Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

EE3EP03 / EX3EP03 Wind & Solar Energy Conversion System

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 wind mill or turbine. **1**

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

ii. Wind flows because of **1**

(a) Difference in temperature (b) Difference in latitude
(c) Difference in longitude (d) Difference in surface roughness

iii. A solar thermal collector **1**

(a) Collects the solar energy and reflects it back
(b) Absorbs the solar radiation and dissipate it to the ambient
(c) Collects and converts the solar energy into electricity energy
(d) Collects and converts the solar energy into thermal energy and delivers it to heat transfer fluid

iv. At maximum power point of the solar cell **1**

(a) Current is maximum
(b) Voltage is maximum
(c) Both voltage and current are maximum
(d) The product of voltage and current are maximum

v. How is the action of yaw controlled in small turbines? **1**

(a) Tail vane (b) Blades (c) Shaft (d) Yaw motor

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

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

P.T.O.

vii. The voltage of a single solar cell is **1**
(a) 0.2 v (b) 0.5 v (c) 1.0 v (d) 2.0 v

viii. Which part of the wind turbines senses wind speed, wind direction, shaft speed and torque? **1**
(a) Turbine blade (b) Shaft
(c) Rotor (d) Controller

ix. The modern electronic loads when they are connected to the isolated AC micro-grid having PV as the single source of energy, the following conversion losses are natural **1**
(a) AC-DC-AC (b) DC-AC-DC
(c) DC-DC-DC (d) AC-AC-AC

x. The capacity of a battery is expressed in term of **1**
(a) Ampere (b) Volt-hour
(c) Ampere-hour (d) Volt-amp-hour

Q.2 i. What are the disadvantages of solar and wind energy conversion system? **2**

ii. Write the differences between conventional and non-conventional energy resources. **3**

iii. What are the site selection considerations for wind energy conversion system? **5**

OR iv. Explain the basic principle of wind and solar energy conversion system. **5**

Q.3 i. Explain MPPT for solar power system. **2**

ii. Explain the types of solar cooker with the help of schematic diagram. **8**

OR iii. How can solar thermal energy be converted into electrical energy? Explain using a schematic diagram. **8**

Q.4 i. How wind turbulence affects the wind power generation? **2**

ii. With the help of schematic diagram explain the vertical axis wind turbine. **8**

OR iii. Mention types of generators in wind power generation and explain any one of them. Also mention the advantages and disadvantages. **8**

Q.5 i. Explain the working of lead acid battery used for storing electric charge with the help of a suitable diagram. **4**

ii. How the water is pumped from a well or any water source using a wind mill? Explain in detail. **6**

OR iii. Describe, using a suitable diagram, the design of irrigation system using wind energy as a source. **6**

Q.6 Attempt any two:

i. Mention the benefits of micro-grid? **2**

ii. With the help of a block diagram explain all the cases of PV-wind-battery hybrid system. **8**

OR iii. Explain the typical structure of AC and DC micro-grid using a suitable diagram. **8**

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Marking Scheme

EE3EP03 / EX3EP03 Wind & Solar Energy Conversion System

Q.1	i.	Wind energy is harnessed as _____ energy with the help of wind mill or turbine. (a) Mechanical		**1**
	ii.	Wind flows because of (a) Difference in temperature		**1**
	iii.	A solar thermal collector (d) Collects and converts the solar energy into thermal energy and delivers it to heat transfer fluid		**1**
	iv.	At maximum power point of the solar cell (d) The product of voltage and current are maximum		**1**
	v.	How is the action of yaw controlled in small turbines? (a) Tail vane		**1**
	vi.	Which type of Generator is employed in wind power plant?		**1**
	vii.	The voltage of a single solar cell is ..... (b) 0.5 v		**1**
	viii.	Which part of the wind turbines senses wind speed, wind direction, shaft speed and torque? (a) Turbine blade		**1**
	ix.	The modern electronic loads when they are connected to the isolated AC micro-grid having PV as the single source of energy, the following conversion losses are natural (b) DC-AC-DC		**1**
	x.	The capacity of a battery is expressed in term of (c) Ampere-hour		**1**
Q.2	i.	Disadvantages of solar energy conversion system		**2**
		0.5 mark for each point (0.5 mark * 2)	1 mark	
		Disadvantages of wind energy conversion system		
		0.5 mark for each point (0.5 mark * 2)	1 mark	
	ii.	At least six differences between conventional and non-conventional energy resources.		**3**
		0.5 mark for each difference	(0.5 mark * 6)	
	iii.	Site selection considerations for wind energy conversion system		**5**
		1 mark for each consideration	(1 mark * 5)	
OR	iv.	Principle of wind energy conversion system.	1.5 marks	**5**
		Diagram	1 mark	
		Principle of solar energy conversion system	1.5 marks	
		Diagram	1 mark	
Q.3	i.	MPPT for solar power system.	1 mark	**2**
		Diagram	1 mark	
	ii.	Types of solar cooker	2 marks	**8**
		Description	4 marks	
		Diagram	2 marks	
OR	iii.	Solar thermal energy be converted into electrical energy		**8**
			5 marks	
		Diagram	3 marks	
Q.4	i.	Wind turbulence affects the wind power generation		**2**
	ii.	Vertical axis wind turbine explanation	5 marks	**8**
		Diagram	3 marks	
OR	iii.	Types of generators in wind power generation	1 mark	**8**
		Explanation of any one	2 marks	
		Diagram	1 mark	
		Advantages	2 marks	
		Disadvantages	2 marks	
Q.5	i.	Working of lead acid battery used for storing electric charge		**4**
			3 marks	
		Diagram	1 mark	
	ii.	Water is pumped from a well or any water source using a wind mill		**6**
			4 marks	
		Diagram	2 marks	
OR	iii.	Design of irrigation system using wind energy as a source		**6**
			4 marks	
		Diagram	2 marks	
Q.6		Attempt any two:		
	i.	Benefits of micro-grid		**2**
		0.5 mark for each benefit	(0.5 mark * 4)	
	ii.	Cases of PV-wind-battery hybrid system		**8**
		2 marks for each case (2 marks * 2)	4 marks	
		Diagram	4 marks	
OR	iii.	Typical structure of AC micro-grid	3 marks	**8**
		Typical structure of DC micro-grid	3 marks	
		Diagram.	2 marks	

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