

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Sem Examination, Jan 2021

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

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

Table with 4 columns: S. No., Question, Marks, CO. It contains 5 questions (Q.1 to Q.5) related to e-vehicles and electric motors, including fill-in-the-blanks, short answer questions, and matching exercises.

Q.6	<p>Choose correct word:</p> <p>A) The acceleration of vehicles is affected by (motor/battery) size.</p> <p>B) The mileage of eVs will be affected by (type of road/Motor voltage)</p> <p>C) Series hybridization is used in (PHEV/BEV)</p> <p>D) As per Battery management system, supply of Energy to (power brake / Power windows) is priority.</p> <p>E) IC engine based vehicles use (clutch / gear Box) to match the characteristics.</p>	1*5	CO4
Section B			
Each Question carries 10 marks			
Q.1	Explain the need and essence of eVs in modern transportation system.	10	CO1
Q.2	With neat diagram, enumerate the 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 Parallel Hybrid combination. With neat diagram, elucidate power flow.	10	CO3
Q.4	Describe the operation of PWM inverter and elaborate its necessity and importance for speed control of Induction motors for eVehicles.	10	CO3
Q.5	Write in brief about following associated with batteries and their importance: 1) State of Charge 2) Energy Density 3) Power Density 4) BMS	10	CO1
Section 'C'			
Long Answer Question (20 Marks)			
Q 1	<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.</p> <p>Energy Requirement for various resistances, drags and propulsion is as follows: (averaged at average speed of 70kMPH and over 180 kMs distance)</p> <p>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).</p> <p>Estimate the performance of vehicles in terms of Energy available for propulsion and effect on mileage when vehicle is running at following Average speeds:</p> <p>A= 50 kmph, B= 60 kmph, C= 80 kmph, D=100 kmph</p> <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>	20 M	CO4