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Question Paper Code : 71082

M.E./M.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
Elective
Electrical Drives and Embedded Control
PX5071 – WIND ENERGY CONVERSION SYSTEMS
(Common to : M.E. Power Electronics and Drives/M.E. Power Systems Engineering)
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. List the schemes of WECS.
2. Draw the torque-speed curve of Wind Turbine.
3. Write the equation of power developed in wind turbine.
4. Define tip-speed ratio.
5. Define Betz – limit.
6. Write the importance of drive-train model of the wind turbine.
7. List any two need of variable speed wind systems.
8. Write the merits of PMSG wind machine.
9. Define ramp rate.
10. What are the interconnection requirements of wind turbine with the grid ?

PART – B

(5×13=65 Marks)

11. a) i) Explain the construction of WECS with neat block diagram. (6)
ii) Describe the wind turbine aerodynamics with expressions. (7)
- (OR)
- b) Enumerate the formation of whirlwind solenoid surface downstream the wind turbine using Sabinin's theory. (13)



12. a) i) With aid of neat block diagram, explain the working principles of two bladed WAYT wind turbine. (6)

ii) Describe the salient features in the selection of rotor for the wind turbine. (7)

(OR)

b) i) With neat schematic diagram, describe the calculation of power regulation of the wind turbine using pitch controlled scheme. (7)

ii) Explain any one scheme for extracting maximum power extraction from wind turbine. (6)

13. a) Write brief notes on

i) Constant speed constant frequency system (7)

ii) Wound rotor induction generator. (6)

(OR)

b) Explain the wind generator modelling for steady state and transient state analysis. (13)

14. a) i) Describe the significance of typical wind turbine power output with steady wind speed characteristics. (6)

ii) With a neat schematic diagram, explain the principle of operation of DFIG. (7)

(OR)

b) i) Illustrate the importance of Torque Vs Speed curve of squirrel-cage induction generator WECS. (6)

ii) Enumerate the concept of variable speed variable frequency scheme with neat diagram. (7)

15. a) i) Explain the significance of Low voltage ride through in the wind turbine connectivity in the grid. (7)

ii) List the wind turbine-grid interconnectivity requirements. (6)

(OR)



b) Elaborately describe the impact of steady-state and dynamic performance of the power system with modelling concept. (13)

PART - C

(1×15=15 Marks)

16. a) Briefly explain the design and applications of wind turbines used for irrigation to pump water from the source and supply to the crops. (15)

(OR)

b) Describe the necessity of ancillary service management used for frequency and voltage control of wind connected power systems. (15)