Reg. No.												

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M.E. / M.Tech. - DEGREE EXAMINATIONS, APRIL/MAY 2023

Second Semester

M.E. – Power Electronics and Drives

20PPEEL216 – WIND ENERGY CONVERSION SYSTEMS

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	What are factors considering while selecting wind power generation?	*2,K1,CO1*
2.	Explain the Cp curve of wind turbine.	*2,K2,CO1*
3.	Summarize the different blade profile for the different TSR.	*2,K2,CO2*
4.	Show Cp Vs λ curves for various types of wind turbines.	*2,K2,CO2*
5.	Illustrate how the variable speed wind turbine generator is more efficient than fixed speed wind turbine generator?	*2,K2,CO3*
6.	Explain short circuit ratio of generator.	*2,K2,CO3*
7.	Outline the difference between variable speed constant frequency systems and variable speed variable frequency system.	*2,K2,CO4*
8.	Explain the various advantages of PMSG over DFIG.	*2,K2,CO4*
9.	What are the two main types of grid connectivity in a wind?	*2,K1,CO5*
10.	Explain the angle of attack in the design of wind mill blades.	*2,K2,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Deduce the expression for Betz limit for the power co-efficient of wind turbine using simple momentum theory.	*13,K2,CO1*
		OR	
	b)	With neat sketch explain the various attributes to be taken care in the aerodynamically designed wind turbine.	*13,K2,CO1*
12.	a)	Explain the various features of pitch controlled WPP and stall controlled WPP.	*13,K2,CO2*
		OR	
	b)	Illustrate the various designs of rotors used for HAWT with its merits and demerits.	*13,K2,CO2*

13. a) Explain the steady state stability analysis for generator model for wind mill application. *13,K2,CO3*

OR

b) Explain the different types of drive train modeling of wind turbine and explain the relationships of various parameters. *13,K2,CO3*

14. a) Explain WECS with fixed-speed with squirrel-cage induction generator (SCIG) and variable-speed with doubly fed induction generator (DFIG). *13,K2,CO4*

OR

b) Explain the torque equation of induction machine and deduce step by step equivalent circuit of it. Prove P2:Pm:Prot.cu.loss = 1:(1-s):s *13,K2,CO4*

15. a) Explain the enhanced Dynamic behaviour of Grid Connected Wind Farms in Load Participation and Frequency Regulation *13,K2,CO5*

OR

b) Explain in detail on the supply of ancillary services for frequency and voltage control. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) (i) Illustrate all types of towers used for wind mill with diagram with the merits and demerits of each type. *7,K2,CO4*

(ii) Explain in detail about Grid side controllers *8,K2,CO5*

OR

b) (i) Specify the mathematical modeling of PMSG with necessary equations. *7,K2,CO4*

(ii) Explain LVRT control strategy of grid connected variable speed wind turbine generator system. *8,K2,CO5*