

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI EXAMINATION – SUMMER 2025

Subject Code: 3160917

Date: 28-05-2025

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) List the types of generator used in wind power plant.	03
(b) Write Betz Law and mention betz limit value in case of wind turbine.	04
(c) Explain Converter control techniques in case of Wind power.	07
Q.2 (a) Define Cut in speed, Cut out speed and Tip speed ratio	03
(b) Write short note on DFIG type of Wind Generator.	04
(c) Classify and Explain Fixed and Variable speed wind turbines	07
OR	
(c) List out various solar thermal applications & explain any one in detail.	07
Q.3 (a) Write the short note on battery sizing.	03
(b) List the advantage and limitation of Solar Energy.	04
(c) What is Maximum Power Point Tracking (MPPT) system? & Explain P & O algorithm to track maximum power from solar PV System.	07
OR	
Q.3 (a) Explain the concept of central receiver.	03
(b) Write short note on box type solar cooker.	04
(c) Draw & explain the I-V and P-V characteristics of Solar cell.	07
Q.4 (a) Define : (i) Solar Azimuth Angle, (ii) Zenith Angle, (iii) Hour Angle	03
(b) Explain solar passive heating and cooling system.	04
(c) Explain solar Refrigeration and Air conditioning System.	07
OR	
Q.4 (a) Explain solar cell, module and array.	03
(b) Explain stall control & pitch control of wind power.	04
(c) Explain the importance & working of solar water pump.	07
Q.5 (a) Define air mass & explain it.	03
(b) Differentiate Grid-Connected System and Standalone system	04
(c) Explain the modeling of elements in hybrid PV-wind system briefly.	07
OR	
Q.5 (a) Describe various types of power quality issues.	03
(b) What are the grid code technical requirements?	04
(c) Classify the solar thermal collectors. Explain the construction & working of solar flat plate collector.	07

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2024****Subject Code:3160917****Date:22-05-2024****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 Tip speed ratio, stall and pitch control for wind turbine	03
(b) Mention Power electronics converter role in wind power	04
(c) Write Short note on modern wind turbine technologies	07
Q.2 (a) List the Advantages of Permanent Magnet Synchronous Generators (PMSG) use for wind power	03
(b) Explain Betz Law with Betz limit value for wind turbine	04
(c) Define various solar angles and their effects on the collection of solar radiation on a tilted flat surface	07
OR	
(c) Describe about solar radiation data.	07
Q.3 (a) Define following terms in case of solar energy: i) Altitude angle ii) Zenith angle iii) Clearness Index	03
(b) Explain measurements of solar radiation	04
(c) Explain working of Doubly-Fed Induction Generators with its characteristics	07
OR	
Q.3 (a) Classify Fixed and Variable speed wind turbines	03
(b) Draw and explain V-I characteristics of a PV cell.	04
(c) Give Comparison of monocrystalline, polycrystalline and thin film type solar module.	07
Q.4 (a) What is voltage and frequency operating limits on integration of solar and wind system	03
(b) Write applications of Solar PV Power	04
(c) Write Short Note on solar Street Light	07
OR	
Q.4 (a) What is Standalone solar system? Where it can be installed?	03
(b) What are the Power quality issues occurring during integration of solar –wind with grid.	04
(c) Explain working of Solar thermal power generation plant	07
Q.5 (a) Give the types of solar collector	03
(b) Explain limitation of solar energy	04
(c) Write technical note on Solar Air Conditioning	07

OR

- Q.5** (a) What is Maximum Power Point Tracking (MPPT)? **03**
(b) Describe Solar water heating plant shortly **04**
(c) Explain PV and wind farm behavior during grid disturbances **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023****Subject Code:3160917****Date:12-07-2023****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 for wind turbine.	04
	(c) Derive an expression for power generation in wind turbine.	07
Q.2	(a) List the types of generator used in wind power plant.	03
	(b) Draw and explain I-V characteristic of a PV array.	04
	(c) Explain the power conversion in PV cell with circuit diagram.	07
OR		
(c)	Explain construction and working of Doubly-Fed Induction Generators with characteristics.	07
Q.3	(a) Define zenith, solar altitude and azimuth angle in solar geometry.	03
	(b) Draw and explain variable speed wind energy conversion system.	04
	(c) Explain structure of solar cell, module, panel and array.	07
OR		
Q.3	(a) Compare polycrystalline and thin film type solar module.	03
	(b) Explain the solar energy availability in India throughout the year.	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) List out Power quality issues during integration of solar wind with grid.	04
	(c) Write technical note on Solar Refrigeration and Air Conditioning.	07
OR		
Q.4	(a) How solar water pump works?	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
Q.5	(a) What is solar collector? Explain its uses.	03
	(b) Give the type of Solar Concentrators used in solar thermal plant.	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) What is grid code and why it is required?	04
	(c) List out application of solar –thermal systems.	07

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
