

B.E. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester-VI  
**TE201A - Wind and Solar Energy System**

P. Pages : 2

Time : Three Hours



**GUG/W/23/13870**

Max. Marks : 80

- Notes :
1. All questions carry equal marks.
  2. Answer **five** questions.
  3. Due credit will be given to neatness and adequate dimensions.
  4. Illustrate your answers wherever necessary with the help of neat sketches.
  5. Use of a non-programmable calculator is permissible.
  6. Assume suitable data wherever necessary.

1. a) What could be the area of the wind turbine rotor, if the power in the wind is 1700W. the available wind characteristics i.e., its speed and density of the air is 10 m/s and  $700 \text{ kg/m}^3$ . Also find the radius of the rotor. 4
- b) Calculate the tip speed of the blade. When the tip speed ratio of the wind turbine is 7.8. The maximum power that can be extracted from the wind is  $600 \text{ m}^2$  and the density of the air is  $1100 \text{ kg/m}^3$ . 4
- c) Explain the concept of wind energy. State the advantages and limitations of wind energy. 8

**OR**

2. a) Explain the working of wind turbine. 4
- b) Define tip speed ratio and explain relationship between TSR and coefficient of power. 4
- c) Explain stall control and pitch control in detail. 8
3. a) With a neat block diagram explain Doubly-Fed Induction Generator (DFIG). 8
- b) What are the different criteria used for wind turbine topologies. 8

**OR**

4. a) Explain variable-speed wind turbines with a neat sketch. Also state its advantages and disadvantages. 8
- b) Explain the growth of modern wind turbine technologies. 8
5. a) Define- 8
- |                      |                       |
|----------------------|-----------------------|
| a) Declination angle | b) Hour angle         |
| c) Zenith angle      | d) Angle of incidence |
- b) Write short note on: 8
- a) Solar radiation on inclined plane surface,
  - b) Solar radiation spectrum, with a neat diagram.

**OR**

6. a) Explain geometry and structure of Sun with neat figure 8
- b) What are the problems associated with interconnected power system. 4
- c) Explain- 4
- a) Importance of solar water pump b) Solar street light working based on solar use

7. a) What are the issues associated with the integration of renewable energy resources? 8
- b) Explain grid code technical requirements in detail. 8

**OR**

8. a) Why are hybrid energy-based system needed? 4
- b) Explain the advantages of interconnected power system. 4
- c) What are the problems associated with interconnected power system? 8
9. a) With a neat diagram explain linear Fresnel lens collector. 8
- b) Explain construction and working of flat plate collector with neat sketch. 8

**OR**

10. a) Write short note on: 8
- a) Solar active space heating and cooling system
- b) Solar passive space heating system
- c) Solar passive cooling system
- b) Classify solar collectors. 3
- c) Explain the construction as well as working of solar water heater. 5

\*\*\*\*\*