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Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Fundamentals of Electrical Vehicles

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	Justify why an electric propulsion system has better efficiency than an IC engine and compare the power, torque and speed characteristics of an electric motor and IC engine.	10	L3	CO2
	b.	Illustrate with neat sketch architecture battery electric vehicles and explain its key components.	10	L2	CO3
OR					
Q.2	a.	Justify the reason for greenhouse gas emissions. List the various emission from automobile and explain its formation.	10	L3	CO3
	b.	Illustrate the architecture for series-parallel hybrid vehicle and discuss its key components. In detail.	10	L2	CO1
Module – 2					
Q.3	a.	Tesla weighs 2000 kgs with a torque of 920 lb.ft at the wheels and assume air density at sea level of 1.22 kg/m^3 . Frontal area of the vehicle = 2.27 m^2 . (i) Find the rolling resistance if coefficient of rolling resistance is 0.01. (ii) Find the air drag if coefficient of air drag is 0.21 at 60 kmph. (iii) Find gradient resistance if the inclination is 5° .	10	L3	CO1
	b.	Explain in detail the drag force, rolling resistance force, gradient resistance force and coefficient of drag. Also explain how it is calculated.	10	L2	CO1
OR					
Q.4	a.	Illustrate with neat sketch, working and construction of regenerative braking used in EVS.	10	L2	CO2
	b.	Identify the forces acting on the vehicle body while climbing the hill. Explain in detail aerodynamic drag.	10	L2	CO2
Module – 3					
Q.5	a.	Illustrate with neat sketch working of Li-polymer battery.	10	L2	CO2
	b.	Illustrate with neat sketch construction and working of Nickel metal hybrid battery.	10	L2	CO3
OR					
Q.6	a.	Justify the primary reason for battery management system. Explain BMS operation in detail.	10	L3	CO3
	b.	Illustrate with a neat sketch construction and working of different level of charging system used in EVS.	10	L2	CO3
Module – 4					
Q.7	a.	Illustrate with a neat sketch construction and working of brushes DC motor in detail.	10	L2	CO2
	b.	Compare the torque and speed characteristics of electric motor.	10	L3	CO2
OR					
Q.8	a.	Illustrate with a neat sketch construction and working of induction motor in detail.	10	L2	CO2
	b.	Explain in detail constant torque mode, constant power mode and maximum speed mode in electric motor.	10	L2	CO2

Module – 5

Q.9	a.	Suggest the suitable fuel cell technology for electric vehicle and explain its working in detail.	10	L3	CO4
	b.	List the various safety factors to be considered for fuel cell vehicle. Also identify the fuel cell vehicle emissions.	10	L2	CO4
OR					
Q.10	a.	Explain the working of boost DC-DC converter. Also explain about buck converters in detail.	10	L2	CO4
	b.	Explain in detail brake specific fuel consumption, energy consumption, power output and efficiency of hybrid power trains.	10	L2	CO4
