Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – MARCH 2026

Date: 10 – 03- 2026 **Time:** 02:00pm – 03:30pm

School: SOE	**Program:** Electrical and Electronics Engineering	
Course Code: EEE3027	**Course Name:** Electric Vehicle Technology	
Semester: VI	**Max Marks**: 50	**Weightage**:25%

CO - Levels	**CO1**	**CO2**			
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	A passenger car is moving on a rough village road and requires more energy than on a highway. Define the resistance responsible.	**2 Marks**	**L1**	**CO1**
2	A vehicle traveling at 100 km/h experiences a strong opposing force due to air. State this force and write its basic formula.	**2 Marks**	**L1**	**CO1**
3	An electric car starts from rest at a traffic signal and accelerates forward. Name the force required at the wheels to move the vehicle and write the relevant equation?	**2 Marks**	**L1**	**CO1**
4	In a hybrid car, both the engine and electric motor are connected to the wheels and can drive them together. Identify this hybrid architecture.	**2 Marks**	**L1**	**CO2**
5	An EV uses a power electronic device to convert battery DC into AC for the traction motor. Predict this device and its function.	**2 Marks**	**L2**	**CO2**

Part B

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

6.	**a.**	Explain the different resistive forces acting on a moving electric vehicle with these, Compute the dynamic equation of vehicle motion and define each term for both front wheel and rear wheel	**5 Marks**	**L2**	**CO1**
	b.	An electric car of mass 1500 kg has: Tractive effort = 3200 N, rolling resistance = 250 N, Aerodynamic drag = 350 N. Compute the acceleration of the car and comment on its suitability for city driving.	**5 Marks**	**L3**	**CO1**
		Or			
7.	**a.**	Explain EV operation in detail with a neat block diagram and also mention each subsystem.	**5 Marks**	**L2**	**CO1**
	b.	An electric vehicle of mass 1200 kg is moving on a level asphalt road. The rolling resistance coefficient of the tire is fr=0.015. Determine, i) Rolling resistance force Fr ii) Rolling resistant moment Tr. Given that the effective wheel radius r_d=0.3 m and take g=9.81 m/s2.	**5 Marks**	**L3**	**CO1**

8.	**a.**	Describe the possible configuration of EV systems with neat diagrams.	**5 Marks**	**L1**	**CO1**
	b.	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. Calculate the normal force acting on the vehicle due to gravity. Take g=9.81 m/s2**.**	**5 Marks**	**L3**	
		Or			
9.	**a.**	Calculate the Front axle and Rear axle load distribution of a vehicle from the following given Data: A passenger car has the following data: Vehicle mass, $M_v = 1500kg$ Wheelbase, $L = 2.5\,m$ Distance of CG from front axle, $L_a = 1.1m$ Distance of CG from rear axle,$L_b = 1.4m$ Height of CG,$h_g = 0.55m$, Road inclination, ($\alpha = 0^\circ$)----flat road Vehicle acceleration,$\frac{dV}{dt} = 2m/s^2$, Rolling resistance and drag neglected $F_r = 0$, Take $g = 9.81\,m/s^2$	**10 Marks**	**L3**	**CO1**

10.	a.	An electric vehicle of mass 1500 kg must accelerate from rest to 60 km/h in 10 seconds on a level road. The rolling resistance is 220 N and aerodynamic drag at 60 km/h is 350 N. The wheel radius is 0.3 m. Transmission efficiency is 90% and gear ratio is 4:1. Compute: Required tractive effort, Wheel torque, Motor torque, Motor power at 60 km/h, Battery energy required for 1 hour of operation.	**10 Marks**	**L2**	**CO2**
		Or			
11.	a.	Describe the torque–speed characteristics of traction motors used in electric vehicles, and address the performance of the electric vehicle propulsion.	**10 Marks**	**L2**	**CO2**

12.	a.	Summarize the complete Power Train mechanism of the electric Vehicle and thus deduce the translational speed from Vehicle power plant to wheels.	**10 Marks**	**L2**	**CO2**
		Or			
13.	a.	Given Data: Required battery energy = 30 kWh Pack voltage = 300 V Cell voltage = 3.7 V Cell capacity = 3 Ah Depth of discharge (DoD) = 80%, Compute Final battery Pack for an Electric Vehicle.	**10 Marks**	**L2**	**CO2**