

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

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|------------|---|-----------|
| 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 monocrystalline, 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 |

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
