

## ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

Solar Installation systems, August 2016, Supplementary Examinations

Diloma year 1, semester 2 Unit Code EED 115

1. a) Define the following terms, and give two examples of each,
  - i. Renewable energy
  - ii. Non-renewable energy (6mks)
- b) State any 4 energy regulations applied in Kenya. (4mks)
- c) Explain the steps involved in sizing a solar installation system. (12mks)
- d) The table below shows loads supplied by a 12V solar battery with a 60% depth of discharge. If the number of days of autonomy is 4, determine the battery capacity.

| Loads  | Quantity | Rating | Daily usage |  |
|--------|----------|--------|-------------|--|
| Lights | 4        | 10W    | 4 hours     |  |
| T.V    | 2        | 40W    | 2 hours     |  |

(8marks)

2. a) With an aid of a diagram, explain the following terms;
  - Solar constant
  - Direct radiation
  - Diffuse radiation (6mks)
- b) Explain why the global radiation is less than the solar constant. (4mks)
- c) Explain the different types of Pv modules, stating their efficiencies. (10mks)
3. a) Explain any five technical specifications of a Pv module. (10mks)
- b) With an aid of a diagram, explain the I – V curve and the important points. (10mks)
4. a) Define the following terms;
  - i. Tilt angle
  - ii. Azimuth angle
  - iii. Stratification
  - iv. Sulfation (8mks)
- b) Explain how sulfation and stratification are prevented. (4mks)
- c) Explain the following systems;

- i. Stand-alone (3mks)
- ii. Hybrid – PV generator system (3mks)

Q5 . (a) Explain the importance of the following

- (1) Low voltage disconnect in a charge controller
- (2) Blocking diodes (4marks)

(b) Explain Any three types of inverters (6marks)

(c) A 12 dc home solar system supplies a load which consists of four 10 watt lamps and an 80 watt television set. If the daily use for each appliance is 2 hours, determine the,

- (i) Total daily energy demand
- (ii) Daily system charge requirement (10 marks)

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(MUTUA)