QP Code: 23RAPhD018 | Reg. No | | | | | | | | | | | AY 23

GIET UNIVERSITY, GUNUPUR – 765022

Ph.D. (Second Semester) Examinations, April – 2024

PPEEE2011 – Non-Conventional Energy Sources

(EEE)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

(14 x 5 = 70 Marks)

Answer ***ANY FIVE*** questions | Marks

1. a.	Explain the process of Solar heating and cooling processes with its applications.	7
b.	Describe briefly the Extra-terrestrial Solar radiation and Terrestrial radiation.	7
2.a.	A hydro power plant with 1050 MW output has an efficiency of 93%. The plant load factor is65%. It operates at a constant head of 60m. Calculate i) The maximum flow rate required ii) The quantity of water to be stored behind a dam to cater for a year's load requirement.	7
b.	Explain how wind generator can aid solar power generation in case of Hybrid systems.	7
3. a.	Describe with neat sketch the working of a wind energy system with main components and derive the expression for power developed due to wind.	8
b.	Design the rotor radius of a multi blade wind turbine that operates in a wind speed of 36kmph to pump water at a rate of 6m3/hr. with a lift of 6m. Also calculate the angular velocity of the rotor. Given water density=1000 kg/m3; g = 9.8m/sec; water pump efficiency = 50%; efficiency of rotor to pump = 80%; CP = 0.3, λ = 1.0 and air density = 1.2 kg/m3.	6
4.a.	What is the basic principle of ocean thermal energy conversion (OTEC)? What are the main types of OTEC power plants? Describe their working in brief.	8
b.	What factors influence the selection of site for wind power plant?	6
5. a.	What is the difference between biomass and biogas? Explain the process of biomass conversion.	7
b.	What are the possible sources of Geothermal pollution? How these are avoided?	7
6.a.	Explain about biofuels and explain the process of extracting commercial biofuels.	8
b.	Calculate the volume of the Digester and the power developed by a Bio-digester with dry mass input per day is 15kg, retention time of 30 days, operating temperature of 300C, biogas yield of 0.2 m3/Kg of dry mass, burner efficiency of 65% and methane proportion of 0.85. Assume that heat combustion of methane is 28 MJ/m3.	6
7. a.	Write short notes on (i) Pumped hydro (ii) Spillway	8
b.	A mini-hydel plant for developing 500kW to supply a small town operates under a head of 80m (about 250 feet). The efficiency is 90%. Assume k=0.5. Calculate the diameter and thickness of pipe required, and the quantity of water flow per second at full load.	6
8. a	Give a brief note on prospectus of Geothermal energy in context to India.	6
b.	Discuss why surge tanks are necessary for short to medium length pipe lines in a hydroelectric development.	8

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