

GOVT. POLYTECHNIC KANDHAMAL, (PHULBANI)

LESSON PLAN: TH:3(b)- ELECTRIC VEHICLES

5TH – SEMESTER, 2026 (W)

Discipline: Electrical Engineering	Semester: Winter 2026	Name of the teaching faculty: PRASANTA KUMAR DAS
Subject: EV	No of days/per week class allotted: 03	Semester From Date: 01.07.2026 To Date: 05.11.2026 No of weeks: 15
Week:	Class day:	Theory/practical topics:
1ST	1ST	UNIT-I(Introduction to Hybrid Electric Vehicles) Evolution of Electric vehicles
	2ND	Advanced Electric drive vehicle technology Vehicles-Electric vehicles (EV)
	3RD	Hybrid Electric drive (HEV),
2ND	1ST	Plug in Electric vehicle (PIEV),
	2ND	Components used Hybrid Electric Vehicle
	3RD	Economic and environmental impacts of Electric hybrid vehicle
3RD	1ST	Parameters affecting Environmental and economic analysis
	2ND	Comparative study of vehicles for economic, environmental aspects
	3RD	Doubt clearing classes or class test
4TH	1ST	UNIT-II(Dynamics of hybrid and Electric vehicles) General description of vehicle movement
	2ND	Factors affecting vehicle motion- Vehicle resistance, tyre ground adhesion, rolling resistance,
	3RD	aerodynamic drag, equation of grading resistance, dynamic equation
5TH	1ST	Drive train configuration, Automobile power train, classification of vehicle power plant
	2ND	Performance characteristics of IC engine, electric motor, need of gear box
	3RD	Classification of motors used in Electric vehicles
6TH	1ST	Basic architecture of hybrid drive trains, types of HEVs
	2ND	Energy saving potential of hybrid drive trains
	3RD	HEV Configurations-Series, parallel, Series-parallel, complex
7TH	1ST	UNIT-III(DC-DC Converters for EV and HEV Applications) EV and HEV configuration based on power converters
	2ND	Classification of converters –unidirectional and bidirectional

	3 RD	unidirectional
8 TH	1 ST	bidirectional
	2 ND	Principle of step down operation
	3 RD	Boost and Buck- Boost converters
9 TH	1 ST	Principle of Step-Up operation
	2 ND	Two quadrant converters; multi quadrant converters
	3 RD	Doubt clearing classes & Previous semester question discussion
10 TH	1 ST	UNIT-IV(DC-AC Inverter & Motors for EV and HEVs)DC-AC Converters
	2 ND	Principle of operation of half bridge DC-AC inverter (R load)
	3 RD	Principle of operation of half bridge DC-AC inverter (R –L load)
11 TH	1 ST	Single phase Bridge DC-AC inverter with R load
	2 ND	Single phase Bridge DC-AC inverter with R –L load
	3 RD	Electric Machines used in EVs and HEVs, principle of operation working & control
12 TH	1 ST	Permanent magnet motors, their drives, switched reluctance motor
	2 ND	Characteristics and applications of above motors
	3 RD	Doubt clearing classes Or Previous semester question discussion Or Class test
13 TH	1 ST	UNIT-V(Batteries) Overview of batteries
	2 ND	Battery Parameters, types of batteries
	3 RD	Battery Charging, alternative novel energy sources-solar photovoltaic cells
14 TH	1 ST	fuel cells, super capacitors, flywheels
	2 ND	Control system for EVs and HEVs, overview, Electronic control unit ECU
	3 RD	Schematics of hybrid drive train, control architecture
15 TH	1 ST	Regenerative braking in EVs
	2 ND	Doubt clearing classes
	3 RD	All type Question discussion

COURSE OUTCOMES

- CO1: Hybrid EV features and vehicle dynamics.
CO2: Maintenance of DC-DC and DC-AC converters.
CO3: Battery selection criteria for EV applications.

Sign. of Faculty Concerned

Sign. of HOD