



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad-500043

ELECTRICAL AND ELECTRONICS ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	Course on Solar Energy (Value Added Course)
Course Code	:	AEE802
Class	:	III B. Tech II Semester (VI Semester)
Branch	:	ELECTRICAL AND ELECTRONICS ENGINEERING
Year	:	2018 – 2019
Course Coordinator	:	Mr. Muralidhar Nayak Bhukya, Assistant Professor, EEE
Course Faculty	:	Mr. Muralidhar Nayak Bhukya, Assistant Professor, EEE

COURSE OBJECTIVES (COs):

The course should enable the students to:

I	Demonstrate the construction, working and characteristics of photoelectric cell.
II	Illustrate the principles of solar energy.
III	Outline the use of tracking algorithms.
IV	Evaluate various control schemes.

COURSE LEARNING OUTCOMES (CLOs):

At the end of the course, the student will have the ability to:

CLO Code	CLO's	
CAEE802.01	CLO 1	Define the PV cell characteristics and equivalent circuit parameters.
CAEE802.02	CLO 2	Determine the effect of temperature and irradiance on the panel surface.
CAEE802.03	CLO 3	Abe to simulate and formulate new parameters to fabricate PV array.
CAEE008.04	CLO 4	Understand the variation in irradiance and temperature with time of day.
CAEE802.05	CLO 5	Estimate the energy on the solar plate with tilted angles
CAEE802.06	CLO 6	Compare the refraction and refractive variation of irradiance on the panel surface.
CAEE802.07	CLO 7	Estimate the sizing of PV system with respect to load
CAEE802.08	CLO 8	To know the concept of maximum power point tracking algorithm
CAEE802.09	CLO 9	Simulate the PV system with dc-dc boost converter
CAEE802.10	CLO 10	Discuss the impedance control method under dynamic weather conditions
CAEE802.11	CLO 11	Determine the working of different tracking algorithm under normal conditions.
CAEE802.12	CLO 12	Understand the concept of PV battery connection with charge controller
CAEE802.13	CLO 13	Analyze the charge equalization with series and parallel connected batteries
CAEE802.14	CLO 14	Predict the performance of solar water pumping system
CAEE802.15	CLO 15	To understand the principle of grid connected topology
CAEE802.16	CLO 16	To understand the principle of standalone topology
CAEE802.17	CLO 17	Apply the concept of complete three phase grid connection
CAEE802.18	CLO 18	Apply the concept of annual payment and present worth factor
CAEE802.19	CLO 19	Explore the knowledge and skills of employability to succeed in national and international level competitive examinations.

TUTORIAL QUESTION BANK

UNIT – I			
THE PV CELL, SERIES & PARALLEL INTERCONNECTION			
Part - A(Short Answer Questions)			
S No	QUESTION	Blooms Taxonomy Level	Course Learning Outcomes
1	What is photovoltaic's (solar electricity) or "PV"?	Remember	CAEE802.01
2	How can we get electricity from the sun?	Remember	CAEE802.02
3	What are the components of a photovoltaic (PV) system?	Remember	CAEE802.01
4	How long do photovoltaic (PV) systems last?	Remember	CAEE802.01
5	What are the applications of series inter connection?	Understand	CAEE802.01
6	Can I use photovoltaics (PV) to power my home?	Remember	CAEE802.02
7	Can I use photovoltaics (PV) to power my business?	Remember	CAEE802.02
8	How do I know if I have enough sunlight for PV?	Understand	CAEE802.02
9	Why should I purchase a PV system?	Remember	CAEE802.01
10	What are the applications of parallel inter connection?	Remember	CAEE802.02
Part - B (Long Answer Questions)			
1	Explain the principle of conversion of solar energy in to heat	Understand	CAEE802.01
2	List out classification of solar energy collectors and explain each	Remember	CAEE802.03
3	Distinguish between advantages and disadvantages of flat plate collectors	Remember	CAEE802.04
4	Discuss advantages of concentrating collectors over flat plate collectors	Remember	CAEE802.04
5	Discuss the advantages and disadvantages of PV solar energy conversion system	Understand	CAEE802.04
6	Describe the following i) short circuit ii) open circuit iii) peak power parameters	Understand	CAEE802.03
7	Discuss about temperature effect calculation with example	Understand	CAEE802.04
8	Discuss about I-V characteristics of solar cell?	Understand	CAEE802.01
9	Write the differences between directional and non directional interconnections?	Understand	CAEE802.02
10	What's the difference between PV and other solar energy technologies?	Understand	CAEE802.01
11	Describe the characteristics of PV system	Understand	CAEE802.01
12	How is a solar electric system designed, installed, and maintained?	Understand	CAEE802.02
13	Where can I find someone who designs, installs, and maintains photovoltaic (PV) systems?	Understand	CAEE802.02
14	How much does a solar energy system cost, and how much will I save on utility bills?	Understand	CAEE802.03
15	Draw the simulation circuits of series and parallel integrating modules	Understand	CAEE802.03

