



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR FIRST TERM EXAMINATION FOR

CERTIFICATE IN ELECTRICAL AND ELECTRONICS ENGINEERING

1601/105/SIT: SOLAR TECHNOLOGY SYSTEMS

DATE: 8/6/2021

TIME: 8.30-11.30 AM

INSTRUCTIONS

Answer ALL the questions.

1.
 - a) Explain any THREE methods of mounting a PV module (6 marks)
 - b) Explain the main components of a solar PV system. (10 marks)
 - c) Explain the terms
 - i. photovoltaic effect
 - ii. solar thermal (4 marks)
2.
 - a) Explain the functions of a charge controller (2 marks)
 - b) With the aid of a well labeled circuit diagram, explain the construction of a series charge controller (10 marks)
 - c) Explain the connecting/disconnecting sequence of a charge controller (4 marks)
 - d) Draw the connection and calculate the total output voltage and capacity of two 12V identical batteries rated 50Ah connected in:
 - i. Parallel
 - ii. Series (4 marks)
3.
 - a) Explain any five technical specifications of a PV module. (10 marks)
 - b) Explain why dissimilar PV modules should NOT be connected in series (4 marks)

- c) State the possible cause and remedy for each of the following faults in a solar PV installation:
- i. no current flowing from module to battery
 - ii. blown fuse. (6 marks)
4. a) Explain the functions of an inverter (2 marks)
- b) With the aid of well labelled diagrams, explain any three types of off-grid inverters. (9 marks)
- c) State any four advantages of solar PV technologies (4 marks)
- d) Explain the term “greenhouse effect” (5 marks)
5. a) State three factors that affect the output of a solar PV Module. (3 marks)
- b) State four advantages of renewable energy sources (4 marks)
- c) State the standard testing conditions (STC) of a PV module (3 marks)