Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II– EXAMINATION – WINTER - 2016

Subject Code: 2724509 **Date: 21/11/ 2016**

Subject Name: Application of Power Electronics in Renewable Energy Conversion

Time: 2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain construction of PV Cells and Panel Modules	**07**
	(b)	What is MPPT? With diagram explain its role in PV system.	**07**
Q.2	**(a)**	Derive equivalent circuit of a photovoltaic cell with equation. Also explain output characteristics of a PV Cell.	**07**
	(b)	Explain perturb and observe method for M.P.P.T. algorithm	**07**
		OR	
	(b)	Explain Transformer isolated DC–DC converters forward H-bridge topology in PV system.	**07**
Q.3	**(a)**	With diagram explain self-commutated Boost and Cuk converters for standalone PV System	**07**
	(b)	Explain different configuration of series connected convertor for stand-alone PV system.	**07**
		OR	
Q.3	**(a)**	Explain basic components of Wind Energy Conversion Systems (WECS).	**07**
	(b)	Explain different configuration of parallel connected convertor for stand-alone PV system.	**07**
Q.4	**(a)**	Explain converter used for full converter turbines with Permanent Magnet Synchronous Generators (P.M.S.G.).	**07**
	(b)	Derive the mathematical expression for governing wind power.	**07**
		OR	
Q.4	**(a)**	Define following terms: (i) Co-efficient of power (Cp) (ii) Tip speed ratio (λ) (iii) Pitch control (iv) Pitch angle (β)	**07**
	(b)	Explain principle and operation of Double fed Induction Generator (D.F.I.G) with diagram.	**07**
Q.5	**(a)**	Explain analysis of PV systems connected to Current Source Inverter.	**07**
	(b)	Draw and explain Fuel Cell electrical equivalent circuit.	**07**
		OR	
Q.5	**(a)**	With diagram explain soft starter for fixed-speed wind turbines.	**07**
	(b)	With the help of block diagram explain operation of a Proton Exchange Membrane Fuel Cell (PEMFC).	**07**

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