R20 Regulation *Subject code: 3O8CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VIII Semester Regular Examinations, April 2024

RENEWABLE ENERGY SOURCES

(Mechanical Engineering)

(Open Elective)

Maximum Marks: 70 Date:22.04.2024 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
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 (10X2M=20 Marks)		CO	Bloom Tx
1	What are renewable sources of energy, and how do they differ from non-renewable sources?	1	
2	What are the key factors to consider when evaluating the appropriate location for wind power plants?	1	
3	What is the principle behind the generation of electricity in photovoltaic power plants?	2	
4	What are the different types of fuel cells based on temperature?	2	
5	Write the concept of steady-state operation in induction generators.	3	
6	What role do magnetizing curves play in self-excitation?	3	
7	What are the key parameters used to evaluate energy storage systems?	4	
8	How do ultra capacitors differ from conventional capacitors in energy storage?	4	
9	What are the key principles of power injection in alternative energy integration?	5	
10	What standards and codes govern the interconnection of renewable energy systems with the grid?	5	

Part-B

Answer All the following questions. (5X10M=50Marks)			
11	A. Evaluate the significance of generators and speed control mechanisms in optimizing energy output from wind power plants. [5] B. Describe the functions and benefits of modern electronic controls in managing power systems for renewable energy sources. [5]	1	
	OR		
12	Explain the working principle of a wind turbine in detail. [10]	1	
13	A. Describe the constructional features of Proton Exchange-Membrane Fuel Cells (PEMFCs). [5] B. Briefly explain the fuel cell equivalent circuit and its practical determination of model parameters. [5]		

	OR		
14	A. What are the advantages and disadvantages of using fuel cells for energy generation? [5] B. Explain the key aspects of hydrogen as a fuel in fuel cell systems. [5]		
15	A. Discuss the methods and techniques used for speed and voltage control in induction generators, emphasizing their importance in power generation. [5] B. Analyze the economic aspects of induction generators, including their cost-effectiveness, maintenance considerations, and impact on the energy sector. [5]		
	OR		
16	Discuss the interconnected and stand-alone operation of induction generators. [10]		
17	Explain the operation of the Energy storage methods of a) Superconducting magnetic storage system b) Pumped hydroelectric energy storage [5+5]		
	OR		
18	Discuss the construction, working principle, and applications of lead-acid batteries in energy storage, highlighting their advantages and limitations. [10]		
19	Explore the various interconnection technologies used to link alternative energy systems with the grid. [10]		
	OR		
20	A. Discuss the importance of standards and codes in governing the interconnection of alternative energy sources with existing power infrastructure. [5] B. Explain how adherence to these standards ensures safe and reliable grid operations. [5]		