



SARVAJANIK UNIVERSITY
Sarvajani College of Engineering and Technology
Bachelor of Technology



Mechanical Engineering
Semester IV

Course Name: Automobile Systems

Course Code: BTME19451

Type of course: Minor – Modern Vehicle Technology

Prerequisite: Passion for Automobile Technologies and new trends in it.

Rationale of Course: The course is designed to understand basic components used in automobile, latest technologies and its application. This Course also Briefs about electric and hybrid vehicles.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	2	4	60	25	15	30	20	150

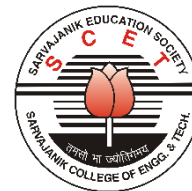
CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests) **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in the course.

Contents:

Sr. No.	Content	Total Hrs	Module Weightage
1	Introduction: Automobile classification and specification, Automobile chassis: General layout, types of layouts and its arrangement, Body construction type and materials	05	10%
2	Power Transmission systems: Clutch: Constructional features and working of a single plate, multi-plate, semi centrifugal and centrifugal clutch. Transmission gearbox: sliding mesh, constant mesh, synchromesh gearboxes and four-wheel drive. Automatic Transmission and CVT Propeller shaft and Final drive: Propeller shaft, universal joints, Hotchkiss & Torque tube Drives. Differential gearbox. Axle: Rear axle, Classification, types of the front axle, Construction, Components and their functions, types of rear axle and application.	10	20%



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Sr. No.	Content	Total Hrs	Module Weightage
3	<p>Suspension and Steering System: Suspension: Principle, Types of suspension systems, Functional requirements of suspension systems, types and Constructional features of Front Suspension and Rear suspension system, Spring types and Air suspensions.</p> <p>Steering System: Steering Layout, types of steering gears, steering linkages, steering mechanism, steering geometry, definitions and significance of camber, caster king, pin inclination, toe-in and toe-out on the turn. Steering ratio, understeering and oversteering, power-assisted steering, and wheel alignment.</p>	06	15%
4	<p>Wheel and Tyres: Types of wheels, types of tyres, tyre construction, constituents of the tyre, tyre tread pattern, tyre pressure and wear, tyre properties, tyre size, tyre maintenance.</p>	03	10%
5	<p>Brake system: Components and configurations, Fundamentals of braking: braking distance, braking efficiency, weight transfer, wheel skidding, Brake proportioning and adhesion utilization, Hydraulic brake system, Power-assisted brakes, ABS and EBD: Working principles, Features and advantages</p>	04	10%
6	<p>Road Load Analysis: Vehicle Loads: Forces acting on the vehicle in motion, Transmission efficiency, Rolling resistance, Grade resistance, the tractive force with uniform speed and with the acceleration of the vehicle. Stability of a vehicle in motion around the curve.</p>	06	15%
7	<p>Safety systems and Modern Automobiles: Safety interlocks and alarms, Engine Control Unit. Active and Passive Safety Systems, Seat belt, Airbag, ACD, Electronic Stability Control (ESC), Tire Pressure Monitoring System (TPMS) Lane Departure Warning System (LDWS), Adaptive Cruise Control (ACC), Driver Monitoring System (DMS). Blind Spot Detection (BSD) and Night Vision System (NVS).</p> <p>Layout and components of Electric and Hybrid Vehicle, Types of Hybrid vehicles, Batteries, Electric Motors, Regenerative Braking.</p>	11	20%



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Percentage Distribution of Marks as per Bloom’s Taxonomy (Theory/Practical):

Percentage Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	50	15	10	10	-

Legends: **R:** Remembrance, **U:** Understanding; **A:** Application, **N:** Analyse, **E:** Evaluate **C:** Create and above Levels

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 Text Books:

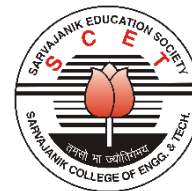
Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Automobile Engineering	G.B.S. Narang	Khanna Publishers	1995	5 th
2	Automobile Engineering	K. M. Gupta	Umesh Publications	NA	NA
3	A Text-Book of Automobile Engineering	R. K. Rajput	Laxmi Publications (P) Ltd.	2017	2 nd
4	Automotive Mechanics	W. Crouse	Tata Mc Graw Hill	NA	10 th
5	Vehicle Dynamics	Thomas Gillespie	SAE International	2021	Revised

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Compare and select the type of vehicle as per safety, features and applications.	10
CO-2	To Study working of various Automobile Systems	40
CO-3	Identity faults and diagnosis of automobile systems.	20
CO-4	Evaluate vehicle performance for different driving and road conditions.	15
CO-5	Study of modern Hybrid/Electric automobiles	15



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Mapping with Program Outcomes (PO's) and Program Specific Outcomes (PSO's):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	2	2	0	2	2	2	1	0	1	0	3
CO-2	2	2	2	2	3	1	2	0	3	2	3	2
CO-3	2	3	3	1	2	1	2	1	2	3	1	2
CO-4	3	2	2	1	2	2	3	1	2	2	0	2
CO-5	3	2	3	2	3	2	3	2	3	3	3	3
Rationale*	12	11	12	6	12	8	12	5	10	11	7	12

***Rationale of CO-PO-PSO mapping*:** This course highly maps with PO 1,2,3,5,7,9,11,12. It states that the course will develop basic engineering knowledge related to automobile engineering, problem analysis, Modern tool usage, the engineer and society, Environment and sustainability. This Course also focuses on Communication, Individual and teamwork and Life-long learning

List of Practical:

1. Study of different types of layout of Automobiles.
2. Study of specifications of different vehicle bodies.
3. Demonstration of different types of Transmission gearbox
4. Demonstration of constructional features of Front and rear suspension system.
5. Study of Hydraulic braking system.
6. Study of safety features of the automobile system.
7. Study of Electric vehicles.
8. Study of Hybrid vehicles.

Major Equipment:

1. Cut section of any four-wheeler.
2. Cut section of various automobile systems.