PRN:		Course Code :	ELE2605.1

Third Year **B. Tech** End Semester Examination Summer 2023

Wind Energy Conversion System

Day and Date: Tuesday, 20/06/2023 Max Marks: **100**

Time : 10.30 am to 1.30 pm Duration: **03** hrs

Instructions: All questions are compulsory.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	Explain the following term (a)Wind Power (b)Blade Swept area (c) Air density (d) Wind Power Density	08	L1	1
	b)	Explain the Coriolis Effect in detail.	08	L1	1
		OR			
	b)	How are you going to select the site for the installation of the wind power plant?	08	L3	3
Q.2		**Attempt the following**			
	a)	Summarize the wind power equation with mathematical analysis	08	L2	2
	b)	State and describe the sources of loads in WECS	08	L2	2
		OR			
	b)	Explain the uneven solar heating	08	L1	1
Q.3		**Attempt any two from the following**			
	a)	Illustrate the importance of power coefficient and tip speed	08	L4	2
	b)	Explain the concept of yaw control, pitch angle, and tip speed ratio control	08	L1	1
	c)	Which wind turbine is generally used? Justify the answer with a proper explanation	08	L3	3
Q.4		**Attempt any two from the following**			
	a)	Explain the importance of MPPT in WECS	08	L2	3
	b)	Explain the hill-climbing algorithm and state merits and demerits	08	L2	
	c)	State the different MPPT methods used in WECS and explain Perturb & Observe method.	08	L2	2
Q.5		**Attempt any Two of the following**			
	a)	Explain the design of the Horizontal Axis Wind Turbine on the basis of rotor design, rotor hub, Nacelle, tower design, control system, aerodynamics, and environmental consideration	09	L4	1
	b)	A HAWT with a rotor diameter of 90 meters is operating at a wind speed of 12 meters per second. If the power coefficient (Cp) of the turbine is 0.48, calculate the maximum power output of the turbine.	09	L5	4

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	c)	A HAWT with a rotor diameter of 100 meters has a maximum power output of 2.5 MW. If the average wind speed at the turbine location is 9 meters per second, calculate the power coefficient (Cp) of the turbine.	09	L5	4
Q.6		**Attempt any Two of the following**			
	a)	Explain the various types of power control and braking systems in HAWT	09	L3	1
	b)	A HAWT has a swept area of 5500 square meters and is operating at an average wind speed of 13 meters per second. If the power output of the turbine is 2.8 MW, calculate the power coefficient (Cp) of the turbine.	09	L5	4
	c)	A HAWT has a rotor diameter of 70 meters and is operating at a wind speed of 16 meters per second. The swept area of the rotor is 3800 square meters. Calculate the power output of the turbine using a power coefficient (Cp) of 0.38.	09	L5	4

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