Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II • EXAMINATION – SUMMER 2017

Subject Code: 2724509 **Date: 30/05/2017**

Subject Name: Application of Power Electronics in Renewable Energy Conversion

Time:02:30 PM To 05:00 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)**	Derive equivalent circuit of a photovoltaic cell with equation. Also explain output characteristics of a PV Cell.	**07**
	(b)	What is MPPT? With diagram explain its role in PV system.	**07**
Q.2	**(a)**	Explain construction of PV Cells and Panel Modules.	**07**
	(b)	Explain basic types of self-commutated converters for standalone PV system.	**07**
		OR	
	(b)	Explain mismatch in series and parallel combination of cell with its configuration & I-V characteristics.	**07**
Q.3	**(a)**	Explain a series-resonant transformer isolated DC-DC inverter feeding a grid connected inverter	**07**
	(b)	Explain perturb and observe method for M.P.P.T. algorithm.	**07**
		OR	
Q.3	**(a)**	Derive the mathematical expression for governing wind power.	**07**
	(b)	Explain incremental conductance method for M.P.P.T. algorithm.	**07**
Q.4	**(a)**	With the characteristics curve explain dynamic behavior of Fuel Cell.	**07**
	(b)	Define following terms: (i) Co-efficient of power (C_p) (ii) Tip speed ratio (λ) (iii) Pitch control (iv) Pitch angle (β)	**07**
		OR	
Q.4	**(a)**	Explain rotor side converter controller and grid side converter controller for DFIG based wind turbine.	**07**
	(b)	With the help of block diagram explain operation of a Proton Exchange Membrane Fuel Cell (PEMFC).	**07**
Q.5	**(a)**	Give the classification for different types of wind turbines generator and explain fixed-speed wind turbine generator.	**07**
	(b)	With the help of a diagram (a) Discuss the power versus wind speed characteristic of a wind turbine (b) Discuss Cp versus to tip speed ratio curve.	**07**
		OR	
Q.5	**(a)**	Explain principle and operation of Double Fed Induction Generator (D.F.I.G) with diagram.	**07**
	(b)	With diagram explain variable-slip wind turbine.	**07**

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