

Name:			
Enrolment No:			
UPES End Semester Examination, December 2023			
Program Name: M. Tech E-mobility Course Name: Battery management system Course Code: MEEM7005 Nos. of page(s): 01 Instructions:		Semester : 1 Time : 3 hrs Max. Marks: 100	
SECTION A (5Qx4M=20Marks)			
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
SECTION B (4Qx10M= 40 Marks)			
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
SECTION-C (2Qx20M=40 Marks)			
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 $L=100\text{mH}$. The battery pack has rated capacity of 120Ah. At $t=0$ switch is closed and the battery begins to discharge. Calculate and plot battery discharge current $i(t)$, if the steady state discharge is $C/5$. Neglect voltage drop. Calculate and plot SoC, assuming that $t=0$, the battery is charged to rated capacity. Calculate the time according to 70% DoD, assume $t \gg 100\text{ms}$</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>	20	CO5
------	--	-----------	------------