Reg.No. _____

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14EE3011
Sub. Name : PHOTOVOLTAIC SYSTEMS

Semester : 2016-17 ODD
Duration : 3hrs
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Explain the following: Beam and diffuse solar radiation.	CO2	4
	b.	The hour angle	CO2	4
	c.	The Sun's declination angle	CO2	4
	d.	Zenith angle.	CO2	4
	e.	Azimuth ngle	CO2	4
		(OR)		
2.	a.	With the help of a neat diagram explain the principle of operation of solar radiation and spectrum of sun geometry.	CO2	10
	b.	Determine the average value of solar radiation on a horizontal surface on June 22nd which is situated 10◦N. Take a= 0.3, b=0.51 and n/N=0.55 for the place where the average solar radiation is to be calculated.	CO2	10
3.	a.	Draw the equivalent circuit of a solar cell and discuss the electrical characteristics of the solar cell.	CO1	**20**
		(OR)		
4.	a.	Discuss in detail about the effect of temperature on the output of the solar panel with necessary equations.	CO1	**20**
5.	a.	Briefly explain about the terrestrial photovoltaic module and derive an expression for the module current (I_M) and series resistance (R_{SEM}).	CO1	**20**
		(OR)		
6.	a.	With the help of neat diagrams explain about the mismatches happened in the solar cell/ module because of series and parallel connection of solar cell/module.	CO1	**12**
	b.	Describe the principle of working of Lead acid batteries and state its merits and demerits	CO1	**8**
7.	a.	With the help of neat diagrams explain about the power conditioning circuits used in PV system and derive an expression for voltage gain for the types of DC-DC Converters.	CO1	**12**
	b.	Design a PV water pumping system, which is required to draw 20,000 litres of water every day from a depth of 20mt.	CO3	**8**
		(OR)		
8.	a.	Design a solar PV System wherein the total load consists of CFL,TV, fan, refrigerator and a computer . The system should allow the use of loads in non-sunshine hours. The operating hours and power rating of these loads are given in the table below.	CO3	**20**

S.NO	LOAD	WATTS	H/DAY	NUMBER
1	CFL	18	6	3
2	FAN	70	4	2
3	TV(27”)	250	8	1
4	REFRIGERATOR	150	2	1
5	COMPUTER	250	1	1

		Compulsory:		
9.	a.	Draw the topologies for a single and multistage grid connected PV Systems.	CO3	**10**
	b.	Design the sizing and energy balance of a grid connected Photovoltaic Systems.	CO3	**10**

ALL THE BEST