Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021

Subject Code:3160917 Date:02/12/2021

Subject Name:Wind And Solar Energy

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define Cut in speed, Cut out speed and Tip speed ratio	**03**
	(b)	Write Betz Law and mention betz limit value in case of wind turbine Wind	**04**
	(c)	Classify and Explain Fixed and Variable speed wind turbines	**07**
Q.2	**(a)**	List the types of generator used in wind power plant	**03**
	(b)	State role of Power electronics converter in wind power	**04**
	(c)	Explain construction and working of Doubly-Fed Induction Generators with characteristics	**07**
		OR	
	(c)	Explain Converter control techniques in case of Wind power	**07**
Q.3	**(a)**	Define zenith, solar altitude and azimuth angle in solar geometry	**03**
	(b)	Prove that solar day length is function of latitude and declination angle	**04**
	(c)	Explain structure of solar cell, module, panel and array	**07**
		OR	
Q.3	**(a)**	Draw and explain V-I characteristics of a PV cell	**03**
	(b)	Compare monocystaline, polycrystalline and thin film type solar module.	**04**
	(c)	What is Maximum Power Point Tracking (MPPT) system and which types of algorithms used to track maximum power from solar PV System.	**07**
Q.4	**(a)**	Differentiate Grid-Connected System and Standalone system	**03**
	(b)	How solar water pump works?	**04**
	(c)	Explain real and reactive power regulation in case of wind power	**07**
		OR	
Q.4	**(a)**	Mention voltage and frequency operating limits on integration of solar and wind.	**03**
	(b)	List out Power quality issues during integration of solar –wind with grid.	**04**
	(c)	Write technical note on Solar Refrigeration and Air Conditioning	**07**
Q.5	**(a)**	How Solar water heater works?	**03**
	(b)	Give the type of Solar Concentrators used in solar thermal plant	**04**
	(c)	Explain working of solar thermal plant	**07**
		OR	
Q.5	**(a)**	What is solar pond?	**03**
	(b)	What is grid code and why it is required?	**04**
	(c)	List out application of solar –thermal systems	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160917 Date:08/06/2022

Subject Name:Wind And Solar Energy

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Explain the available wind power scenario in India.	**03**
	(b)	Explain stall and pitch control for wind power conversion system.	**04**
	(c)	What is maximum power point tracking algorithm for PV system? Explain any one in details	**07**
Q.2	**(a)**	Draw the Torque – Speed characteristic of induction generator.	**03**
	(b)	Draw and explain I-V characteristic of a PV array.	**04**
	(c)	Derive an expression for power generation in wind turbine.	**07**
		OR	
	(c)	Explain the power conversion in PV cell with circuit diagram.	**07**
Q.3	**(a)**	Draw the per phase model of PMSG. Also write its terminal per phase voltage expression.	**03**
	(b)	Draw and explain variable speed wind energy conversion system.	**04**
	(c)	Explain the electrical circuit model of PV cell.	**07**
		OR	
Q.3	**(a)**	Define earth sun angle and observer sun angle.	**03**
	(b)	Explain the solar energy availability in India throughout the year.	**04**
	(c)	Explain power electronics converter used for doubly-fed induction generator with circuit diagram	**07**
Q.4	**(a)**	What are PV module and PV Array?	**03**
	(b)	Draw and explain solar street light operation with its circuit diagram	**04**
	(c)	Explain power electronics converter used in PV power system for maximum power extraction.	**07**
		OR	
Q.4	**(a)**	Explain necessity of battery in PV based power system.	**03**
	(b)	Explain solar water pump with its circuit diagram.	**04**
	(c)	State and explains any three network integration issues for solar and wind energy sources integration with grid.	**07**
Q.5	**(a)**	What is solar collector? Explain its uses.	**03**
	(b)	Draw the power generation by solar PV and wind turbine during 24 hours of a day.	**04**
	(c)	Explain operation of solar pond with its applications.	**07**
		OR	
Q.5	**(a)**	Explain operation of solar cooker with usual diagram.	**03**
	(b)	Explain solar Air Conditioner.	**04**
	(c)	Explain Solar heater in details.	**07**

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