

Program: Diploma in Automobile Engineering	
Course Code: 6051B	Course Title: Automotive Vehicle and Body Control Systems
Semester: 6	Credits: 4
Course Category: Program Elective	
Periods per week: 4 (L:4, T:0, P:0)	Periods per semester: 60

Course Objectives:

- To explain the principle of chassis management system, vehicle control system and different types of sensors used in the systems.
- To interpret various vehicle safety systems.

Course Prerequisites:

Topic	Course code	Course name	Semester
Electricity storage and distribution, electronic systems		Automobile electrical and electronics systems	3
Suspension system, chassis components, brakes systems.		Automobile chassis and Transmission	4

Course Outcomes:

On completion of the course, the student will be able to:

CO _n	Description	Duration (Hours)	Cognitive level
CO1	Summarize electronic suspension and steering systems	14	Understanding
CO2	Explain the cruise control system and Antilock braking system	14	Understanding
CO3	Summarize the features of modern Automotive wiper, and washer. Air-conditioning, and instrumentation	15	Understanding
CO4	Outline the features of power windows, Airbags and security systems.	15	Understanding

	Series Test	2	
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CO – PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2	3						
CO3	3						
CO4	3						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcomes	Description	Duration (Hours)	Cognitive level
CO1	Summarize electronic suspension and steering systems		
M1.01	Outline Components of the electronic suspension system	3	Understanding
M1.02	Explain the working of the adjustable shock absorber	4	Understanding
M1.03	Demonstrate the electronic suspension control	4	Understanding
M1.04	Outline the features of Electronic steering control	3	Understanding
Contents: Vehicle control systems; Suspension control: Electronic Suspension system - Adjustable shock absorber - Electronic suspension control system Steering Control - Power steering - types - Electronic steering control - 4-wheel steering configuration			
CO2	Explain the cruise control system and Antilock braking system		
M2.01	Illustrate the cruise control system	4	Understanding
M2.02	Illustrate the advanced cruise control system	3	Understanding

M2.03	Explain the antilock braking system	3	Understanding
M2.04	Explain traction control	4	Understanding
	Series Test – I	1	

Contents:

Vehicle control systems: Cruise control - Types of vehicle motion - Typical cruise control system - cruise control configuration - Block diagram - Digital cruise control system- Digital speed sensor - Digital speed measurement system - vacuum operated throttle actuator - Cruise control configuration - Advanced cruise control

Braking control: Antilock braking system - Components and Block diagram- forces during braking - Theory of ABS - Tyre slip controller

Overview of traction Control used in differential.

CO3	Summarize the features of modern Automotive wiper, washer. Air-conditioning, and instrumentation		
M3.01	Illustrate windshield wiper and washer system	4	Understanding
M3.02	Explain automatic air conditioning	5	Understanding
M3.03	Illustrate various electronic meters used in automobiles	6	Understanding

Contents:

Body control systems: Wind shield wiper/washer system-Intermittent wiper system-Rain sensing wipers

Automatic air conditioning: Fundamentals of HVAC (Heating Ventilating and Air conditioning) controls - Working - Parameters - Elements of control system.

Electronic meters: modern automotive instrumentation - Block diagram - computer based instrumentation system - Fuel quantity sensor and measurement - Coolant temperature sensor and measurement - Oil pressure sensor and measurement - Vehicle speed sensor and measurement

CO4	Outline the features of power window, Air bags and security systems.		
M4.01	Explain the power window, power lock, and power mirror systems	5	Understanding
M4.02	Illustrate the working of airbags	5	Understanding
M4.03	Explain various security systems in modern automobiles	5	Understanding
	Series Test – II	1	

Contents:

Body control systems: Power windows: Power lock Systems - Power seats - Power mirror

<p>system</p> <p>Rear obstacle detection</p> <p>Seat Belts - Air bags - side air bags - pre-collision system-</p> <p>Security systems: Security and antitheft devices - keyless entry - smart keys - alarm systems</p> <p>Communication systems</p>
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Text / Reference:

T/R	Book Title/Author
T1	U.Kienck, and L. Nielsen, Automotive Control Systems, SAE and Springer - Verlag 2000
R1	LjuboVlacic, Michel Parent, Fumio Harashima, “Intelligent Vehicle Technologies”, Butterworth-Heinemann publications, Oxford, 2001
R2	Crouse, W.H & Anglin, D.L, “Automotive mechanics”, Intl.Student edition, 9 th edition, TMH, NewDelhi, 2002.
R3	William B. Ribbens-Understanding Automotive Electronics, 5 th edition, Butter worth Heinemann Woburn 1998.
R4	Bosh, “Automotive Handbook”, 6 th edition, SAE,2004

Online Resources:

Sl.No	Website Link
1	https://www.edmunds.com/car-technology/suspension-iii-active-suspension-systems.html
2	https://www.bosch-mobility-solutions.com/en/products-and-services/passenger-cars-and-light-commercial-vehicles/driver-assistance-systems/adaptive-cruise-control/
3	https://www.youtube.com/watch?v=ru4JIZ-x8yo
4	https://lifeskillprogram.files.wordpress.com/2014/05/automotive-instrumentation.pdf
5	https://www.youtube.com/watch?v=scWc_9ALo9Y
6	https://www.youtube.com/watch?v=R4ekbB5EzZM