R22 Regulation *Subject code:4O7BB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VII Semester Regular/Supplementary Examinations, October 2026

ENERGY STORAGE SYSTEMS

(EEE)

Maximum Marks: 60 Date:02.11.2026 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	BTL
1.a)	State any one characteristic of electricity that creates a need for Electrical Energy Storage.	1M	1	L1
b)	What is meant by congestion in a power grid?	1M	1	L2
c)	Mention one emerging need for Electrical Energy Storage.	1M	2	L1
d)	State one role of EES from the viewpoint of a consumer.	1M	2	L1
e)	What is Pumped Hydro Storage?	1M	3	L1
f)	What is the basic principle of Flywheel Energy Storage?	1M	3	L1
g)	What is a Double-Layer Capacitor?	1M	4	L1
h)	What is Superconducting Magnetic Energy Storage	1M	4	L2
i)	Mention one application of EES in a Smart Grid.	1M	5	L1
j)	What is a Virtual Power Plant in the context of EES?	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Explain the characteristics of electricity and discuss the role of Electrical Energy Storage (EES) in an electric power system.	10M	1	L2
	OR			
3	Discuss the need for EES with respect to high generation cost during peak-demand periods, continuous and flexible supply, and long-distance transmission.	10M	1	L2
4	Explain the emerging needs for Electrical Energy Storage with increasing renewable energy penetration and reduction of fossil-fuel dependence.	10M	2	L2
	OR			
5	Discuss the roles of electrical energy storage technologies from the viewpoints of utilities, consumers, and generators of renewable energy.	10M	2	L2
6	Classify Electrical Energy Storage systems and explain the working principles and characteristics of Pumped Hydro Storage (PHS), Compressed Air Energy Storage.	10M	3	L2

	OR			
7	Explain electrochemical and chemical energy storage systems with reference to secondary batteries, flow batteries and hydrogen (H_2).	10M	3	L2
8	Explain electrical energy storage systems based on Double-Layer Capacitors and Superconducting Magnetic Energy Storage. Compare their major characteristics.	10M	4	L2
	OR			
9	Explain thermal storage systems and discuss the standards for EES. Present a technical comparison of major EES technologies based on suitable performance parameters.	10M	4	L2
10	Explain the applications of EES in conventional power generation, grid operation and services, and uninterruptible power supply for large consumers. Discuss new trends in EES applications.	10M	5	L2
	OR			
11	Explain the use of EES in renewable energy generation, Smart Grid, Smart Microgrid, Smart House, and Electric Vehicles. Describe the management and control hierarchy of storage systems.	10M	5	L2