



R22 Regulation

Subject code:406HA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, November 2025

RENEWABLE ENERGY SOURCES

((CSE(DS))

Maximum Marks: 60

Date:17.11.2025

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)	Give the advantages of renewable sources of energy.	1M	1	I
b)	Differentiate between drag-type and lift-type wind turbines.	1M	1	II
c)	List the various materials used in making a Solar Cell.	1M	2	I
d)	What is a fuel cell?	1M	2	I
e)	Mention the primary sources of losses in an induction generator.	1M	3	I
f)	State the difference between interconnected and stand-alone operation of an induction generator?	1M	3	II
g)	How does a flywheel store energy? Give its typical applications.	1M	4	I
h)	Give the economic benefits of integrating energy storage systems into the power grid.	1M	4	I
i)	Define reactive power in the context of renewable energy system.	1M	5	I
j)	Provide an example of a hybrid renewable energy system and its interconnection to the grid.	1M	5	I

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Discuss the main economic factors affecting electricity generation costs. How do capital costs, fuel costs and operation and maintenance impact overall pricing? b) What is supply-side management in the context of power systems? How does it differ from demand-side management?	5M 5M	1	III
OR				
3	Describe the components of a wind turbine and their functions in converting wind energy into electrical power. Add a note on the various speed control mechanisms used in wind turbines and their impact on energy efficiency.	10M	1	III
4	a) Draw and discuss the equivalent circuit of a PV cell and the significance of each parameter b) List the advantages and disadvantages of PV system.	5M 5M	2	III

	OR			
5	Describe the constructional features of Proton Exchange Membrane Fuel Cells (PEMFCs) and explain their significance in the fuel cell's operation. Add a note on merits and its limitations.	10M	2	III
6	Discuss the concept and operation of a self-excited induction generator. Also add a note on its components and the role of capacitor banks in its operation.	10M	3	III
	OR			
7	Describe the methods used to control the speed and voltage of an induction generator, including the role of excitation capacitance and mechanical input adjustments.	10M	3	IV
8	Give an account of the working principle of lead–acid batteries and List their advantages and limitations in energy storage applications.	10M	4	III
	OR			
9	a) Present the principle of superconducting magnetic energy storage and discuss its applications. b) Present the economic benefits of energy storage systems in reducing electricity costs and enhancing grid reliability.	6M 4M	4	III
10	Critically analyze the instantaneous active and reactive power control approach in the integration of multiple renewable energy sources into the power grid. Also write a note on challenges.	10M	5	IV
	OR			
11	Discuss the role of interconnection technologies, standards and codes in integrating distributed energy resources (DERs) into the electric power grid. Also discuss the technical and operational considerations involved.	10M	5	III