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**Question Paper Code: 49251**

M.E. DEGREE EXAMINATION, MAY 2015.

Elective

POWER ELECTRONICS AND DRIVES

14PPE515 – WIND ENERGY CONVERSION SYSTEMS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (5 x 1 = 5 Marks)

1. The maximum wind energy available is proportional to
  - (a) air density
  - (b) cube of wind velocity
  - (c) square of rotor diameter
  - (d) all of the above
2. The Darrious & Savonius rotor are related to
  - (a) vertical axis machine
  - (b) horizontal axis machine
  - (c) small hydropower
  - (d) coal extraction mechanism
3. The torque causing the rotation of rotor is due to
  - (a) drag force
  - (b) gravitational force
  - (c) force of lift
  - (d) axial thrust
4. The variable speed range of DFIG is
  - (a)  $\pm 100\%$
  - (b)  $\pm 90\%$
  - (c)  $\pm 60\%$
  - (d)  $\pm 30\%$
5. Which of the following Wind generator is sensitive to grid disturbances?
  - (a) DFIG
  - (b) squirrel cage IG
  - (c) PMSG
  - (d) SG

PART - B (5 x 3 = 15 Marks)

6. Define Sabinin's theory and write down its significance.
7. Distinguish between Yaw control and Pitch control.
8. What are the merits and demerits of squirrel cage induction generator?
9. Draw the typical wind speed characteristics of a wind generator.
10. What is low-voltage ride through? Write down its challenges in wind turbines.

PART - C (5 x 16 = 80 Marks)

11. (a) Explain with a neat sketch the various schemes of wind energy conversion system. (16)

Or

- (b) (i) Describe the wind survey in India. (10)
- (ii) Describe the parameters characterizing wind machines. (6)

12. (a) (i) Describe with a neat diagram the working of standalone wind diesel hybrid systems. (8)
- (ii) Describe the various aspects of rotor design for wind turbines. (8)

Or

- (b) (i) Describe with a neat diagram the working of horizontal axis wind turbine. (8)
- (ii) Describe the schemes for maximum power extraction. (8)

13. (a) Explain with a neat schematic diagram, the typical wind turbine configuration for constant speed constant frequency system. (16)

Or

- (b) (i) Explain with a neat diagram, the generator model for steady state and transient analysis. (10)
- (ii) Describe the choice of wind generators for fixed speed system. (6)

14. (a) Draw the schematics of DFIG and PMSG. Describe how it is suitable for variable speed systems. (16)

Or

- (b) (i) Describe the need of variable speed systems. (6)
- (ii) Explain with necessary diagrams, the variable speed variable frequency schemes. (10)

15. (a) (i) Explain the basic requirements of grid integrations of WECS. (10)
- (ii) Write short notes on LVRT. (6)

Or

- (b) (i) Describe the supply of ancillary services for frequency and voltage control. (8)
- (ii) Describe the current practices and industry trends of grid connected WECS. (8)

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