Code No: 52108/MT **NR**

M.Tech. I-Semester Regular Examinations, March-2008.

ENERGY CONVERSION SYSTEMS
(Common to Power Electronics & Electric Drives, Power & Industrial Drives, Power Electronics, Electrical Power Engineering and Power Engineering & Energy Systems)

Time: 3 hours **Max. Marks: 60**

Answer any FIVE questions
All questions carry equal marks.

1.a) Show that a wavelength of $\lambda = 1\mu m$ solar radiation corresponds to an energy of 1.24 ev. List out all assumptions made.
b) Explain the symbols AMO, AMI levels. Give the values of power densities available in solar radiation at these two levels.
c) Taking a solar power content of 1 W/cm^2 at the space-station location, calculate the area of solar panels required at 20% efficiency of conversion for powers of 2000Mw, 5000Mw and 10,000Mw.

2. What is meant by the term "Segmented Electrodes"? Give reasons why such an electrode arrangement is necessary in an MHD generator. Are segmented electrodes necessary for the Faraday configuration or Hall configuration or both in a combined Faraday-Hall generator? Explain.

3.a) Explain how the energy produced by a wind turbine can be stored for re-use. What are the arrangements used for starting a Darrieus Wind turbine?
b) Construct the table showing the rotor diameters required for developing maximum powers of 10, 15, 50, 100 KW at undisturbed wind speeds of 5, 10, 15, 20, 25 meters/sec. Take coefficient of performance value as 0.60, the Betz value.

4.a) Draw figures and explain the following Layout of tidal schemes with i) Vertical axis Kaplan turbine
ii) Bulb turbine with horizontal shafts, iii) Straflow turbine with rim generator.
b) Assuming the spectral density for a square wave height is given by approximating to a triangle with a maximum amplitude of $7.4m^2/HZ$ within the frequency range of 0.05 to 0.2HZ, and zero else where calculate the significant wave height.

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5.a) Describe the working of a closed cycle OTEC system using NH_3 as the working fluid.
b) Mention 4 applications where OTEC system can be utilized.

6.a) Describe why hydrogen is called a perennial source of energy for the world "Describe the reasons why hydrogen is called an energy carrier".
b) Prove that 1 Faraday is equal to a charge of 96, 485C.

7. Describe the cogeneration systems using.
   a) A topping cycle and a bottoming cycle
   b) Providing several types of energy from the same source.

8. Suggest the methods of eliminating or minimization of pollution from fossil fuel plants?
   a) Smoke and dust
   b) Co_2,
   c) So_2,
   d) NO. and
   e) Thermal.

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