

MEEM-202

M.E./M.Tech., II Semester Examination, June 2020

Wind Power Generation

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Explain the origin of winds in the atmosphere.
b) Discuss the principles and equipment's, employed to measure wind speeds.
2. a) What is Betz's law and how does it related to wind turbines?
b) Explain various forces that act on a wind blade profile, when subjected to external wind conditions?
3. a) Explain the multiple stream tube theory.
b) List the major part of a horizontal axis wind turbine and explain each part in brief.
4. a) Name various control systems those used for wind power plant, why these used explain in brief?
b) Discuss different types of data those are important for analyzing wind turbine performance.
5. a) Discuss the economic considerations for the wind power generation.
b) Explain the environmental impact of wind power generation. How its assessments are made?
6. a) Explain the various aerodynamic losses at the rotor blade.
b) Derive an expression for the tip speed ratio in terms of power coefficient and momentum coefficient.
7. A site has a wind that blows at a steady 10 m/s for 12 hours and 5 m/s for 12 hours. Assume a wind turbine with 10 m blades has an efficiency of 0.3, calculate the energy for each 12 hours period and repeat the calculations for the average velocity of 7.5 m/s for 24 hours.
8. Write short notes on following: (any four)
 - a) Wind rose
 - b) Cut-in and cut-out wind speed
 - c) Gust wind speed
 - d) Mechanical stresses on wind turbine
 - e) Tower shadow
 - f) Site selection for wind form
