Reg. No.													

Question Paper Code	12803

M.E. / M.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024
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.	List the factors to be considered while selecting wind power generation.	2	K1	CO1
2.	What is the power contained in wind?	2	K1	CO1
3.	What are lift and drag coefficients?	2	K1	CO2
4.	Show Cp Vs λ curves for various types of wind turbines.	2	K2	CO2
5.	List the merits and limitations of fixed speed generation system.	2	K1	CO3
6.	Outline the performance of squirrel cage induction generator.	2	K2	CO3
7.	What is the advantage of variable speed WECS?	2	K1	CO4
8.	Relate the use of PWM rectifier in variable speed synchronous generator.	2	K2	CO4
9.	What is voltage dip and voltage swell?	2	K1	CO5
10.	Show the ramp rate limit of wind power output.	2	K2	CO5

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) Explain the construction of wind energy conversion system with a neat block diagram.   13   K2   CO1

OR

    b) Explain the aerodynamics of wind rotor using blade element theory.   13   K2   CO1

12. a) What are the various designs of rotors used for HAWT with its merits and demerits? Discuss.   13   K2   CO2

OR

    b) Explain the various features of pitch controlled WPP and stall controlled WPP.   13   K2   CO2

13. a) Explain about the constant voltage, constant frequency wind energy generation system.   13   K2   CO3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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<div align="center">**OR**</div>

b)	Explain the wind generator modeling for transient state analysis.	*13*	*K2 CO3*

14. a)	Explain variable-speed WECS with doubly fed induction generator.	*13*	*K2 CO4*

<div align="center">**OR**</div>

b)	Explain the variable speed variable frequency systems and define the function of each block in it.	*13*	*K2 CO4*

15. a)	Explain the significance of Low Voltage Ride Through wind turbine connectivity in the grid.	*13*	*K2 CO5*

<div align="center">**OR**</div>

b)	Explain the enhanced dynamic behavior of grid connected wind farms in load participation and frequency regulation.	*13*	*K2 CO5*

<div align="center">**PART - C (1 × 15 = 15 Marks)**</div>

16. a) i)	Illustrate the importance of Torque Vs Speed curve of squirrel cage induction generator in WECS.	*7*	*K2 CO4*
ii)	Explain the wind turbine grid connectivity requirements.	*8*	*K2 CO5*

<div align="center">**OR**</div>

b) i)	Explain the mathematical modeling of PMSG with necessary equations.	*8*	*K2 CO4*
ii)	Briefly explain the application of wind turbines used for irrigation to pump water from the source and supply to the crops.	*7*	*K2 CO5*