UNIT-II			
ENERGY FROM SUN INCIDENT ENERGY ESTIMATION			
Part - A(Short Answer Questions)			
1	How does troposphere affect the satellite signals?	Remember	CAEE802.04
2	Which makes the existence of ionosphere possible?	Remember	CAEE802.05
3	What happens to the satellite signals as the density of the ionosphere is high?	Remember	CAEE802.04
4	What is the increase in velocity of the signal by the ionosphere termed as?	Remember	CAEE802.05
5	What is the maximum possible output of a solar array?	Remember	CAEE802.05
6	What is the maximum possible output of a solar array?	Remember	CAEE802.06
7	Define Global radiation.	Remember	CAEE802.06
8	Which makes the existence of ionosphere possible?	Remember	CAEE802.04
9	Which device is used to measure solar radiation?	Understand	CAEE802.04
10	How does troposphere affect the satellite signals?	Remember	CAEE802.04
11	What happens to the satellite signals as the density of the ionosphere is high?	Understand	CAEE802.04
12	What is the increase in velocity of the signal by the ionosphere termed as?	Understand	CAEE802.04
13	Which is true with respect to ionosphere scintillation effects?	Remember	CAEE802.05
14	Maximum efficiency occurs in which collector?	Understand	CAEE802.05
15	How much power from the sun intercepted by the earth is approximately?	Remember	CAEE802.05
Part - B (Long Answer Questions)			
1	Describe about ionization and radiation in solar systems	Remember	CAEE802.06
2	Discuss in detail about Insulation on a horizontal flat plate	Understand	CAEE802.06
3	Discuss in detail about Energy on a horizontal flat plate	Remember	CAEE802.06
4	Discuss in detail about Sunrise and sunset hour angles	Understand	CAEE802.06
5	Discuss in detail about Energy on a tilted flat plate	Understand	CAEE802.05
6	Write short notes on energy plots in octave	Remember	CAEE802.05
7	Discuss in detail about Atmospheric effects on solar system,	Understand	CAEE802.05
8	Discuss in detail about energy with atmospheric effects	Remember	CAEE802.07
9	Define and discuss about Clearness index	Remember	CAEE802.07
10	Discuss in detail about energy scripts in Octave.	Remember	CAEE802.07
11	How Insulation variation with time of day?	Understand	CAEE802.07
12	Define and discuss in detail about Solar geometry	Understand	CAEE802.06
UNIT-III			
SIZING PV AND MAXIMUM POWER POINT TRACKING			
Part - A(Short Answer Questions)			
1.	Define module.	Remember	CAEE802.05
2.	What is the disadvantage, with solar cells for power generation is?	Remember	CAEE802.05
3.	Which type of reflecting mirrors used for exploiting solar energy?	Understand	CAEE802.06
4.	Where the sun tracking system is required?	Remember	CAEE802.05

5.	Most of the solar radiation received on earth surface lies in which range ?	Remember	CAEE802.07
6.	What is the order of output of the solar cell?	Understand	CAEE802.07
7.	Who invented First solar cell?	Remember	CAEE802.07
8.	What is power density?	Remember	CAEE802.07
9.	What is the function of photo voltaic cell	Understand	CAEE802.07
Part - B (Long Answer Questions)			
1	What are the sizing pv applications without batteries?	Understand	CAEE802.07
2	Describe about energy storage methods.	Remember	CAEE802.07
3	Describe about PV system design.	Understand	CAEE802.07
4	What is the effect on load factor?	Understand	CAEE802.08
5	Describe what are the factors to be considered while selecting a battery	Remember	CAEE802.08
6	Describe the various charging methodologies of battery	Understand	CAEE802.07
7	What are classifications of PV array and its applications	Understand	CAEE802.07
8	What are classifications Batteries used in solar system	Remember	CAEE802.09
9	what is energy density and discuss the importance of it?	Remember	CAEE802.08
10	Describe the methods to increase the efficiency of solar system?	Remember	CAEE802.08

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