MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS

VI SEMESTER B.TECH. (MECHATRONICS)
END SEMESTER EXAMINATION

SUBJECT: Power Sources for Electric Vehicles Subject Code: MTE 4084

Date: 01-06-2023

Time: 3 Hrs **Exam Time 2:00PM – 5:00PM** **MAX. MARKS: 50**

Name:……, Registration No:……..

- Answer **ALL** the questions.

Q. No		M	CO	PO	LO	BL
1A.	Estimate the amount of energy that can be stored in a container having mass of 100 kg using following battery technologies: a) Lead-Acid b) Li-Ion	**4**	**1**	**1**	**1**	**3**
1B.	Identify the key aspects of sodium-ion battery technology in electric vehicles.	**3**	**1**	**1,2**	**1**	**3**
1C.	Select suitable battery technology used in "ICE Engine Vehicles" with its typical charging system.	**3**	**1**	**1**	**1**	**3**
2A.	Examine the attainment of sustainable development goals (SDG) considering case of smart phone electronic technology.	**4**	**2**	**1,2**	**7**	**4**
2B.	Distinguish the conductive and non-conductive charging systems.	**3**	**2**	**1,2**	**2**	**4**
2C.	Elaborate on the significance of hybrid SoC estimation techniques over their counterparts.	**3**	**2**	**1,2**	**2**	**4**
3A.	Compare the switched inductor and switched resistive based cell balancing techniques.	**5**	**2**	**1,2**	**2**	**4**
3B.	Examine the essence and contribution of solar energy for electric vehicles.	**3**	**2**	**1,2**	**2**	**4**
3C.	Make use of characteristics to signify the need for maximum power tracking in solar energy systems.	**2**	**3**	**1**	**1**	**3**
4A.	Compare the super-capacitor and flywheel technologies with their working principles, energy flow, merits and de-merits.	**5**	**3**	**1,2**	**2**	**4**
4B.	Inspect the need for hybrid sourcing in electric vehicle technology with suitable converter topology.	**3**	**3**	**1,2**	**2**	**4**
4C.	Identify suitable power sources/battery for following applications: a. Electric vehicles in cold environments. b. No emissions for Long Range cars. c. Solar UPS residential systems. d. Peaking energy for racing cars.	**2**	**4**	**1,2**	**1**	**3**

5A.	Utilize the characteristics to signify the statement "Fuel cell based vehicles are promising technology for electric vehicles".	**3**	**4**	**1,2**	**1**	**3**
5B.	Identify the color codes for hydrogen production with their key aspects.	**3**	**4**	**1,2**	**1**	**3**
5C.	Recognize the necessity of interleaved power factor correction boost topology for power processing the fuel cell in electric vehicles.	**4**	**4**	**1,2**	**1**	**3**