R22 Regulation *Subject code: 4P8BD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VIII Semester Regular Examinations, May 2026

SMART GRID TECHNOLOGIES

(EEE)

Maximum Marks: 60 Date: 08.05.2026 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	BTL
1.a)	What are limitations of traditional grid?	1	1	1
b)	What is self-healing grid?	1	1	1
c)	What are the components of smart grid?	1	2	1
d)	What is Distribution Automation	1	2	1
e)	What is computational intelligence?	1	3	1
f)	What is machine learning?	1	3	1
g)	What is WAMS?	1	3	1
h)	What is Vehicle-to-Grid (V2G)?	1	3	1
i)	Why is frequency control important in a microgrid?	1	3	1
j)	How do EVs support LFC and voltage control?	1	3	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Explain the policies and regulations to support the development and deployment of Indian smart grid technologies	10	1	2
	OR			
3	a. Compare Traditional Grid and Smart Grid with neat diagram.	5	1	4
	b. Explain Smart Grid concept, features, and functions.	5	1	2
4	Explain the components and architecture of smart grid design.	10	2	2
	OR			
5	a. What are Smart Energy Resources? Explain the Renewable energy needs in a Smart Grid.	5	2	2
	b. Explain Transmission Automation in Smart Grid with diagram.	5	2	2
6	Describe computational intelligence techniques in Smart Grid.	10	3	3
	OR			
7	a. Discuss about dynamic optimization techniques.	5	3	6
	b. Explain AI techniques used in Smart Grid.	5	3	2

8	a. What is not a Microgrid? Explain the three important benefits of a Microgrid with a neat sketch.	5	3	2
	b. Differentiate EV, H E V and P H E V.	5	3	4
	OR			
9	Discuss the life cycle emissions, composition of battery materials, and recycling techniques associated with Electric Vehicles and Plug-in Hybrid Electric Vehicles.	10	3	6
10	a. Analyze how distributed energy resources contribute to maintaining frequency stability in a microgrid.	5	3	5
	b. Discuss the significance of test beds in validating smart grid technologies and solutions.	5	3	6
	OR			
11	a. Assess the benefits of effective reactive power control in improving microgrid performance.	5	3	5
	b. Describe the voltage control techniques in microgrid.	5	3	5