Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH MAKEUP EXAMINATIONS DECEMBER 2022 - JANUARY 2023

RENEWABLE ENERGY [ELE 4306] (OPEN ELECTIVE)

REVISED CREDIT SYSTEM

Time: 3 Hours			Date: 03 January 2023			Max. Marks: 50	
Instructio	ns to Candidates	:					
*	Answer ALL the						
*	Missing data may	y be suitably assu	imed.				
1A.	A flat plate collector in New Delhi ($28^{\circ}35'$ N & $77^{\circ}12'$ E) is tilted by 300 from horizontal. It is pointing towards the southern direction at 11:00 hours on 01/06/2022. Calculate the angle of the incident sun's ray on the collector surface to its normal.					(04)	
1B.	Classify the solar collectors and explain each.					(03)	
1C.	Describe the problems faced by solar PV cells connected in series under the influence of partial shading.					(03)	
2A.	Compare conventional and non-conventional energy resources concerning the Indian scenario.					(02)	
2B.	The load use pattern of a studio apartment is given in the table below.						
	Load	Quantity	Rating (KW)	Time of use (h)			
	Fan	4	0.075	10			
	Light	8	0.05	12			
	Heater	1	2	1			
	Design the PV load.	system with a	a battery to su	pply reliable po	wer to the	(04)	
2C.	Classified the different types of wind turbines. With neat diagram explain the doubly fed induction generator (DFIG) wind turbine system.						
3A.	A WT has a mass flow rate of 30,000 kg/s. The upwind speed is 30 m/s and the downwind speed is 25 m/s. Compute the following: 1. Diameter of the air mass boundary in the upwind and downwind regions 2. Power in the upwind and downwind areas 3. Power captured by the blades (04)						

3B.	Why is the fixed Speed Wind Turbine being used for small size systems? Explain the Torque-speed characteristics of fixed speed wind turbine.	(03)			
3C.	A fixed-speed generator has a torque range from 700 to 3200 Nm. The synchronous speed of the generator is 1000 rpm. Estimate the range of the developed power of the generator assuming the slip is -0.02 .				
4A.	Compare the relative performance of a floating drum and fixed dome type biogas plants? With the help of neat diagram explain fixed dome type biogas plant.				
4B.	The Green Mountain Energy Wind Farm is located in Borden and Scurry counties in Texas. The elevation of the area is 900 m above the sea level. The average wind speed of these counties is 15 m/s at 50 m above ground level. The average temperature of the area is 17°C. Compute the power density of wind at these average values.	(03)			
4C.	What are the advantages of hybrid energy system compared with individual system? With the help of neat block diagram ,explain the control strategy of wind and battery storage hybrid system connected to Electrical Utility.	(03)			
5A.	Explain the downdraft gasifier plant with the help of a neat diagram.	(02)			
5B.	Explain a dry steam geothermal plant with the help of a block diagram.	(04)			
5C.	Describe an open cycle OTEC system with the help of a block diagram.	(04)			