Total No. of Questions: 6 *Total No. of Printed Pages:2*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

EE3EE02 / EX3EE02 Wind Energy Systems

Programme: B.Tech. Branch/Specialisation: EE/EX

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Wind energy is harnessed as _____ energy with the help of windmill or turbine. **1**

(a) Mechanical (b) Solar
(c) Electrical (d) Heat

ii. The following factor(s) affects the distribution of wind energy- **1**

(a) Mountain Chains
(b) The hills, Trees and buildings
(c) Frictional effect of the surface
(d) All of these

iii. Winds having following speed are suitable to operate wind turbines. **1**

(a) 5-25 m/s (b) 10-35 m/s (c) 20-45 m/s (d) 30-55 m/s

iv. Which type of Generator is employed in wind power plant? **1**

(a) Synchronous Generator
(b) Induction Generator
(c) Permanent magnet motor
(d) Brushless Motor

v. Maximum wind energy available is proportional to: **1**

(a) Air density
(b) Cube of Wind velocity
(c) Square of the rotor diameter
(d) All of these

vi. What are used to turn wind energy into electrical energy? **1**

(a) Turbine (b) Generators
(c) Yaw Motor (d) Blades

P.T.O.

vii. What is the diameter of wind turbine blades? **1**

(a) 320 feet (b) 220 feet (c) 80 feet (d) 500 feet

viii. When did the development of wind power in India began? **1**

(a) 1965 (b) 1954 (c) 1990 (d) 1985

ix. Turbines blades have ____ type cross section to extract energy from wind. **1**

(a) Aerofoil (b) Elliptical
(c) Rectangular (d) All of these

x. Low solidity rotors use which of the following force for rotation **1**

(a) Drag (b) Lift
(c) Centrifugal (d) Centripetal

Q.2 i. What causes wind to produce energy? **2**

ii. How is the energy in wind captured? **3**

iii. Enlist the advantages of wind generated energy? **5**

OR iv. State the drawbacks of using wind energy. **5**

Q.3 i. State the various types of wind turbines. **2**

ii. Explain variable speed variable frequency scheme in wind energy. **8**

OR iii. What types of generators are used in wind turbines? Explain any one. **8**

Q.4 i. What are the six different parts of wind turbine? **3**

ii. Write a short note on energy storage system for wind power. **7**

OR iii. Explain the function of DC to DC converter in wind turbine. **7**

Q.5 i. Explain grid connected wind energy system. **4**

ii. Write a short note on standalone wind energy system. **6**

OR iii. State the difference between induction generator and synchronous generator. **6**

Q.6 Attempt any two:

i. What are the applications of wind energy? **5**

ii. State the methods involved for maintenance and lubrication of wind turbine. **5**

iii. Write a short note on methods used for planning of offshore wind farms. **5**

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Marking Scheme
EE3EE02 / EX3EE02 Wind Energy Systems

Q.1	i.	Wind energy is harnessed as _____ energy with the help of windmill or turbine. (a) Mechanical	**1**
	ii.	The following factor(s) affects the distribution of wind energy- (d) All of these	**1**
	iii.	Winds having following speed are suitable to operate wind turbines. (a) 5-25 m/s	**1**
	iv.	Which type of Generator is employed in wind power plant?	**1**
	v.	Maximum wind energy available is proportional to: (d) All of these	**1**
	vi.	What are used to turn wind energy into electrical energy? (a) Turbine	**1**
	vii.	What is the diameter of wind turbine blades? (b) 220 feet	**1**
	viii.	When did the development of wind power in India began? (c) 1990	**1**
	ix.	Turbines blades have ____ type cross section to extract energy from wind. (a) Aerofoil	**1**
	x.	Low solidity rotors use which of the following force for rotation (b) Lift	**1**

Q.2	i.	Causes wind to produce energy		**2**
	ii.	Energy in wind captured		**3**
	iii.	Advantages of wind generated energy		**5**
		At least five points 1 mark for each	(1 mark * 5)	
OR	iv.	Drawbacks of using wind energy		**5**
		At least five points 1 mark for each	(1 mark * 5)	

Q.3	i.	Types of wind turbines		**2**
		1 mark for each type	(1 mark * 2)	
	ii.	Variable speed variable frequency scheme in wind energy.		**8**
		Block diagram	3 marks	
		Explanation	5 marks	
OR	iii.	Types of generators are used in wind turbines	2 marks	**8**
		Explanation of any one	6 marks	

Q.4	i.	Six different parts of wind turbine		**3**
		0.5 mark for each	(0.5 mark * 6)	
	ii.	Energy storage system for wind power		**7**
		Diagram	2 marks	
		Explanation	5 marks	
OR	iii.	Function of DC to DC converter in wind turbine		**7**
		Diagram	3 marks	
		Explanation	4 marks	

Q.5	i.	Grid connected wind energy system		**4**
		Diagram	2 marks	
		Explanation	2 marks	
	ii.	Standalone wind energy system		**6**
		Diagram	2 marks	
		Explanation	4 marks	
OR	iii.	Difference between induction generator and synchronous generator		**6**
		1 mark for each difference	(1 mark * 6)	

Q.6		Attempt any two:	
	i.	Applications of wind energy At least three application with explanation	**5**
	ii.	Methods involved for maintenance and lubrication of wind turbine. Stepwise marking	**5**
	iii.	Methods used for planning of offshore wind farms. Stepwise marking	**5**

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