

Code No: 5221AD

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech I Semester Examinations, February - 2017

NON CONVENTIONAL ENERGY REOURCES

(Thermal Engineering)

Time: 3hrs

Max.Marks:75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

5 × 5 Marks = 25

- 1.a) Discuss about orientation of solar flat plate collector to get maximum output. [5]
- b) State the environmental problems associated with geothermal energy. [5]
- c) Discuss briefly the five methods of hydrogen storage. [5]
- d) Explain the process of photosynthesis. [5]
- e) State the merits and demerits of tidal energy. [5]

PART - B

5 × 10 Marks = 50

2. Calculate the monthly average hourly radiation falling on a flat plate collector facing south with a slope of 15° downwards, given the following data.
Location (13° N), month: January ; Time: 10AM to 11 AM. ; $I_d = 1073 \text{ kJ/m}^2\text{-hr}$; $I_g = 2452 \text{ kJ/m}^2 \text{ hr}$. assume ground reflectivity be 0.2. [10]

OR

- 3.a) List out differences between Active and passive heating.
- b) Describe in brief, the different energy storage methods used in the solar system. [5+5]
4. Explain with a neat diagram vapour dominated geo thermal power plant. List the operational problems. [10]

OR

- 5.a) With a neat sketch explain the working of HDR geothermal plant.
- b) Explain the heating and cooling applications of a thermoelectric system. Comment on the type of materials used for low and high-temperature applications. [5+5]
- 6.a) Explain the role of (i) fuel rods (ii) control rods (iii) heavy water. also discuss about commonly used isotopes in nuclear reactors.
- b) Comment on the type of materials required in a thermionic converter. [5+5]
- 7.a) Discuss about the prospectus of using hydrogen in I.C. Engine applications.
- b) Differentiate between Thermionic and thermoelectric generation. [5+5]

8.a) Classify biogas plant and explain any one type of biogas plant with neat sketch.

b) What do you understand by energy farming?

[5+5]

OR

9.a) Explain the process of commercial production of ethanol from biomass.

b) Explain the desirable features of bio-ethanol that makes it suitable as automobile fuel. What grade of bio-ethanol is required for blending with petrol and why?

[5+5]

10.a) By explaining factors effecting wave energy, write a short note on oscillating water column surge device.

b) What is the working principle of OTEC?

[5+5]

OR

11.a) What is Betz criteria? Derive expression for calculation of maximum power available based on this criteria.

b) Explain the operation of heaving float type water device.

[5+5]

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