Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2724509 **Date: 31/05/2016**

Subject Name: Application of Power Electronics in Renewable Energy Conversion

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.**

Q.1	**(a)**	Explain Transformer isolated DC–DC converters forward H-bridge topology in PV system.	**07**
	(b)	Derive equivalent circuit of a photovoltaic cell with equation. Also explain output characteristics of a PV Cell.	**07**
Q.2	**(a)**	Explain a series-resonant transformer isolated DC-DC inverter feeding a grid connected inverter	**07**
	(b)	With diagram explain self-commutated Buck and Buck-Boost converters for standalone PV System.	**07**
		OR	
	(b)	With diagram explain self-commutated Boost and Cuk converters for standalone PV System.	**07**
Q.3	**(a)**	Derive the mathematical expression for governing wind power.	**07**
	(b)	With diagram explain autonomous parallel converters for voltage regulation and battery charging bidirectional buck–boost inverter for battery regulation and boost inverter for DC bus voltage regulation for standalone PV System.	**07**
		OR	
Q.3	**(a)**	With diagram explain autonomous series converters for voltage regulation and battery charging buck converter for voltage regulation and battery charging for standalone PV System.	**07**
	(b)	Explain perturb and observe method for M.P.P.T. algorithm	**07**
Q.4	**(a)**	Explain blade pitch control and variable-slip turbines control.	**07**
	(b)	Give the classification for different types of wind turbines generator and explain fixed-speed wind turbine generator.	**07**
		OR	
Q.4	**(a)**	Power converter for external resistance control in variable-slip turbines.	**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)	Explain modeling of PEMGC (Proton Exchange Membrane Fuel Cell).	**07**
		OR	
Q.5	**(a)**	With the characteristics curve explain dynamic behavior of Fuel Cell.	**07**
	(b)	Explain controllability of wind turbine connected to grid through L and LCL filter	**07**

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