GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering
Level: PG
Branch: Electric Vehicle Technology
Course / Subject Code: ME01064031
Subject Name: Power Train Management Systems

WEF Academic Year :	2024 – 25
Semester :	1st Semester
Category of the Course :	PEC

Course Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	(I)	(V)	
3	0	2	4	70	30	20	30	150

Course Content :

Sr. No.	Content	Total Hrs.
1	**Basics of power train:** Layouts of vehicle, Front engine & front wheel drive, front engine & rear wheel drive, rear engine & rear wheel drive, Four wheel drive. **Performance of Vehicle:** Vehicle motion, Resistances during motion, Power required for acceleration and constant velocity motions, Tractive efforts and draw bar pull, Power required and motor characteristics, Motion on gradient.	**07**
2	**Transmission:** The purpose and need of gear box, classification, design of gear box, manual transmission and clutch, over running clutch, Planetary gear box, overdrive, conventional automatic gearbox, automated manual transmission, dual clutch transmission, Continuously Variable Transmission, transfer case, torque converters.	**10**
3	**Drive line and components:** Drive Lines, Universal joints, Constant velocity joints, Propeller shaft, Front-wheel drive shafts, driveline modelling.	**09**
4	**Final drive and rear axles:** Final drive and its types, Differential gears, open differential, locking differential, limited-slip differential, torque-vectoring differential, Rear axle construction, traction control system.	**09**
5	**Drive efficiency:** impact of altitude, ambient temperature, gradient and motors. Different type of motors used and its comparative study. Torque vs speed, calibration of drive train based on vehicle parameters. EV design and components sizing. Electric Drive Train Overview.	**10**
	TOTAL	**45**

Reference Book :

1. David Crolla, Behrooz Mashadi, "Vehicle Powertrain Systems", Wiley.
2. Light and Heavy Vehicle Technology, M.J. Nunney, Elsevier
3. Automotive Technology, Jack Erjavec, Cengage Learning
4. Automotive suspension and steering systems, Thomas W. Birch, Delmar Cengage Learning

5. Automobile Engineering Vol-1, 2 Kirpal Singh, Standard Publishers
6. A text book of Automobile Engineering, R.K. Rajput, Laxmi Publication
7. Hybrid Electric Vehicle System Modelling and Control - Wei Liu, General Motors, USA, John Wiley & Sons, Inc.
8. Hybrid Electric Vehicles – Teresa Donateo, Published by Intech Open
9. Electric and Hybrid Vehicles Power Sources, Models, Sustainability, Infrastructure and the Market Gianfranco Pistoia Consultant, Rome, Italy, Elsevier Publications
10. R Krishnan , Electric motor drives: Modelling, Analysis, and Control

Course Outcome : After Completion of the Course, Student will able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand basic knowledge about functional and operational aspects powertrain	25%
CO-2	Evaluate types of transmission for proper functioning and performance of an automobile.	20%
CO-3	Understand function of driveline and components.	15%
CO-4	Understand function of final drive and differential.	20%
CO-5	Evaluate driveline efficiency.	20%

Suggested Specification table with Marks (Theory) :

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**30**	**30**	**30**	**00**	**00**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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.

List of Experiments :

1. To study layouts of vehicle drive.
2. To study clutch.
3. To study manual transmission.
4. To Study automatic gearbox.
5. To study CVT.
6. To study DCT.
7. To study various types of differentials.
8. To study and compare motors for vehicle.
9. To study drive line efficiency.

Activity to be carried out

1. Visit of any automobile industry

Major Equipment :

1. Cut section of Synchromesh gear box
2. Automatic gear box
3. Cut section of differential
4. Cut section or working model of CVT
5. Cut section or working model of DCT
6. Tractions motors of vehicle
7. MATLAB

List of Open Source Software/learning website :

http://nptel.ac.in

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