R18

Code No: 156EA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, January/February - 2025

RENEWABLE ENERGY SOURCES

(Common to CE, ME, ECE, CSE, IT, CSE(AI&ML))

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Define distributed generation and its importance in modern power systems.	[2]
b)	Mention two key challenges in analyzing small wind generating systems.	[3]
c)	Explain the aspects of hydrogen as fuel.	[2]
d)	What are the economic considerations of solar energy systems?	[3]
e)	State the voltage control of induction generator.	[2]
f)	What is the mathematical description of the self-excitation process in induction generator?	[3]
g)	What are the key parameters to consider for energy storage systems?	[2]
h)	What is the principle behind pumped hydroelectric energy storage?	[3]
i)	What is meant by islanding in renewable energy integration?	[2]
j)	What is the need for interconnecting renewable energy with the grid?	[3]

PART – B

(50 Marks)

2.a) Discuss the differences between demand-side management and supply-side management options.
b) Explain the purpose and benefits of integrating renewable energy into grid-supplied electricity. [5+5]

OR

3.a) Compare different classifications of wind turbines based on their operating principles.
b) Discuss the topographical and environmental factors affecting wind power generation. [5+5]

4.a) Discuss the working principles of photovoltaic systems and their applications.
b) Provide an economic analysis of photovoltaic solar energy compared to traditional energy sources. [5+5]

OR

5.a) Compare low-temperature and high-temperature fuel cells, focusing on their constructional features and applications.
b) Discuss the advantages and disadvantages of using fuel cells as an energy source. [5+5]

6.a) Describe the self-excitation process in induction generators, supported with mathematical expressions.

b) Provide an analysis of power and losses generated in induction generators. [5+5]

OR

7.a) Discuss the differences between stand-alone and interconnected operations of induction generators.

b) Explain the economic benefits and limitations of induction generators in power systems. [5+5]

8.a) Discuss the principles and applications of various energy storage systems.

b) Discuss the advantages and limitations of compressed air energy storage. [5+5]

OR

9.a) Compare ultra-capacitors and flywheels in terms of performance and applications.

b) Analyze the role of energy storage in improving the economic efficiency of power systems. [5+5]

10.a) Explain the approach for instantaneous active and reactive power control in renewable energy systems.

b) Elaborate on the challenges and solutions for integrating alternative energy sources into modern grids. [5+5]

OR

11.a) Explain the considerations for integrating renewable energy sources with the grid.

b) Discuss the principles and methods of integrating multiple renewable energy sources. [5+5]

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