

IV SEMESTER B. TECH END SEMESTER EXAMINATIONS, MAY 2023

SUBJECT: RENEWABLE ENERGY (ELE 4306) (OPEN ELECTIVE - I)

REVISED CREDIT SYSTEM

Time: 3 Hours	Date:02 JUNE 2023	Max. Marks: 50		
Instructions to Candidates:				
 Answer ALL the questions. Missing data may be suitably assumed. 				
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1A.	role of each in the Indian Power Scenario.	e (03)		
18	Design a battery system in solar PV system for the following telecom tower having a connected load of 4KW, operating a 230V AC. PV system should be supplying power to the load even if there are clouds for continuous 3 days. Determine the battery capacity (Ah) of total batteries to be used in the proposed system. Assume the following, inverter efficiency and battery efficiency. The input voltage to the inverter in 48V, DC. Assume batteries have the following specifications12V,150Ah system, and losses of 30%.	g it d e v, s g (04)		
1C.	Estimate the monthly average of the daily extraterrestriar radiation on a horizontal surface at 30°10′N, 75 ° 08′ during the month of January 26. If the average sunshine hou per day is 6h,(a= 0.25 b =0.57).	al E r (03)		
2A	What are the mismatch losses in solar PV modules? Explait the sources of mismatch losses and how to protect against these losses.	n st (04)		
2B	A heterojunction solar cell of active area 6 cm ² gave th following results $V_{oc} = 400 \text{mV}$, I = 200 mA, under insolatio	e n		
	equal to 0.8 sun, what is the energy conversion efficiency of the device? (assume FF=80%).	of (03)		
2C	With the help of a neat block diagram explain the wind energ conversion system and discuss its economic an environmental benefits.	y d (03)		
3A	Explain the grid-connected Doubly Fed Induction Generator wind energy conversion system with the help of a bloc diagram. Explain the role of the grid side converter and rotor side converter to reduce energy loss.	r k r (03)		

3B	A wind turbine has wind blades 24 m long. The average wind speed at the site is 6.9 m/s. The total efficiency of the system including Cp is 30%. Compute the annual energy produced. Assuming the air density.	(03)
3C	Discuss different types of control mechanisms used in wind turbine systems and explain grid integration issues of wind energy systems.	(04)
4A	What are the advantages of a hybrid energy system compared with an individual system? With the help of a neat block diagram, explain the control strategy of PV and wind hybrid systems connected to Electrical Utility with a battery storage system.	(03)
4B.	What are the characteristics and environmental benefits of fixed dome-type biogas plants? With the help of a neat diagram explain the floating dome-type biogas plant.	(03)
4C.	The annual energy requirement of a primary health center (PHC) located in a remote area is 30000 kWh, estimate the power rating of the wind turbine required to be installed to meet the energy requirement. The following assumptions are taken into account for estimation: Coefficient of performance – 0.40, Wind speed at 15-meter height is 5 meter/sec speed. The density of air – 1 kg/m ³ , Capacity factor – 0.30.	(04)
5A.	What are the different types of gasifiers plant? With a neat diagram explain the updraft gasifier system. Discuss its limitations and benefits.	(04)
5B.	What are the different types of geothermal power plants? Explain a dry steam geothermal power plant with the help of a neat diagram and discuss environmental benefits.	(03)
5C.	What are the different types of Ocean thermal energy conversion (OTEC). With the help of a neat diagram explain the working of the closed cycle OTEC system.	(03)