GIET UNIVERSITY, GUNUPUR – 765022

Ph.D. (Second Semester) Examinations, November – 2023

WPPEEE2011 /PPEEE2011 – Non-Conventional Energy Sources

(EEE)

Time: 3 hrs   Maximum: 70 Marks

The figures in the right hand margin indicate marks.

Answer ANY FIVE Questions   **(14 x 5 = 70 Marks)**

		Marks
1.a.	Explain about 4 types of Solar cells with it characterises.	8
b.	Explain the concept of photovoltaic energy conversion.	6
2.a.	Explain the importance of Solar Thermal Conversion.	6
b.	Enumerate the different types of solar collectors with its characteristics.	8
3.a.	Derive the expression for power developed due to wind.	6
b.	How a wind generator will aid solar power generation in the case of Hybrid systems?	8
4.a.	What methods are used to overcome the fluctuating power generation in windmills?	8
b.	Describe the main applications of wind energy.	6

5.a. A Tidal project has installed capacity of 2176 MW in 64 units each of 34MW rated output. The head at rated output is 5.52 m. The embarkment is 4 miles long = 6.4 km. Assume 93% efficiency for both turbine and generator. The generation is 5 hours twice a day. Calculate
a) The quantity of water flowing through each turbine and the total flow out of the tidal basin.
b) The surface area of reservoir behind the embarkment, and the wash.
c) Energy produced in TW-h per year.   **14**

6.a. Describe the 'closed cycle' OTEC system, with its advantages over 'open cycle' system.   **8**

b. The observed difference between the high and low water tide is 8.5m, for a proposed tidal site. The basin area is about 0.5 sq. km which can generate power for 3 hours in each cycle. The average available head is assumed to be 8m, and the overall efficiency of the generation to be 70%. Calculate the power in h.p. at any instant and the yearly power output. Average specific weight of sea water is assumed to be 1025 kg/m^3 **6**

7 a. Explain about direct combustion for heat and electricity generation.   **8**

b. Calculate the Volume of the Digester and the power developed by a Bio-digester with dry mass input per day 15kg. retention time of 30 days, operating temperature of 30^{0}C, biogas yield of 0.2 m^3/Kg of dry mass, burner efficiency of 65% and methane proportion of 0.85. Assume that heat combustion of methane is 28 MJ/m^3.   **6**

8 a. What are the advantages and limitations of small-scale hydroelectric power generation?   **6**

b. Classify between Mini, micro, and Pico hydro-power plants.   **8**

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