

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S) Exam April 2025 (2019 Scheme)

Course Code: EET458**Course Name: SOLAR PV SYSTEMS****Max. Marks: 100****Duration: 3 Hours****PART A***Answer all questions, each carries 3 marks.*

Marks

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|----|---|-----|
| 1 | Differentiate between extra-terrestrial and terrestrial solar radiation. | (3) |
| 2 | Explain the difference between direct and diffuse solar radiation | (3) |
| 3 | What is solar constant how is it measured? | (3) |
| 4 | List the advantages and disadvantages of flat plate solar collectors. | (3) |
| 5 | List the benefits of using solar thermal energy in greenhouse operations. | (3) |
| 6 | How does shadowing affect the performance of PV systems? | (3) |
| 7 | What are the main components of a Solar PV system | (3) |
| 8 | What is meant by islanding in a grid connected solar PV system | (3) |
| 9 | Explain the function of charge controller in a standalone PV system | (3) |
| 10 | Why we need of EMI Filters in a grid connected PV system? | (3) |

PART B*Answer any one full question from each module, each carries 14 marks.***Module I**

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|----|---|-----|
| 11 | a) What is a sunshine recorder, and how does it function? | (7) |
| | b) Explain how a pyrliometer measures solar radiation | (7) |

OR

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| 12 | a) With the help of a neat diagram, explain the working of pyranometer | (7) |
| | b) Calculate the number of daylight hours in Chennai for 1 January and 1 July. Take latitude of Chennai as 13.0843° N | (7) |

Module II

- 13 a) Explain the different types of solar collectors based on the way they collect solar radiation. (8)
- b) Compare and contrast flat plate and focussing collectors. (6)

OR

- 14 a) Design a solar water heater for domestic application. Assume suitable values. (7)
- b) How do solar-powered pumps work? Give some applications of solar thermal energy in pumping systems. (7)

Module III

- 15 a) What is the packing factor in a PV module, and why is it important in the design and performance of solar panels? (7)
- b) How do connecting PV modules in series differ from connecting them in parallel? Discuss the advantages of each configuration in a PV system. (7)

OR

- 16 a) Explain the concept of Maximum Power Point Tracking (MPPT). (4)
- b) Explain the Perturb and Observe MPPT method (10)

Module IV

- 17 a) Design a solar PV system for a house which contains 4 fans of 70 watts each, running for 6 hours a day, 4 tube lights of 40 watts each running for eight hours a day, and a refrigerator of 300 watts running for 6 hours a day. (Consider battery autonomy two days) (10)
- b) List out components of a grid-connected solar PV system and explain its working. (4)

OR

- 18 a) Explain the working of a stand-alone system with battery feeding AC and DC loads (4)
- b) Design a SPV system for a factory which contains 1.5 hp motor (1 hp = 747 W) operating for 5 hours a day, 10 tube lights, each of 50 watts (10)

operating for 7 hours a day, 4 ceiling fans of 75Watts operating for 6 hours a day. Consider battery autonomy for 1day.

Module V

- 19 a) Write short notes on: (6)
- (a) Reverse current protection in solar modules;
 - (b) Over current protection in solar modules
- b) With a neat sketch explain anti- islanding protection in Standalone PV systems (8)
- OR**
- 20 a) The life cycle cost of a system is Rs. 20000/- for a life period of 20 years. The rate of interest is 9% and the inflation rate is 4%. What is the annual life cycle cost for the system? (7)
- b) With the help of a flowchart explain the PV fuse selection (7)
