

Course No: ARC5342
Course Title: energy system in
architecture
Date: 14/5/2015
No. of Questions: (6)
Time: 2 hours (120min.)

University of Palestine



Final Exam
2014/2015
Total Grade: 70

Instructor: Dr. Nagham Ali Hasan
Student No.: _____
Student Name: _____
College Name: _____
Dep. / Specialist: Architecture

Answer the following questions:

Question One

(20 marks)

True (✓) or false (X):

1. () Human activity increases the levels of greenhouse gases
2. () Sustainable building refers to both a structure and the using of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle
3. () Energy efficiency refers to the increase of the energy amount required to perform a specific job.
4. () Coal, oil and gas – are sustainable energy sources
5. () Biomass energy is renewable.
6. () Natural oil is liquid that fills pores of rocks and forms at plate boundaries.
7. () USA, Russia, and Qatar are the largest countries that produce coal.
8. () Geothermal uses humanly approachable technology and widely available
9. () Geothermal power is considered a non-polluting source of energy, and does not have any serious environmental drawbacks.
10. () Solar collectors' trackers increased the solar energy power supply about 30% than fixed type.
11. () Solar cells work on the principle of photoelectric effect.
12. () The inverter transfers the electric current from AC to DC.
13. () The building loads affect on PV system calculations and design.
14. () Wind turbines generally produce less electricity than fossil fuelled power station.
15. () Lift wind design is used in most modern turbines but it is lower efficiency.
16. () Wind Turbine is shut down when wind speed is higher than 50mph
17. () Stack or chimney effect is the difference in air density due to temperature difference between indoor and outdoor air.
18. () Passive solar heating are mechanical systems used for heating water
19. () U-values are typically given in w/m^2 per $^{\circ}C$ or as Btu / ft^2 per $^{\circ}F$.
20. () Most solar systems do not require any maintenance during their lifespan,

Question Two

(12 marks)

Choose the correct answer:

1. **Sustainability in architecture is referred to:**
 - a. The built environment based on renewable resources.
 - b. Imagination of both design and construction for future.
 - c. Non-exhaustible resources.
 - d. None of them
2. **The common objective for green buildings are designed to:**
 - a. Efficiently using energy, water, and other resources
 - b. Protecting occupant health and improving employee productivity
 - c. Reducing waste, pollution and environmental degradation
 - d. All of them

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3. **Europe produces 30% of its electricity needs from:**
 - a. Nuclear power
 - b. Petrol
 - c. Natural Gas
 - d. Coal

4. **Wind Power depends on:** _____
 - a. amount of air (volume)
 - b. speed of air (velocity)
 - c. mass of air (density)
 - d. All of them

5. **The main disadvantages of solar energy plant is:**
 - a. The Installation site area
 - b. Unreliable energy source because of the sunshine
 - c. The initial cost
 - d. Pollution

6. **It is more difficult to achieve water conservation than energy conservation:**
 - a. Cost of the equipment
 - b. Extra space and structure required.
 - c. Collected water may be contaminated by air pollution.
 - d. All of them

7. **Factors that affects how much solar energy for any location on the earth receives:**
 - a. Latitude and geographic location
 - b. Date and time
 - c. Cloudiness
 - d. All of them

8. **Reasons to support Geothermal Energy:**
 - a. Although it is unreliable power but it is environmentally friendly
 - b. Geothermal power supports local economic development and promotes national security
 - c. A & B
 - d. None of them

9. **The minimum operational speed for Wind power ranges from**
 - a. 0~5 m/s
 - b. 5 ~ 15 m/s
 - c. 15 ~ 25 m/s
 - d. > 25 m/s

10. **Hydropower plants convert the:**
 - a. Kinetic energy into mechanical energy
 - b. Mechanical energy into electricity
 - c. Mechanical energy into Kinetic energy
 - d. Mechanical energy into heat energy

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11. To move air into a building, A pressure difference between the inside and outside have to be:

- a. greater inside
- b. greater outside
- c. equal
- d. not required

12. Water residential applications:

- a. Gray water
- b. Landscape irrigation
- c. Space heating and cooling
- d. All of them

Question Three

(6 marks)

Show the difference:

1. The two ways to brought Geothermal heat energy to earth surface:

Directly from hot springs/ geysers	Geothermal heat pump

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2. General advantages and disadvantages of wind power:

Advantages	Disadvantages

Stack ventilation	Cross ventilation

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Question Four

(6 marks)

1. The wind pressure difference is caused by combination of both wind and stack effects. Sketch an example drawing for a case study building.

Section	Plan

Question Five

(10 marks)

By sketching:

1. Floating head of Biogas Plants

A large, empty rectangular box with a black border, intended for the student to draw a sketch of a floating head of a biogas plant.



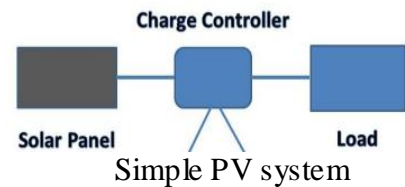
2. Evacuated-tube solar collectors

Question Five **(10 marks)**

1. Design a simple solar panel (PV) that converts solar energy into electrical power.

The sunshine at Hifa city is 5 hours/day

- Load output for:
 - Three light bulb = 100 watt AC for 8 hours/days all the year
 - Fan = 40 watt for 4 hours/days all the year
- The invertors: 65%
- Charge Controller: 88%
- The solar panel output (1m²) : 120watt



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2. Design a solar panel (PV) system that converts solar energy into electrical power.

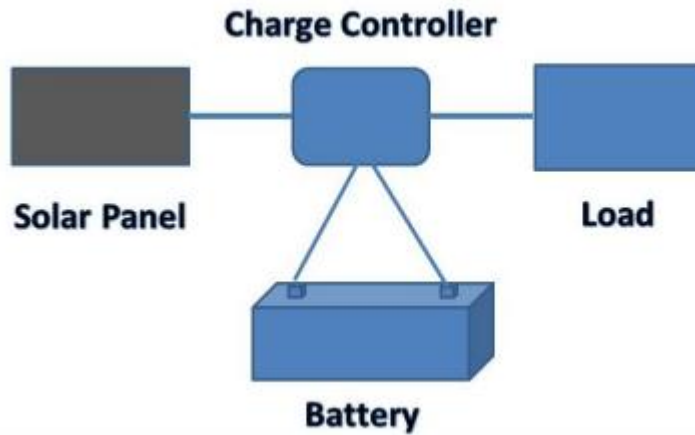
- The house building roof area 120m²
- The south elevation 60m²
-

The sunshine at Gaza city is 5.3 hours/day

- Total Load output for house building = 22kw/day



- The invertors: 80%
- Charge Controller: 85%
- The solar panel output (1m²) : 170watt
- Battery 12 Volt, 100 Amp.:
 - Battery efficiency 80% , discharge (DOD) 75%



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Question Five **(6 marks)**

How do I begin thinking and designing ecologically?

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Question Five

(10 marks)

Talk about your report at max. 8 lines:

1.
2.
3.
4.
5.
6.
7.
8.

Good Luck