

Government Polytechnic, Balangir

Department of Department of Electrical Engineering

LESSON PLAN 2026-27(WINTER)

NAME OF THE Faculty : _Guest Faculty-3

Subject: TH:3(b)- ELECTRIC VEHICLES
 Program: Diploma in Electrical Engineering
 Semester: 5th
 Total Contact Hours: 45
 Total Marks: 100
 Assessment: Internal Assessment – 30, End Term – 70

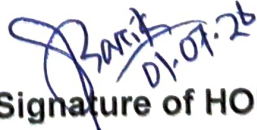
COURSE OUTCOMES:

- CO1 Discuss salient features of Hybrid Electric Vehicles.
- CO2 Interpret dynamics of hybrid and electric vehicles.
- CO3 Illustrate DC-DC converters.
- CO4 Illustrate DC-AC converters and EV motors.
- CO5 Explain batteries and EV control.

Period	Unit	Topic	Learning Objectives	Activity	Course Outcome	Learning Methodology	Homework
1	I	Introduction to Electric Vehicles	Explain the evolution and need of EVs	Interactive discussion	CO1	Lecture & PPT	Read EV basics
2	I	Evolution of Electric Vehicles	Describe the development of EV	Timeline activity	CO1	Lecture	Prepare notes
3	I	EV, HEV & PHEV	Differentiate EV, HEV and PHEV	Comparative discussion	CO1	Interactive lecture	Comparison chart
4	I	Components of HEV	Identify major HEV components	Component identification	CO1	Demonstration	Draw block diagram
5	I	Economic Impact	Explain economic benefits of EVs	Case study	CO1	Activity-based	Assignment
6	I	Environmental Impact	Explain environmental benefits of EVs	Group discussion	CO1	Lecture	Prepare report
7	I	Environmental Analysis	Analyze environmental parameters	Classroom exercise	CO1	Interactive	Notes
8	I	Comparative Study of Vehicles	Compare ICE, EV and HEV	Seminar	CO1	Collaborative learning	Comparison table
9	I	Unit-I Revision	Review Unit-I concepts	Quiz	CO1	Discussion	Practice questions
10	II	Vehicle Dynamics	Explain vehicle movement	Lecture	CO2	PPT	Read chapter
11	II	Vehicle Resistance	Explain rolling and tyre resistance	Numerical examples	CO2	Lecture	Assignment
12	II	Aerodynamic Drag	Explain aerodynamic effects	Demonstration	CO2	Interactive	Numerical problems
13	II	Grading Resistance	Calculate grading resistance	Problem solving	CO2	Lecture	Practice numericals
14	II	Dynamic Equation	Explain vehicle dynamic equation	Board work	CO2	Interactive	Notes
15	II	Drive Train Configuration	Explain vehicle drivetrain	Diagram discussion	CO2	Lecture	Draw layouts
16	II	Power Train & Motor Classification	Explain power train and motor types	PPT presentation	CO2	Lecture	Assignment
17	II	HEV Configurations	Explain series, parallel & series-parallel HEVs	Case study	CO2	Interactive	Comparison table
18	II	Energy Saving Potential	Explain energy-saving techniques	Discussion	CO2	Activity	Unit-II worksheet
19	III	Power Converter Based EV Configuration	Explain converter-based EV architecture	Lecture	CO3	PPT	Read chapter
20	III	Converter Classification	Differentiate unidirectional &	Discussion	CO3	Interactive	Notes
21	III	Step-Down Operation	Explain buck converter operation	Circuit explanation	CO3	Lecture	Draw circuit

	III	Boost Converter	Explain boost converter	Simulation	CO3	Demonstration	Assignment
	III	Buck-Boost Converter	Explain buck-boost operation	Circuit analysis	CO3	Problem solving	Practice problems
24	III	Step-Up Operation	Explain boost principle	Numerical examples	CO3	Lecture	Notes
25	III	Two Quadrant Converter	Explain two-quadrant converter	Waveform analysis	CO3	Interactive	Assignment
26	III	Multi-Quadrant Converter	Explain multi-quadrant converter	Discussion	CO3	Lecture	Prepare report
27	III	Unit-III Revision	Review DC-DC converters	Quiz	CO3	Discussion	Practice questions
28	IV	DC-AC Converters	Explain inverter fundamentals	Lecture	CO4	PPT	Read chapter
29	IV	Half Bridge Inverter	Explain operation with R load	Waveform analysis	CO4	Lecture	Draw circuit
30	IV	Half Bridge Inverter (R-L Load)	Explain operation with inductive load	Simulation	CO4	Demonstration	Assignment
31	IV	Full Bridge Inverter	Explain single-phase bridge inverter	Circuit discussion	CO4	Interactive	Notes
32	IV	Electric Machines for EVs	Explain EV motor types	PPT presentation	CO4	Lecture	Prepare
33	IV	PM Motor & Drives	Explain PM motor operation	Demonstration	CO4	Activity-based	Assignment
34	IV	Switched Reluctance Motor	Explain construction & working	Video	CO4	ICT	Notes
35	IV	Characteristics & Applications	Compare EV motors	Seminar	CO4	Collaborative learning	Unit-IV assignment
36	V	Battery Fundamentals	Explain battery basics	Lecture	CO5	PPT	Read chapter
37	V	Battery Parameters	Explain battery specifications	Discussion	CO5	Lecture	Assignment
38	V	Battery Types	Compare battery technologies	Group discussion	CO5	Interactive	Comparison chart
39	V	Battery Charging	Explain charging methods	Video demonstration	CO5	ICT	Notes
40	V	Alternative Energy Sources	Explain fuel cells, supercapacitors & flywheels	Presentation	CO5	Lecture	Assignment
41	V	Control System & ECU	Explain EV control architecture	Diagram discussion	CO5	Interactive	Draw ECU block diagram
42	V	Hybrid Drive Train Architecture	Explain hybrid drivetrain	Case study	CO5	Activity-based	Notes
43	V	Regenerative Braking	Explain regenerative braking	Animation	CO5	Demonstration	Assignment
44	V	Unit-V Revision	Review batteries & control systems	Quiz	CO5	Discussion	Final revision
45	All	Comprehensive Revision & Class Test	Assess attainment of course outcomes	Written test & feedback	CO1-CO5	Assessment	Prepare for end-semester

Signature of Faculty


Signature of HOD