

Non Conventional Energy Sources Paper – II

P. Pages : 2

Time : Three Hours



TKN/KS/16/7311

Max. Marks : 80

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- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Diagrams and chemical equations should be given whenever necessary.
 11. Illustrate your answers whenever necessary with the help of neat sketches.
 12. Use of non programmable calculator is permitted.

1. a) Define & Explain the terms : **6**
i) Zenith angle.
ii) Declination angle.
iii) Hour angle.
- b) Calculate the angle made by beam radiation with normal to a flat collector on December 01, at 9 : 00 AM, solar time for location at $28^{\circ}35'N$. The collector is tilted at an angle of latitude plus 10° with the horizontal & is pointing due south. **7**

OR

2. a) Determine the Local Solar time & declination at Nagpur latitude $21^{\circ}N$, longitude $79^{\circ}10'E$ at 12 : 30 IST on March 19. Equation of Time correction is from standard chart = $-8'4''$. **7**
- b) Classify Solar radiation measuring instruments. Describe the principle of Angstrom type pyrheliometer. **6**
3. a) Discuss the advantages & disadvantages of concentrating type of collector over a flat plate collector. **7**
- b) What are the main components of solar air heater? Explain function of each part. **7**

OR

4. a) Classify the methods of solar energy storage. Describe thermal energy storage system. **7**
- b) What are the main applications of solar pond? Describe briefly the principle & construction of non – convective solar pond. **7**

5. Write short notes on
- i) Solar Pumping System. 6
 - ii) Solar Cooking System. 7

OR

6. a) Describe how solar energy can be directly converted into electrical energy using photo voltaic effect. Sketch a typical solar cell. 7
- b) Enumerate the application of solar energy. Also explain a solar hot water system. 6
7. a) How are WEC systems classified? Describe in brief. 7
- b) Discuss the consideration to be made while selecting the site for WECS. Also state the advantages & disadvantages of WECS. 7

OR

8. a) Prove that in case of horizontal axis turbine, maximum power can be obtained when 8

$$\text{Exit velocity} = \frac{1}{3} \cdot \text{Wind velocity} \ \& \ P_{\max} = \frac{8}{27} \rho AV_i^3$$
- b) Describe with a neat sketch, the working of a WECS with its main components. 6
9. a) What are the basic principle of Ocean Thermal Energy Conversion (OTEC). 6
- b) Describe the 'Closed Cycle' OTEC system with its advantages over 'open cycle' system. 7

OR

10. a) Compare the double basin arrangement with single basin arrangement in a Tidal power generating systems. 5
- b) Explain the working principle of a wave energy conversion system. 8
11. a) Describe MHD closed cycle system with Advantages and Disadvantages. 7
- b) Write short note on Small Scale hydro electric power generation. 6

OR

12. Write a short notes on
- i) Advantages of Geothermal energy sources. 6
 - ii) Principle of MHD Generation. 7
