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RN-8179

B. E. II (Sem. IV) (Mech) Examination

May / June – 2010

Non-Conventional Energy Sources

(Institute Elective-I)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 2 (Sem. 4) (Mech)**

Name of the Subject :

☛ **Non-Conventional Energy Sources (Institute Elective-1)**

☛ Subject Code No. : **8 1 7 9** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt all questions from both the section.

(3) Answer to the **two** sections must be written in two **separate** answer books.

(4) Figures to the **right** indicate **full** marks.

(5) Assume suitable data if necessary.

(6) Use of calculator is permitted.

SECTION – I

1 (a) Answer the following : **10**

(1) Define : Beam radiations of solar energy.

(2) Define : Solar constant.

(3) Define : Power coefficient of wind.

(4) Write disadvantages of biogas plant.

(5) What are the types of geothermal resources ?

(b) Explain with neat sketch flat plate types solar water heater system. Also write its advantages and disadvantages. **10**

2 (a) Describe the working of horizontal axis type wind turbine generator with the help of neat sketch. **7**

(b) Write short note on floating dome type biogas plant with the help of neat sketches. **8**

OR

2 (a) Why wind energy is preferred ? Write in brief its advantages and disadvantages. 7

(b) Write short note on site selection for installation of biogas plant. 8

3 Answer the following questions : (any **two**) 15

(1) Explain with sketch vapour dominated power plant.

(2) Describe with sketch liquid dominated power system. Also draw T-S diagram.

(3) Calculate day length and solar declination angle (δ) on 1st may 2010, at located of SVMIT Bharuch engineering college. Assume latitude $\phi = 28^{o}35'N$, Longitude=$77^{o}12'E$.

SECTION – II

4 Answer the following : (any **ten**) 20

(1) What is energy management and energy audit ?

(2) List different methods of transportation of Hydrogen. Explain any one.

(3) What are the advantages of Hydrogen over other fuels?

(4) Draw labeled sketch of phosphoric acid fuel cell.

(5) What is the working principle of OTEC plant ?

(6) What are the limitations of Tidal energy ?

(7) What is fuel cell ? Define Alkaline fuel cell.

(8) Which materials are used for MHD system ?

(9) List various applications of fuel cell.

(10) What is Hybrid cycle for OTEC plant ?

(11) How you classified fuel cell based on physical state of fuel.

(12) Which factors to be consider for selection of fuel cell ?

5 Answer the following :

(a) Explain open type MHD system with labeled diagram. 8

(b) Hydrox fuel cell has the following data at 300K and atmospheric pressure is 1 bar. 7

(1) Change in Gibbs free energy $\Delta G = -237191$ kJ/Kg K

(2) Heat of reaction of the Hydrogen fuel cell $\Delta H = -285838$ KJ/Kg K.

(3) Actual output voltage at 453 k V=1.12 v
Find out :
(a) Maximum efficiency of fuel cell
(b) EMF
(c) Voltage efficiency
(d) Total loses.

OR

5 In single basin system, the basin area of a single basin type power plant is $10^7 m^2$. The tidal range is 6 m. The turbine starts operating when the water head on it fall below 2m. The generator efficiency 73% assuming density of water is 1025 Kg/m^3. find the average power generated in kWH. Time between high tide and low tide is 22360 sec. Derive the formula you have used. **15**

6 Answer the following questions : (any **two**) **15**
(1) Explain double basin arrangement for tidal power plant.
(2) What is energy conservation ? What is its importance ?
(3) Write down short note on inverted, tidal power plant (single basin system).