



SARVAJANIK UNIVERSITY
Sarvajani College of Engineering and
Technology



Mechanical Engineering Department
B.Tech. Semester VII

Course Name: Automobile Engineering **Course Code:** BTME13701
Type of course: Professional Core Course
Prerequisite: Nil
Rationale of Course: The course is designed to understand basic concepts used in automobile engineering and its application in various fields of engineering.

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 course

Content:

Sr. No.	Content	Total Hrs	Module Weightage
1	Introduction: Automobile classification and specification, Automobile chassis: General layout, types of layout and its arrangement, Body construction type and materials.	05	10%
2	Power Transmission Systems: Clutch: Constructional features and working of single plate, multi plate, semi centrifugal and centrifugal clutch. Transmission gear box: 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 gear box. Axle: Rear axle, Classification, types of front axle, Construction, Components and their functions, types of rear axle and application.	09	20%



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3	<p>Suspension and Steering System:</p> <p>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 turn. Steering ratio, under steering and over steering, power assisted steering, wheel alignment.</p>	06	15%
4	<p>Wheel and Tyres:</p> <p>Types of wheels, types of tyres, tyre construction, constituents of tyre, tyre tread pattern, tyre pressure and wear, tyre properties, tyre size, tyre maintenance.</p>	04	10%
5	<p>Brake system:</p> <p>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:</p> <p>Vehicle Loads: Forces acting on vehicle in motion, Transmission efficiency, Rolling resistance, Grade resistance, the tractive force with uniform speed and with acceleration of vehicle. Stability of a vehicle in motion around the curve.</p>	09	20%
7	<p>Safety Systems and Modern Automobiles:</p> <p>Safety interlocks and alarms, Engine control Unit. Active and Passive Safety systems, Seat belt, Air bag, 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>	08	15%



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

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30	20	30	10	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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 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	5th
2.	Automobile Engineering Volume 1 & 2	K. M. Gupta	Umesh Publications	2012	1st
3.	A Text Book of Automobile Engineering	R. K. Rajput	Laxmi Publications (P) Ltd.	2007	1st
4.	Automotive Mechanics	W. Crouse	Tata Mc Graw Hill	2017	10th
5.	Fundamentals of Vehicle Dynamics	Thomas Gillespie	SAE International	1992	

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Compare and select type of vehicle as per features and applications.	10
CO-2	Demonstrate working of various Automobile Systems	40
CO-3	Identify the types of wheel rims and tyres with their specifications and different types of brakes.	20
CO-4	Evaluate the performance of different driving and road conditions on vehicle.	15
CO-5	Analyze modern hybrid Automobiles	15



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Mapping with POs:

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	P O 11	PO 12	PS O1	PS O2	PS O3	PS O4
CO-1	1	3	2	1	3	3	3	2	2	0	3	3	3	2	2	1
CO-2	3	3	3	3	3	3	3	1	1	1	2	2	3	2	3	2
CO-3	3	2	1	1	1	0	0	0	0	0	2	2	2	2	1	0
CO-4	1	3	3	3	3	2	1	1	1	2	1	2	3	1	3	2
CO-5	1	1	1	2	3	3	3	3	1	0	2	3	1	2	2	1
Rationale*	9	12	10	10	13	11	10	7	5	3	10	12	12	9	11	6

Rationale*:

It states that the course will develop Problem analysis, Design / development of solutions, Conduct investigations of complex problems, Modern tool usage, The engineer and society, Environment and sustainability, Project management and finance, Life-long learning. This Course also focuses on Automobile Engineering knowledge.

This course highly maps with PO 2,3,4,5,6,7,11,12 and PSO 1, 3. It states that the course will develop Problem analysis, Design / development of solutions, Conduct investigations of complex problems, Modern tool usage, The engineer and society, Environment and sustainability, Project management and finance, Life-long learning. This Course also focuses on Automobile Engineering knowledge.

List of Experiments:

1. Study of different types of layout of Automobiles.
2. Study of different types of Transmission gearbox
3. Study of constructional features of Front and rear suspension system.
4. Study of different types of Steering mechanism.
5. Study of Hydraulic braking system.
6. Study of safety features of the automobile system.
7. Study of Hybrid vehicles.

Major Equipment:

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

List of Open learning website:

1. <https://nptel.ac.in/courses/107106088>

List of Open Source Software: Nil