

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Sem Examination, Dec 2021

Course: e-Vehicle & Energy Storage
Programme: M.Tech (REE) & M.Tech (ESS)
Course Code: EPEC 7023

Semester: I
Max Marks:100
Duration : 3 Hrs.

S. No.		Marks	CO
	Section A		
	Short Answer Question. Each Question carries 5 marks		
Q.1	Explain challenges associated with eVs	4	CO1
Q.2	In an eV, the rolling resistance (drag) is 12 N at a speed of 80 kmph. If speed is decreased to 50 kmph, what is new value of Rolling resistance (drag)?	4	CO2
Q.3	Explain the speed armature voltage control technique for eVs	4	CO3
Q.4	Explain the Need of Clutch in conventional eVs	4	CO2
Q.5	Names 4 types of configuration for hybridization.	4	CO3
	Section B		
	Each Question carries 10 marks		
Q.1	'eVs can act as life line in modern transportation system', justify the statement.	10	CO1
Q.2	With neat diagram, enumerate the Ideal Torque-Speed characteristics of vehicles. Explain the effect of rolling resistance and aerodynamic drag.	10	CO2
Q.3	Explain the architecture of Hybrid eV using Series Hybrid combination. With neat diagram, elucidate power flow.	10	CO3
Q.4	Classify the Electric Motors under the category of Brushed Motors & Brushless motors. Also, explain the importance of Brushless feature. Or Explain the construction and operation of BLDC motors.	10	CO3
	Section 'C'		
	Long Answer Question (20 Marks)		
Q 1	An electric vehicle is deigned such that, when its batteries are fully charged, gives a mileage of 200 kMs at an average speed of 80 km/hr. Energy Requirement for various resistances, drags and propulsion is as follows: (averaged at average speed of 80kMPH and over 200 kMs distance) Rolling resistance:4.5 %, Aerodynamic: 13%, Averaged Gravitational pull: 4.9%, Passenger comfort System: 8 %, Vehicle Lighting System: 4.5%, Transmission Losses: 23%, Rest is for Propulsion(including starting). Estimate the performance of vehicles in terms of Energy available for propulsion and effect on mileage when vehicle is running at following Average speeds: A= 50 kmph, B= 60 kmph, C= 80 kmph, D=100 kmph	20 M	CO4

	<p>Please note: Estimate performance (energy available for propulsion and mileage) for each case. Preferable you can draw a graph of Energy available & Mileage Vs Speed (within 50 kmph to 100 kmph). Hand drawn graph is okay. Assume all other parameters are independent of speed and hence remain unchanged with speed variation.</p> <p style="text-align: center;">OR</p> <p>An electric vehicle is deigned such that, when its batteries are fully charged, gives a mileage of 180 kMs at an average speed of 70 kM/hr. Energy Requirement for various resistances, drags and propulsion is as follows: (averaged at average speed of 70kMPH and over 180 kMs distance) Rolling resistance: 5 %, Aerodynamic: 11%, Averaged Gravitational pull: 5.1%, Passenger comfort System: 9 %, Vehicle Lighting System: 5%, Transmission Losses: 21%, Rest is for propulsion (including starting). However, the driver is driving car with poor type pressure and open windows. Due to this, the rolling resistance has increased from 0.028 to 0.031 & Aerodynamic drag has changed from 0.3 to 0.34. Estimate the effect on the vehicle mileage at an average speed of 70 kmph due to this. Please assume all other parameter remains unchanged and vehicle is moving at an average speed of 70 kmph.</p>		
Q.2	<p>A) Write in brief about following associated with batteries and their importance: 1) Terminal Load Voltage 2) Cut off Voltage 3) SoC 4) Internal Resistance B) Explain the various challenges associated with selection of batteries. How hybridization can address certain problems associated with the same.</p>	<p style="text-align: center;">10</p> <p style="text-align: center;">10</p>	<p style="text-align: center;">CO4</p> <p style="text-align: center;">CO4</p>