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Question Paper Code	12236
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023**

Seventh Semester

**Electrical and Electronics Engineering**

**20EEL712 - ENERGY STORAGE TECHNOLOGIES**

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |   | <i>Marks,<br/>K-Level, CO</i> |
|---|-------------------------------|
| 1. Compare sags and swells.   | <i>2,K2,CO1</i>               |
| 2. Explain Demand and Scale Requirements in energy storage.   | <i>2,K2,CO1</i>               |
| 3. Illustrate the storage of energy in a linear type spring can be calculated as.   | <i>2,K2,CO2</i>               |
| 4. Define Super capacitors.   | <i>2,K1,CO2</i>               |
| 5. What are the different types of energy storage technologies and how do they compare in terms of efficiency and cost effectiveness? | <i>2,K1,CO3</i>               |
| 6. List the factors that contribute to fire an explosion hazards from thermal runaway.  | <i>2,K1,CO3</i>               |
| 7. Illustrate the cell reaction of fuel cell.   | <i>2,K2,CO4</i>               |
| 8. How do you calculate regenerative power?   | <i>2,K2,CO4</i>               |
| 9. Recall any four main causes of greenhouse effect.  | <i>2,K1,CO5</i>               |
| 10. Relate the common performance problems in battery management system.  | <i>2,K2,CO5</i>               |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

- |  |                  |
|--|------------------|
| 11. a) Explain the Demand for portable energy.                                 | <i>13,K2,CO1</i> |
| <b>OR</b>  |                  |
| b) Explain in detail Environmental and sustainability issues on social impact. | <i>13,K2,CO1</i> |
| 12. a) Explain the concept of mechanical flywheels.                            | <i>13,K2,CO2</i> |
| <b>OR</b>  |                  |
| b) Illustrate different Types of Energy Storage Systems.                       | <i>13,K2,CO2</i> |
| 13. a) Explain the risks in performance factors of energy storage systems.     | <i>13,K2,CO3</i> |

**OR**

b) Explain Environmental consideration and recycling process in energy storage systems. *13,K2,CO3*

14. a) Explain the Materials-Based Hydrogen Storage method. *13,K2,CO4*

**OR**

b) Outline in detail about Hybrid Power generation - Bacitor. *13,K2,CO4*

15. a) Summarize the energy storage in automotive applications in hybrid and electric vehicles. *13,K2,CO5*

**OR**

b) Explain the different modes of Charging batteries Compare them in detail. *13,K2,CO5*

**PART - C (1 × 15 = 15 Marks)**

16. a) (i) Outline in detail about characteristics of super capacitors. *8,K2,CO4*  
(ii) Explain the Reversible reactions in storage systems. *7,K2,CO5*

**OR**

b) (i) Explain the application of a storage energy system. *7,K2,CO4*  
(ii) Compare lead acid and lithium storage system. *8,K2,CO5*