R22 Regulation *Subject code: 4O7BB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Supplementary Examinations, May 2026

ENERGY STORAGE SYSTEMS

(EEE)

Maximum Marks: 60 Date:14.05.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Why are underground cables preferred in urban areas?	1M	1	1
b)	What is meant byflexible supply in a power system?	1M	1	1
c)	Write the V2G significance	1M	2	1
d)	How does EES help reduce power fluctuations caused by weather variations?	1M	2	1
e)	Why Lead-acid batteries are suitable for medium and large energy storage applications	1M	3	1
f)	What is meant by the state of charge of a battery?	1M	3	1
g)	What is meant by latent heat storage?	1M	4	1
h)	Name one technology suitable for short discharge times	1M	4	2
i)	Define a Smart Microgrid.	1M	5	2
j)	What is the purpose of a Battery SCADA system?	1M	5	2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	Discuss the role of Electrical Energy Storage in addressing the high generation cost during peak-demand periods with help of comparison of daily load curves.	10	1	2
	OR			
3	a. Explain what is meant by congestion in power grids and how EES helps to alleviate it. b. Explain the main characteristics of electricity and their impact on power system operation.	5 5	1	2 2
4	Discuss the different factors affecting the role of Electrical Energy Storage from the viewpoint of utilities, with suitable examples.	10M	2	3
	OR			
5	a. Why can EES be viewed as a virtual power plant in a Smart Grid?	4	2	1

	b. How can EES help with effective connection of solar and wind systems to the grid?	6		4
6	Explain about the Principle of operation and construction of Ni-Cd battery with require equations and diagrams and also mention advantages and disadvantages.	10	3	2
	OR			
7	a. Compare the operation and efficiency of Compressed Air Energy Storage and Flywheel Energy Storage. b. Discuss the challenges and future prospects of implementing hydrogen-based storage in modern power grids.	6 4	3	2 3
8	a. Is a super conducting magnetic energy storage system a potential energy storage system? Justify. b. Explain the working principles and characteristics of a double-layer capacitor.	5 5	4	3 2
	OR			
9	a. Analyze the importance of thermal storage in enhancing renewable energy reliability. b. Explain why no single EES technology can meet all storage needs.	5 5	4	3 2
10	a. Explain Future home energy network in a smart house with related diagrams and examples. b. Discuss the advantages and limitations of hybrid vehicle powertrains compared to electric vehicle powertrains.	7 3	5	2 3
	OR			
11	Explain with a neat block diagram how decentralized battery storage improves the performance and reliability of a grid-connected PV system.	10	5	2