

Subject Code: EEE-202

Roll No.

B.TECH.
Year: 2nd, Semester: 4th
MINOR TEST (EXAMINATION): 2025-26
Fundamentals of Electric Vehicles

Time: 2 Hr.

Max. Marks: 30

Note- Answer all questions

Q1.	Attempt any Three parts of the following.	Marks	CO	BL	PO	PI Code
a)	Explain rolling resistance and aerodynamic drag.	4	1	2	1	1.1.2
b)	Explain the advantages of electric vehicle over ICE based vehicles.	4	1	2	1	1.1.2
c)	Explain gradeability. .	4	1	2	1	1.1.2
d)	An electric vehicle of mass 1500 kg is driven by a motor that provides a tractive force of 1800 N. The total resistive force (rolling + air resistance) acting on the vehicle is 600 N. Analyze the velocity of the vehicle after 10 seconds, if it starts from rest.	4	2	4	2	2.1.1
Q2.	Attempt any Three parts of the following.					
a)	Develop the equation for tractive effort on the driven wheels.	3	1	6	1	1.1.1
b)	Explain the need of sustainable transportation in today's world.	3	1	2	1	1.1.2
c)	An electric vehicle of mass 1200 kg is moving on a level road. The vehicle accelerates at 1 m/s ² . The rolling resistance is 150 N and air resistance is 100 N. Calculate the tractive effort required at the wheels.	3	1	5	2	2.1.1
d)	Discuss manual gear transmission versus hydrodynamic transmission.	3	1	2	2	2.1.2
Q3.	Attempt any Three parts of the following.					
a)	Demonstrate, how the vehicle performance is affected by maximum speed of vehicle?	3	2	5	2	2.1.2
b)	Draw and explain power plant characteristic of electric motor for traction	3	2	3	1	1.2.1
c)	Show the basic techniques to improve vehicle fuel economy.	3	2	3	1	1.2.2
d)	Explain the dynamic equation of an e-vehicle.	3	2	2	2	2.2.2

Sub Code: EEE-202

Roll No

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

B. Tech.

Year: II Semester: IV
Even Semester 2025-2026

Subject Name: Fundamentals of Electric Vehicles

Time: 3Hr.

Max Marks: 50

Note: Attempt All questions.

Q1	Attempt any five parts of the following.	Marks	CO	BL	PO	PI Code
a)	Explain Manual Gear Transmission of a vehicle with diagram.	2	1	2	1	1.1.1
b)	Discuss fuel economy characteristics of internal combustion engine.	2	3	2	2	2.1.2
c)	Why did electric vehicles decline in the early 20 th century?	2	1	1	2	2.1.1
d)	Explain the concept of braking in electric vehicles. How does regenerative braking improve it?	2	3	5	4	4.1.1
e)	Discuss the history and evolution of electric vehicles. Highlight major milestones and technological developments.	2	3	2	4	4.1.1
f)	Discuss the major challenges faced in the adoption of electric vehicles in today's world.	2	2	2	1	1.1.3
g)	An EV has mass of 1200 Kg, rolling resistance coefficient C_{rr} of 0.015, frontal area A of 2.2 m^2 , drag coefficient C_d of 0.3, air density ρ of 1.2 kg/m^3 , speed of 20 m/s, gradient of 0.05. Examine rolling resistance, air drag force, gradient force and total tractive force.	2	3	4	4	4.1.2
Q2.	Attempt any two parts of the following.					
a)	Explain the concept of hybrid electric drive train with a neat diagram.	5	4	5	1	1.1.1
b)	Discuss series hybrid electric drive trains along with disadvantages.	5	4	2	2	2.1.2
c)	Illustrate the classification of hybrid electric vehicles with diagrams.	5	4	3	1	1.1.2
Q3.	Attempt any two parts of the following.					
a)	Explain torque coupling parallel hybrid electric drive trains with diagram.	5	4	5	1	1.1.2
b)	Explain the speed-coupling parallel hybrid electric drive train with diagram.	5	4	5	1	1.1.2
c)	A series hybrid electric vehicle operates at vehicle speed of 20 m/s, total tractive force required of 900 N, transmission efficiency of 0.9, motor efficiency of 88% and generator efficiency of 92%. Engine efficiency is 30%. Determine power required at wheels, motor input power, generator output power, engine power required.	5	5	5	1	1.1.3
Q4.	Attempt any two parts of the following.					
a)	Explain the importance of thermal management in electric vehicles. Discuss its impact on battery performance, safety, and lifespan.	5	6	5	1	1.1.3
b)	Explain any two cooling methods used in EVs.	5	6	5	1	1.1.2
c)	Discuss various thermal management techniques used in EVs. How do they improve efficiency and reliability?	5	6	2	1	1.1.3
Q5.	Attempt any two parts of the following.					
a)	Discuss safety challenges in EVs related to battery, electrical systems and thermal management.	5	6	2	2	2.2.1
b)	Discuss power assisted steering in detail.	5	5	2	2	2.1.1
c)	A battery pack generates 500 W heat. Air is used for cooling. The Specific heat is $1005 \text{ J/kg}\cdot\text{K}$ and temperature rise allowed is 10°C . Determine mass flow rate of air required.	5	6	5	1	1.1.2
