Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – March 2026

Date: 12- 03-2026 **Time:** 02:00pm – 03:30pm

School: SOE	**Program:** B.Tech	
Course Code: EEE3103	**Course Name:** Electric Vehicles and Battery Technology	
Semester: VI	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**26**	**24**	**-**	**-**	**-**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

1	Mention the advantages of electric vehicles compared to internal combustion vehicles.	**2 Marks**	**L1**	**CO1**
2	Define the tractive effort used in an electric propulsion system.	**2 Marks**	**L1**	**CO1**
3	Outline the major challenges facing electric vehicles in transportation.	**2 Marks**	**L1**	**CO1**
4	Label the major advantages of hybrid electric vehicles.	**2 Marks**	**L1**	**CO2**
5	Name the various types of hybrid electric vehicles adopted for the propulsion system.	**2 Marks**	**L1**	**CO2**

Part B

Answer the Questions. **Total Marks 40M**

6.	**a.**	Select three major subsystems for a modern electric vehicle configuration to achieve efficient electric vehicle propulsion system operation.	**10 Marks**	**L3**	**CO1**
		Or			
7.	**a.**	An electric vehicle is parked on a hilly road section in a residential area to charge at a roadside charging station. The vehicle has a mass of 1200 kg and is resting on a road inclined at an angle of 20° to the horizontal. Determine, the normal force acting on the vehicle due to gravity. Take $g = 9.81\ \text{m/s}^2$.	**10 Marks**	**L3**	**CO1**

8.	**a.**	A new electric vehicle manufacturer plans to design an urban electric vehicle for stop-and-go city traffic. Apply the concepts of tractive effort, rolling resistance, and aerodynamic drag parameters, which influence the acceleration performance of an urban electric vehicle operating under stop-and-go city traffic conditions.	**10 Marks**	**L3**	**CO1**
		Or			
9.	**a.**	An electric vehicle of mass 1200 kg is moving on a level asphalt road. The rolling resistance coefficient of the tire is $f_r = 0.015$. Solve, i) Rolling resistance force F_r ii) Rolling resistant moment T_r. Given that the effective wheel radius $r_d = 0.3\text{m}$ and take $g = 9.81\ \text{m/s}^2$.	**10 Marks**	**L3**	**CO1**

10.	**a.**	A parallel hybrid electric vehicle of mass 1500 kg accelerates uniformly from rest to 54 km/h in 9 seconds on a flat road. The given data are: Rolling resistance coefficient, $\boldsymbol{C_r = 0.014}$ Aerodynamic drag coefficient, $\boldsymbol{C_d = 0.31}$ Frontal area, $\boldsymbol{A = 2.4\ m^2}$ Air density, $\boldsymbol{\rho = 1.225\ kg/m^3}$ Electric motor contribution = 40% of tractive effort IC engine contribution = 60% of tractive effort Determine: i. Vehicle acceleration ii. Tractive effort required for acceleration iii. Tractive effort shared by the motor and the engine Total traction power at 54 km/h	**10 Marks**	**L3**	**CO2**
		Or			

11.	**a.**	A new automobile manufacturer is developing a series hybrid electric vehicle (SHEV) intended for long-range urban and highway operation. The vehicle is equipped with both a battery pack and a fuel tank to meet varying power demands. Apply the operating principle of a series hybrid electric drive configuration to explain how the battery pack and fuel tank are utilized to meet propulsion power demands during urban and highway driving conditions.	**10 Marks**	**L3**	**CO2**

12.	**a.**	Summarize the series and parallel hybrid electric drive trains configuration with neat diagrams, advantages, and disadvantages.	**10 Marks**	**L2**	**CO2**
		Or			
13.	**a.**	Explain the conceptual illustration of a hybrid electric drive train propulsion system and mention all available power flow patterns to meet the load.	**10 Marks**	**L2**	**CO2**