

B.E Semester: 8 Automobile Engineering
Subject Name: Electric and Hybrid Vehicles (AE803-N-E)
[Dept. Elect.-5]

Course Objective:

- To present a problem oriented in depth knowledge of Electric and Hybrid vehicles.
- To address the underlying concepts, methods and application of Electric and Hybrid vehicles.

B. Teaching / Examination Scheme:

Teaching Scheme				Total Credit	Evaluation Scheme					Total
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
3	0	2	5	4	3	70	30	20	30	150

C. Detailed Syllabus:

Unit No.	Details
1	Introduction Electric and hybrid vehicles, flexible fuel vehicles (FFV), solar powered vehicles, magnetic track vehicles, fuel cells vehicles.
2	Power Systems of Hybrid Vehicles Hybrid Vehicle engines, Stratified charge engines, lean burn engines, low heat rejection engines, hydrogen engines, HCCI engine, VCR engine, surface ignition engines, VVTI engines. High energy and power density batteries, fuel cells, solar panels, flexible fuel systems.
3	Vehicle Operation and Control Computer Control for pollution and noise control and for fuel economy – Transducers and actuators - Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.
4	Vehicle Automated Tracks Preparation and maintenance of proper road network - National highway network with automated roads and vehicles - Satellite control of vehicle operation for safe and fast travel, GPS.
5	Suspension, Brakes, Aerodynamics and Safety Air suspension – Closed loop suspension, compensated suspension, anti-skid braking system, retarders, regenerative braking, safety gauge air backs- crash resistance. Aerodynamics for modern vehicles, safety systems, materials and standards

Total hours (Theory):48

Total hours (Practical):32

Total hours:80

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1 st , 2 nd , 3 rd	Unit 1	20%	1
2	4 th , 5 th , 6 th	Unit 2	20%	2
3	7 th , 8 th , 9 th	Unit 3	20%	3
4	10 th , 11 th , 12 th	Unit 4	20%	4
5	13 th , 14 th , 15 th , 16 th	Unit 5	20%	5

E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

F. List of Practical

Sr. No.	Name of Experiment
1	Case Study-1: Analysis of effect of pollution generated by automobiles on
2	Case Study-2: Survey of EVs available in Indian Context and explore possible resistance in the acceptance of EVs.
3	To study about various types of electric vehicles.
4	To study about hybrid vehicles and its types.
5	To study about Computer Control for pollution and noise control and for fuel economy.
6	To study about suspension system of automobiles.
7	To study about safety systems used in Automobiles.
8	To study about use of aerodynamics in Automobiles.

G. Students Learning Outcomes:

1	Confidence to create new product based on New generation and hybrid vehicles.
2	Students will have knowledge of all automobile aspects of New generation and hybrid vehicles by incorporating concept, creativity, structural, manufacturing, aesthetic etc.
3	Students will have ability to solve open-ended problem belongs to design engineering that meet the requirements.
4	Students will have ability to understand contemporary issues and their impact on provided solution.

H. Text Books & Reference Books:

1	Modern Vehicle Technology by Heinz.
2	Bosch Hand Book, SAE Publication,, 2000
3	Light weight electric for hybrid vehicle design
4	Advance hybrid vehicle power transmission, SAE
5	Value Engineering : A Systematic Approach by Arthur E. Mudge - Mc GrawHill
6	Assembly automation and product design – by Geoffrey Boothroyd, CRC Taylor & Francis