



CVM
UNIVERSITY

Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: MINOR DEGREE IN ELECTRIC VEHICLES

Semester: III

Course Code: 202190301

Course Title: Automotive Systems

Course Group: MINOR CORE

Course Objectives: This course aims to study about the evolution of the car, classification and terminologies related to the internal combustion engine and automotives. This course also aims to build working fundamental of various automotive systems and subsystems.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
3	0	2	4	50/18	50/17	25/9	25/9	150/53

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	History & Classification: Brief History: The Car: from dream to necessity, The pioneer years, into the 20th century, Birth of a legend, Birth of the mass market, Design refinements, years of innovation. Vehicle Classification, Vehicle layout with reference to Power Plant Location and drive systems, Types of chassis, Body styles, Classification of vehicle based on body types. Types of car bodies: Integral body construction details, Ladder, Conventional control, full forward control, semi-forward control.	05
2	Internal Combustion Engine: Engine fundamentals, operation, construction and function of parts. Classification of engine, engine terminology, 2-stroke & 4-stroke engine, working and constructional feature of 2-wheeler, automotive engine fuels and fuel rating, Fuel injection systems: petrol and diesel, exhaust systems, Limitations of I.C Engines. Exhaust Emission and Global warming: Engine exhaust treatment devices. Cooling system: Necessity, Types of cooling system.	05
3	EV: Opportunities and challenges: Need for alternative energy sources, CNG, LPG, Biogas, Bio-diesel, solar, Hybrid technology, advantages and disadvantages of EV.	05



4	Steering & Suspension System: Steering system: Introduction, principle of Ackerman steering, turning circle radius, steering gears, steering ratio, Hydraulic & electronic steering systems, steering geometries. Suspension system: Introduction, solid axles, four link rear suspension, coil spring, leaf spring, torsion bar, dampers, shock absorbers, Independent suspension: front, Mac-Pherson strut, rigid axle suspension, SLA suspension. Air suspension system, Hydro-plastic, Hydra-gas suspension.	10
5	Braking System: Purpose of brakes, Principle of brakes, Co-efficient of friction. Types of brake: internal expanding, Hydraulic and Pneumatic brake, function of parts, brake fluid. Properties of friction lining, friction pad materials, power brakes.	05
	Total	42

List of Practicals:

1	To demonstrate and understand the importance of Automotive Chassis.
2	To identify major components of different automobile engines.
3	Demonstration of automotive driveline systems.
4	To demonstration about the steering systems.
5	To demonstration about the suspension systems.
6	To demonstrate the various automobile systems.
7	Demonstration of the Electric vehicles.
8	To study about the cooling systems of automotive engine.
9	Demonstration about the different automotive braking systems.
10	Performance of Brake bleeding.
11	Demonstration of the different suspension systems for two and four-wheeler vehicle.
12	To review technical specifications of electric vehicles.

Reference Books:

1	Automotive mechanics by Crouse and Anglin, - TMH.
2	Automobile Engineering Vol-I & II Dr. K.M. Gupta.
3	A Textbook of Automobile Engineering-I and II, P.S.Gill, S.K.Kataria & Sons.
4	Fundamentals of Automobile Body Structure Design, Donald E. Malen, SAE International.
5	Internal combustion engine, S. S. Thipse, Jaico Publishing House, 2010.

Supplementary learning Material:

1	https://nptel.ac.in/courses/
2	https://www.electricaltechnology.org/

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods



Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
30	30	30	05	05	--	

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.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
1	Understand the automotive revolution.	15
2	Comprehend the various vehicle classification and IC engine.	25
3	Know about the Electric vehicle challenges and opportunities.	15
4	Explain the steering and suspension systems.	30
5	Demonstrate the braking operation.	15

Curriculum Revision:

Version:	1
Drafted on (Month-Year):	May - 2022
Last Reviewed on (Month-Year):	--
Next Review on (Month-Year):	May - 2025