GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI-25

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**ELECTRIC VEHICLE TECHNOLOGY**
Course Code	**EE/2020/007**
Course Duration	60 Hours
Minimum Eligibility Criteria	10th/+2 /ITI/Diploma/Graduates
Pre-requisites (if any)	-
Course Objectives	Training module has been designed to provide the participants • Explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals. • Understand the Vehicle dynamics, Motors, Power Electronics, Batteries, Charging • Explain the Electric Vehicle technology and its applications.
Course Outcomes	At the end of training, the trainees will be able to • Demonstrate different configurations of electric vehicles and its components. • Demonstrate hybrid vehicle configuration by different techniques, sizing of components and design optimization. • Identify and rectify the fault in Electric Vehicles/
Expected Job Roles	Electric Vehicle Technician

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
EE/2020/007	ELECTRIC VEHICLE TECHNOLOGY	Theory	42	10	20	3 Hours
		Practical	18	40	80	
		Total	60	50	100	

EE/2020/007- ELECTRIC VEHICLE TECHNOLOGY

DETAILED SYLLABUS

Unit No	Modules	No.of.Hours	
		Theory	Practical
I	**Introduction to Electric Vehicle**	**14 Hours**	
1.1	Introduction, Components of Electric Vehicle	10	04
1.2	Vehicle Mechanism classification of Electric Vehicle		
1.3	Architecture of Electric Vehicle		
1.4	Operation modes of Electric Vehicle		
1.5	EHV- Series mode, Parallel mode, extra mode		
1.6	PHEV		
1.7	Sizing of elements & Concept of Hybridness		
II	**Battery**	**12 Hours**	
2.1	Basics of Batteries and Its Types	08	04
2.2	Parameters – Capacity, Discharge rate, State of charge, state of Discharge and Depth of Discharge		
2.3	Technical characteristics		
2.4	Properties of Batteries		
2.5	Battery pack Design		
III	**DC & AC Electrical Machines& Inverters**	14 Hours	
3.1	Motor and Engine rating	10	04
3.2	Requirements, DC machines		
3.3	Three phase A/c machines, Induction machines,		
3.4	Permanent magnet machines, switched reluctance machines.		
3.5	Inverters – Function and Block Diagram – Power and Control Electronics		
IV	**Electric Vehicle Drive Train**	10 Hours	
4.1	Transmission configuration, Components – gears, differential, clutch, brakes regenerative braking, motor sizing	08	02
V	**Hybrid Electric Vehicles**	10 Hours	
5.1	Types – series, parallel and series, parallel configuration	06	04
5.2	Design – Drive train, sizing of components		
	Total Theory and Practical Hours	**42**	**18**
	Total hours	**60**	

HARDWARE REQUIREMENT

S.NO	LIST OF TOOLS /EQUIPMENTS
1	Electric Vehicle
2	Hybrid Vehicle
3	Batteries
4	DC and AC Motor
5	Controller
6	Drive System

SOFTWARE REQUIREMENT

NIL

REFERENCE BOOKS

S.NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Electric Vehicle Technology Explained	James Larminie, John Lowry	John Wiley & Sons
2	Build Your Own Electric Vehicle,	Seth Leitman, Bob Brant	McGraw Hill Professional
3	The Electric Car: Development and Future of Battery, Hybrid and Fuel-cell Cars	Michael Hereward Westbrook, Mike Westbrook	IET.
4	Electric Vehicle Battery Systems	Sandeep Dhameja	Newness

ASSESSMENT AND CERTIFICATION

S.No	Criteria for assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the CIICP Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max. Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Objective and Circuit Diagram	20
	b)Procedure and Connections / Execution	20
	c)Result and Viva	20
	d) Record	20
	Total Marks	**100**

THEORY MODEL QUESTION PAPER

EE/2020/007 ELECTRIC VEHICLE TECHNOLOGY

(Maximum Marks: 20)

(N.B: Answer any Twenty questions) **20x1= 20 Marks**

1. Write any two major components of Electric Vehicle.
2. What is the use of battery in Electric Vehicle?
3. Write the Major classification of Electric Vehicle.
4. Write the classification of Hybrid Electric Vehicle.
5. Draw the simple diagram of series Hybrid Electric Vehicle.
6. What is Hybrid Electric Vehicle?
7. Compare Hybrid Electric Vehicle and Battery Electric Vehicle.
8. Draw the neat diagram of Parallel Hybrid System.
9. Expand PHEV.
10. Write any two types of Battery.
11. What is Depth of Discharge?
12. Write the unit of battery ratings.
13. What is energy efficiency in battery?
14. What is Columbic Efficiency in battery?
15. Write the principle of DC Motor.
16. Write the classification of DC Motor.
17. What is Line Voltage in 3-Phase system?
18. What are the types of AC motors?
19. Why single phase motor is not self-starting?
20. What is the use of DC-AC Converter?
21. What is Regenerative Breaking?
22. What are the advantage of Regenerative Breaking?
23. What is electric drives?
24. State any two application of single motor drive.
25. Write any two advantage of Series-Parallel Hybrid Vehicle.