Answer ALL the questions

Knowledge Levels	K1 – Remembering	K3 – Applying	K5 - Evaluating
(KL)	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What is the need for controlling the output voltage of an converter? What are the different techniques used to control the output voltage?	2	K2	CO1
2.	Which among the following is the most preferable method of switching of a power device? (i) hard switching (ii) soft switching. Justify your answer.	2	K4	CO1
3.	Elucidate the importance of hybrid PV and wind energy system.	2	K2	CO2
4.	What are the factors to be considered for the selection of inverter/batteries for solar energy conversion?	2	K2	CO2
5.	What is the difference between stand alone and grid connected wind generators?	2	K2	CO3
6.	Why is variable speed wind turbine generator (WTG) more efficient than fixed speed WTG?	2	K4	CO3
7.	Write a short note on flickers.	2	K1	CO4
8.	Plot the CBEMA curve.	2	K1	CO4
9.	How does a D-STATCOM differ from a regular STATCOM?	2	K2	CO5
10.	What are the types of converters basically used in FACTS devices & what are the differences between them?	2	K2	CO5

PART – B

Q.No.		Questions	Marks	KL	CO
11.	a)	A three phase fully controlled converter drives a DC load of 10 A. The power input is 415 V, 50 Hz AC supply. Sketch the output voltage waveform and identify the switching sequence for a firing angle of 60°. Derive the expressions for average voltage and calculate the numerical value based on the given data.	13	K4	CO1
		(OR)			
	b)	Consider a primitive boost converter and calculate its efficiency. What happens to the efficiency of the converter if non-ideal parameters like diode and switch voltage drop are added? Design the value of L to be added to the circuit taking the ripple in the inductor current into account.	13	K4	CO1
12.	a)	What is MPPT? Discuss the types of MPPT with its merits and demerits. Explain the incremental-conductance algorithm with a neat example.	13	K3	CO2
		(OR)			
	b)	A horizontal axis wind turbine has a diameter of 6 m. When the wind speed unaffected by the turbine is 10 m/s, the turbine rotates at 300 rpm and produces 5 kW of mechanical power. Find the tip-speed ratio and the power coefficient. Also derive an expression of power extracted from the wind turbine.	13	K3	CO2
13.	a)	What is the need of grid integration of wind energy conversion system? With power electronic interface circuit, explain how grid integration is done for doubly-fed induction generator (DFIG) based wind energy conversion system.	13	K3	CO3
		(OR)			
	b)	Sketch out the block diagram for the implementation of constant speed constant frequency based WECS and explain the function of each block in it.	13	K3	CO3
14.	a)	What are the problems that are noticed when the DG is interfaced to the utility system? Discuss the impact of DG interface to utility system.	13	K2	CO4
		(OR)			
	b)	Explain briefly about the phenomena of how current distortion affects the voltage distortion under the presence of harmonics.	13	K2	CO4

15.	a)		With the help of block diagram explain functional control structure of UPFC to control real and reactive power independently.	13	K2	CO5

<div align="center">(OR)</div>

	b)	i.	Explain the effect of shunt compensation in power system with necessary derivation.	6	K2	CO5
		ii.	The operation of STATCOM is based on the operation of synchronous machine as a rotating synchronous condenser. Explain.	7		

<div align="center">

PART – C

(1 x 15 = 15 Marks)
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Q.No.	Questions	Marks	KL	CO
16. a)	A single phase full bridge inverter feeds a R load of 20 Ω and connected to an input voltage of 100 V. Describe the modes of operation with relevant waveforms. Determine the rms value of the fundamental component of AC voltage, output power, average and peak currents of the switches, lowest order harmonic factor and THD.	15	K4	CO1

<div align="center">(OR)</div>

b)	By means of a block diagram describe a generalized IPFC which can be operated as a STATCOM , SSSC , UPFC OR IPFC.	15	K2	CO5