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Code No: 156DX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

NON-CONVENTIONAL ENERGY SOURCES

(Common to CE, EEE, ME, ECE, CSE, IT, MMT)

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 is the function of sunshine recorder? [2]
- b) Explain the information included in solar radiation data. [3]
- c) Give the classification of concentrating collectors. [2]
- d) Explain (i) Peltier effect and (ii) Thomson effect. [3]
- e) Define latent heat. [2]
- f) What is solar distillation? Explain. [3]
- g) Define power coefficient of a wind power. [2]
- h) What are the factors affecting the nature of wind? [3]
- i) What are the applications of biogas? [2]
- j) What are the possible sources of geothermal pollution? [3]

PART – B

(50 Marks)

2. Explain the procedure of estimating solar radiation on tilted surfaces. [10]

OR

3. Define and explain the following terms:

- a) Altitude angle
- b) Incident angle
- c) Zenith angle
- d) Solar Azimuth angle
- e) Hour angle. [10]

4. What are the main components of a flat plate solar collector? Explain the function of each component. State its advantages and disadvantages. [10]

OR

- 5.a) What is a fuel cell ? Explain the working principle of a fuel cell with respect o $H_2 - O_2$ cell.

- b) What are the materials for MHD generators? State the requirements for these materials.

[5+5]



- 6.a) What are the main applications of solar pond? Explain in brief.
b) Classify the methods of solar energy storage. Give brief explanation of each one. [5+5]

OR

- 7.a) What is the basic principle of Ocean Thermal Energy Conversion (OTEC)? Explain.
b) Explain various methods of tidal power generation with neat sketches. [5+5]

8. Discuss the design considerations of Horizontal axis windmills. [10]

OR

- 9.a) Derive the expression for power developed due to wind.
b) Wind at 1 standard atmospheric pressure and 15°C temperature has a velocity of 15 m/s. The turbine has diameter of 125 m and its operating speed is 45 r.p.m at maximum efficiency. Calculate (i) total power density in the wind stream (ii) the maximum obtainable power density, assuming $\eta = 40\%$ (iii) total power produced in KW and (iv) the torque and axial thrust. [4+6]

10. Explain different types of Bio gas digesters. [10]

OR

- 11.a) What are the main applications of geothermal energy? Explain in brief.
b) Give a brief note on prospects of geothermal energy in context to India. [4+6]

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