

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: M.Tech
BRANCH: Electric Vehicle Technology (EEE)

SEMESTER : I
SESSION : MO/2025

SUBJECT: EE584 ENERGY STORAGE SYSTEM & CONVERSION

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a)	Why is the electrical energy storage required? Describe different electrical storage technologies?	[5] 1	2
Q.1(b)	Enumerate different Electrochemical Energy storage systems? Explain i) Li ion battery ii) Sodium sulfur battery iii) Lead acid battery	[5] 1	2
Q.2(a)	Illustrate the principle of lithium-ion battery along with lattice structure of LiCoO_2 ? Infer the requirements of materials of Lithium ion batteries?	[5] 2	3
Q.2(b)	Classify different types of Lithium-ion batteries in terms of cathode electrode? Distinguish different types of Lithium ion batteries in view of specific energy, safety, performance, Life span, and cost?	[5] 2	3
Q.3(a)	Discuss the principle of fuel cell? Draw the block diagram of fuel cell system? Enumerate and explain the components of the fuel cell?	[5] 3	4
Q.3(b)	Based on electrolyte, specify different types of fuel cells? Describe about polarization and power characteristics of Proton Exchange Membrane (PEM) Fuel cell system?	[5] 3	4
Q.4(a)	Devise the basic difference between capacitor and supercapacitor? Explain the operation of supercapacitor?	[5] 4	5
Q.4(b)	Evaluate how supercapacitors can replace batteries?	[5] 4	5
Q.5(a)	Design the standard charger protocols of a battery Charger?	[5] 05	6
Q.5(b)	Enumerate different types of chargers? Interpret the standards used in the chargers for charging infrastructure?	[5] 05	6

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