

Total No. of Questions – [6]

Total No. of Printed Pages: 4

G.R. No.	
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**DECEMBER 2021 - ENDSEM EXAM**  
**Final Year. B. TECH. (Mechanical) (SEMESTER - I)**  
**COURSE NAME: Solar and Wind Energy**  
**COURSE CODE: IOEUA40183E**  
**(PATTERN 2018)**

Time: [1]

[Max. Marks: 30]

**(\*) Instructions to candidates:**

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a) Categorize Wind Farm? Types? List the factors affecting Wind Farm? [4 marks]  
b) Instruments used to measure Wind Velocity? Draw schematic diagrams. [6 marks]

**OR**

Q.2) a) Examine the potential wind sites in Maharashtra and their potential? [4 marks]  
b) How wind is produced? Explain with diagrams, a) Wind die out. (b) Wind rise.  
c) Wind lull. (d) Wind gust. [6 marks]

Q.3) a) Compare the difference between Drag and Lift? [4 marks]  
b) A 40m diameter, three bladed wind turbine produces 700kW at a wind speed (hub height) of 14 m/s. The air density is 1.225 kg/m<sup>3</sup>. Assume Drive efficiency= 95% and Generator Efficiency = 80%, Determine:

- a) The rotational speed (rpm) of the rotor at a tip-speed ratio of 5.0.
- b) What is tip speed of blade in m/s?
- c) If generator turns at 1800 rpm, what gear ratio is needed to match the rotor speed to the generator speed?
- d) What is the efficiency of the wind turbine system (including blades, transmission, shafts, and generator) under these conditions? [6 marks]

**OR**

Q.4) a) Discover a) Cut in Speed, b) Rated Speed and c) Cut Out speed with the help of Power (Watts/m<sup>2</sup>) Vs Wind Velocity graph. [4 marks]

- b) Select with specifications for Gear Ratio and Gear Box used in Wind Turbines. [6 marks]



Q.5) a) Decide the basic comparison between HVDC and HVAC? [4 marks]

b) Examine the benefits of Wind Energy. [6 marks]

**OR**

Q.6) a) Enlist the issues occur while integrating wind energy with power grids? [4 marks]

b) Identify reactive power compensation? Enumerate its two aspects? List the methods used for Reactive Power Compensation. Explain any one method. [6 marks]

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