FAHAD BIN SULTAN UNIVERSITY
College of Engineering
Department of Mechanical Engineering

MECH 453 Int. to Renewable Energy	2nd Exam	28/06/2021
Student Name:	ID#:	

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(1) : Hot-spot heating occurs when there is [＿＿＿＿＿＿＿＿] in a string of at least several [＿＿＿＿＿＿＿＿] solar cells.

(2) : Hot-spot heating occurs when [＿＿＿＿＿＿＿＿＿＿＿＿] cause a large reverse bias across [＿＿＿＿＿], leading to [＿＿＿＿＿＿＿＿] in the poor cell.

(3) : The use of by-pass diodes to [＿＿＿＿＿＿＿＿] and a blocking diode, may be used to [＿＿＿＿＿＿＿＿].

(4) : When circuits are wired in series, the voltage of each panel is [＿＿＿] together, but the amperage [＿＿＿] the same. When circuits are wired in parallel, the voltage of each panel [＿＿＿＿＿＿] and the amperage of each panel is [＿＿＿].

(5) : Photovoltaic modules can be wired together to create [＿＿＿].

(6) Solar charge controller – regulates the [＿＿＿＿＿＿＿] coming from the PV panels going to battery and prevents battery [＿＿＿＿＿] and [＿＿＿＿＿] battery life.

(7) Inverter [＿＿＿＿＿] output of PV panels or wind turbine into a [＿＿＿＿＿＿＿＿] appliances or fed back into grid line.

(8) : The sizing of controller depends on [＿＿＿＿＿＿＿＿＿＿] which is delivered to the controller and also depends on [＿＿＿＿＿＿] on (series or parallel configuration).

(9) Apartment has the following electrical appliance usage:

a) Three *40* Watt fluorescent lamp with electronic ballast used 6 hours per day.

b) One *500* Watt air conditioner used for *15* hours per day.

c) One *200* Watt refrigerator that runs *24* hours per day with compressor run *14* hours and off *10* hours.

d) The system will be powered by *12* VDC, *150* WP solar panel and Sun Hours is *10*.

Determine:

1. Power consumption demands?

2. Number of PV panels needed:

3. find out the size of battery for battery *85%* Efficiency, depth of discharge of *0.65*, days of autonomy of *3* days, Nominal battery voltage of *12 V*.

(10) The following recommended tests has to be done to ensure the photovoltaic installation is safe for equipment as well as personnel use?

a) _____

b) _____

c) _____

d) _____

e) _____

f) _____

g) _____