understand and study the vehicle management systems.

Session No *	Topics to be covered	Ref	Teaching Aids
37.	ABS system, its need, layout and working.	2-Ch. 7, Pg. 311-314	PPT
38.	Electronic control of suspension, Damping control	2-Ch. 7, Pg. 312 -313	PPT
39.	Electric power steering	2-Ch. 7, Pg. 314	PPT
40.	Supplementary Restraint System of air bag system	2-Ch. 7, Pg. 315-318	PPT
41.	crash sensor, seat belt tightening	2-Ch. 7, Pg. 318-328	PPT
42.	Cruise control	2-Ch. 7, Pg. 328	PPT
43.	Vehicle security systems alarms	2-Ch. 7, Pg. 330	PPT
44.	vehicle tracking system	2-Ch. 7, Pg. 349-355	PPT
45.	On board diagnostics, Collision avoidance Radar warning system	2-Ch. 7, Pg. 356-366 2-Ch. 7, Pg. 372-378	PPT

Content beyond syllabus covered (if any):
Advantage of Numerical methods for finding the Natural frequency.



* Session duration: 50 mins.



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REFERENCES:

1. William B Ribbens, "Understanding Automotive Electronics", 8th edition, Butterworth Heinemann, 2017.
2. Eric Chowanietz, "Automobile Electronics", SAE Publications, 1995.
3. Robert Bosch, "Diesel Engine Management", Wiley-Blackwell, 4th edition, 2006.
4. Robert Bosch, "Gasoline Engine Management", Wiley, 3rd edition, 2006.

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Date	05/01/2024	05/01/2024
Remarks *:		
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD