

CBCS SCHEME

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18EE731

Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024 Solar and Wind Energy

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is meant by Renewable Energy Sources? What are the prospects of Non – Conventional Energy Sources in India? (10 Marks)
- b. What are the advantages and limitations of Renewable Energy Sources? (05 Marks)
- c. Explain various aspects of Energy Conservation. (05 Marks)

OR

- 2 a. Why is it necessary to store energy? (04 Marks)
- b. Describe the specification of Energy Storage Devices. (06 Marks)
- c. Explain the Extraterrestrial and Terrestrial Solar radiation through atmosphere. (10 Marks)

Module-2

- 3 a. Define the following terms : i) Zenith angle ii) Altitude angle iii) Declination angle iv) Solar Azimuth angle and v) Latitude angles. (10 Marks)
- b. Calculate the number of day light hours (sunshine hours) in Srinagar on January 1st and July 1st. The latitude of Srinagar is 34° 05' N. (10 Marks)

OR

- 4 a. Classify different types of Solar thermal collectors and show the constructional details of a flat plate collector. What are its main advantages? (12 Marks)
- b. Draw a schematic diagram of Solar pond based electric power plant with cooling tower and explain its working. (08 Marks)

Module-3

- 5 a. What are major advantages and disadvantages of a Solar PV system? (08 Marks)
- b. Give a detailed explanation of how Solar cell, module and array systems are built. And also illustrate the concept of load mismatch in an SPV – load system. (12 Marks)

OR

- 6 a. Explain the I – V characteristics of a Solar cell and define fill factor. What is significance of fill factor? (10 Marks)
- b. What is the importance of MPPT in an SPV systems? Explain various strategies used for operation of an MPPT. (10 Marks)

Module-4

- 7 a. What is the basic principle of Wind Energy Conversion? (06 Marks)
- b. Describe the main consideration in selecting a site for wind generators. (10 Marks)
- c. Write short note on “Nature of Wind” required for Energy Conversion process. (04 Marks)

OR

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 8 a. Prove that in case of horizontal axis wind turbine maximum power can be obtained when exist velocity = $\frac{1}{3}$ wind velocity and $P_{\max} = \frac{8}{27} \rho A V^3$. (12 Marks)
- b. Write comments on Environment and Economics Environment benefits and problems of wind energy. (08 Marks)

Module-5

- 9 a. Describe with a neat sketch, the working of a Wind Energy Systems (WECS) with main components. (12 Marks)
- b. How are WEC Systems are classified? Describe in brief. (08 Marks)

OR

- 10 a. Discuss the advantages and disadvantages of Wind Energy Conversion System. (08 Marks)
- b. Describe the different schemes for Wind Electric Generation (or) describe the generating systems. Also describe the generator control systems. (12 Marks)
