


Name:			
Enrolment No:			
<b>UPES</b> <b>End Semester Examination, December 2023</b>			
<b>Program Name: M. Tech E-mobility</b> <b>Course Name: Battery management system</b> <b>Course Code: MEEM7005</b> <b>Nos. of page(s): 01</b> Instructions:		<b>Semester : 1</b> <b>Time : 3 hrs</b> <b>Max. Marks: 100</b>	
<b>SECTION A</b> <b>(5Qx4M=20Marks)</b>			
Q 1	Under what condition a pure EV can be chosen as a better option compared to hybrid vehicles considering the impact on climate change?	4	CO2
Q 2	Explain rolling resistance and aerodynamic drag in vehicles.	4	CO1
Q 3	Explain historical background of EV and HEV technology involvement.	4	CO2
Q 4	Describe the process of charge balancing process in BMS.	4	CO3
Q 5	Enumerate the methods used for estimating the state of Charge and state of health of batteries through BMS.	4	CO2
<b>SECTION B</b> <b>(4Qx10M= 40 Marks)</b>			
Q 6	Explain the Amp- hr measurement and direct measurement of SOC in battery	10	CO4
Q 7	Describe the thermal issues associated with lithium ion battery.	10	CO2
Q 8	Dissect the environmental importance of EV and their social impacts.	10	CO3
Q 9	With a neat sketch, explain the configuration of Series hybrid electric drive train. Or Describe the battery thermal management system with schematic representation	10	CO5
<b>SECTION-C</b> <b>(2Qx20M=40 Marks)</b>			
Q 10	Briefly explain the structure of BMS using a schematic diagram. A battery is constructed from five 50 Ah and 3.7 V battery cells. calculate the nominal voltage and nominal capacity if connected in a) series b) parallel.	20	CO3

Q 11	<p>A 12V battery pack is connected to series RL load with <math>L=100\text{mH}</math>. The battery pack has rated capacity of 120Ah. At <math>t=0</math> switch is closed and the battery begins to discharge. Calculate and plot battery discharge current <math>i(t)</math>, if the steady state discharge is <math>C/5</math>. Neglect voltage drop. Calculate and plot SoC, assuming that <math>t=0</math>, the battery is charged to rated capacity. Calculate the time according to 70% DoD, assume <math>t \gg 100\text{ms}</math></p> <p style="text-align: center;">OR</p> <p>Briefly describe the various factors to be considered while developing a charging infrastructure for electric vehicle(4 wheeler).</p>	<b>20</b>	<b>CO5</b>
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