Reg. No.



II SEMESTER M.TECH (ESM/PED) MAKE UP EXAMINATIONS JUNE 2017

SUBJECT: DISTRIBUTED ENERGY SYSTEMS [ELE 5202]

REVISED CREDIT SYSTEM

Time:	3 Hours	Date: 15 JUNE 2017	Max. Mark	s: 50
Instru	ctions to Candidates:			
	 Answer ALL the questions. 			
	 Missing data may be suitably as 	ssumed.		
1A.	Describe about distributed energy	system with a proper block diagram.	((04)
1B.	What are the different distribute explain about any two energy gene	ed energy generation technologies available a eration technologies?	and briefly	(04)
1C.	What are the advantages with dist	ributed energy resources?	((02)
2A	Derive the current-voltage relation of a PV cell by using the single diode circuit model. Draw the I-V and P-V characteristics of a PV cell/module for two different insolation and temperature conditions and define efficiency of the PV cell/module.		odel. Draw lation and	(04)
2B.	What is the function of DC-DC convingence (i.e., ${f R}_{eq}$) as seen	verter in PV systems and derive the relation for a by the DC-DC converter by considering Buck co	equivalent onverter.	(04)
2C.	For the design of a stand-alone PV with a capacity factor of $K_{cf,PV} = 1$	y system with an average power of 50 kW at MI 0% , how many 200 W, PV modules are require	T Manipal, d? ((02)
3A.	Define power coefficient in Wind value is 59%.	Energy conversion System and prove that its	maximum	(05)
3B.	What are the different wind turbin	es used in wind energy conversion systems?	((03)
3C.	Draw the characteristics of <i>"Turl</i> speeds and locate the respective n	bine mechanical power - wind speed" for diff naximum power point.	erent wind	(02)
4A.	Design a standalone distributed en	nergy system with the following specifications:		
	Load profile parameters: P _{dem.mi}	$P_{n} = 2 MW, P_{dem, max} = 12 MW, \overline{P}_{dem} = 8 M$	MW;	
	$K_{cf_wtg} = 12.5\%$, $K_{cf_PV} = 10\%$ a Photovoltaic system respectively. wind energy conversion system an	are the capacity factors of wind turbine generation Assume that the system is operating with phated battery bank as an energy storage.	erator and iotovoltaic,	
	i) If P _{PV, rated} = 30 MW, what sho (WECS)?	uld be the rated power of Wind energy convers	ion system	
	ii) For the generation of the rat generator units required.	red power from WECS, how many 1 MW wi	nd turbine	
	iii) What is the maximum possible factors of the sources?	excess power generated by considering the give	en capacity	(03)
4B	Explain about power management considering PV, wind, fuel cell, Elec	nt strategy in standalone distributed energy ctolyzer, battery bank and give a flowchart for t	system by he same.	(04)

4C	Describe the working principle of <i>Flywheel energy storage</i> technology with proper block diagram.	(03)
5A.	What are the challenges in Grid integration of distributed energy resources?	(03)
5B.	What are the different grid synchronization techniques exist and briefly explain about one grid synchronization technique?	(03)
5C.	What are standards set by CEA (Central Electricity Authority) for voltage range, frequency range, harmonics, flicker, for the grid connection of distributed energy resources in INDIA?	(04)