

Code No: 156DH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, February - 2023

WIND AND SOLAR ENERGY SYSTEMS

(Electrical and Electronics Engineering)

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) What are the disadvantages of wind power? [2]
- b) What is the principle of wind power generation? [3]
- c) Draw the induction generator torque speed characteristics and brief. [2]
- d) What is the need for Power electronics converters in wind energy technology? [3]
- e) What is beam and diffused radiation? [2]
- f) Draw and brief the V-I characteristics of a PV cell. [3]
- g) List out the advantages of hybrid operation of solar and wind energy systems. [2]
- h) What are the major Network Integration Issues of Wind energy system? [3]
- i) Draw the Parabolic trough collector diagram. [2]
- j) Compare Flat plate and Paraboloidal types of solar collectors. [3]

PART – B**(50 Marks)**

- 2.a) Discuss in detail about Wind power-cumulative distribution functions.
- b) Describe with a neat sketch the working of wind energy system with main components. [5+5]

OR

3. From fundamentals derive the expression for Betz limit ratio. [10]

- 4.a) With neat and necessary diagrams, explain the working principle of doubly fed Induction Generator.
- b) Discuss in detail about the differences between fixed speed and variable speed wind turbines. [5+5]

OR

- 5.a) With neat and necessary diagrams, explain the working principle of Permanent Magnet Synchronous Generator.
- b) With neat and necessary diagrams, explain about the power electronic converters used in wind energy conversion. [5+5]

- 6.a) With suitable example, explain the estimate the solar energy availability.
b) What do you understand about solar radiation spectra? Explain in detail. [5+5]
- OR**
7. Classify the Power Electronic Converters used for Solar Systems and explain any one control technique. [10]
- 8.a) Discuss in detail about the grid code technical requirements: real and reactive power Regulation.
b) Discuss in detail about isolated operations of solar PV and wind systems. [4+6]
- OR**
9. Discuss in detail about solar PV and wind farm behavior during grid disturbances. [10]
10. With neat and necessary diagrams, explain the construction and working of parabolic dish, and Fresnel solar collectors. [10]
- OR**
- 11.a) Explain the construction and working of central receivers system.
b) With neat and necessary diagrams, explain the construction and working of solar pond. [5+5]

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