



**Answer the following questions:**

**Question No. 1:**

Traditional energy power plants are facing many problems that force specialists to search for other alternatives

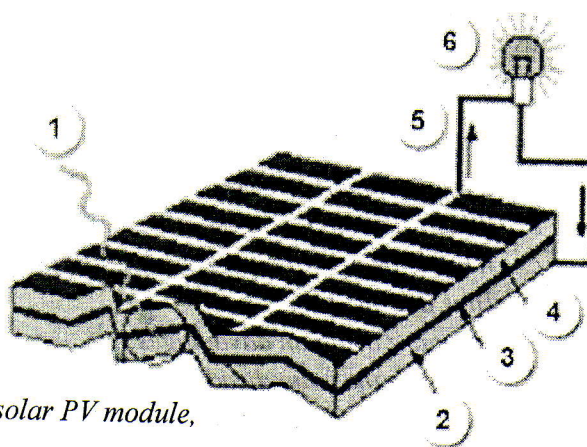
- State traditional energy power plant problems. (4)
- Classify types of electric power plants. (4)
- Compare between Photovoltaic, Wind and Fuel cell resources from the following points of views: cost of one kWh, efficiency, potential-time of working during the year, site, plant life, and space requirements. (5)

Marks = 13

**Question No. 2:**

The Figure shown Indicates an electric power plant

- Nominate it. (2)
- Write the names of the numbered components shown on the figure. (3)
- Explain how it works (3)
- What are the difference between: Solar PV cell, solar PV module, PV panel and PV array? (2)
- A 600 PV solar modules, each of 250 W peak power and area  $1.67 \text{ m}^2$  are connected to form a PV solar system. If the performance ratio of the system is 0.75, the solar panel yield is 0.19, and the average annual solar radiation is  $1900 \text{ kWh/m}^2$ , calculate:
  - The total capacity power of the system. (2)
  - The expected annual energy production. (2)

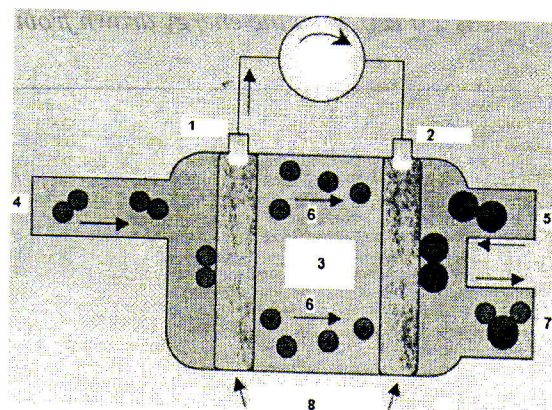


Marks = 14

**Question No. 3:**

The Figure shown Indicates an electric power plant

- Nominate it. (2)
- Write the names of the numbered components shown on the figure. (5)
- Explain how it works (3)
- State advantages of such power plants. (3)
- State disadvantages of such power plants. (3)



Marks = 16

**Question No. 4:**

- What is the difference between offshore, and onshore wind turbines? (2)
- What are the main advantages? (3)

- c. What are the main disadvantages? (3)
- d. Assume 8 wind turbines are clustered together, if each turbine generates 40 kW/h for 65 % of time, and each consumer consumes an average power of 1.16 kW/h, find:
  - i. The energy generated during a year. (2)
  - ii. The consumption of one consumer during a year. (2)
  - iii. Number of consumers that can be supplied from this power supply. (1)

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Marks = 12

Question No. 5:

Although there are only about forty sites on the earth that are convenient to install a tidal power plant, it is considered a renewable energy resource.

- a. What is causing tide of water? (3)
- b. How does tidal power plant work? (3)
- c. State its main advantages. (3)
- d. What are the main disadvantages? (3)

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Marks = 12

Question No. 6:

- a. What is biomass energy source? (2)
- b. What are biomass fuel sources? (2)
- c. What is the use of biomass energy? (2)
- d. How does it work? (3)
- e. What are the main advantages? (3)
- f. What are the main disadvantages? (3)
- g. Explain: "Biomass causes a closed cycle with no net emissions of greenhouse gases" (2)

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Marks = 17

Question No. 7:

A hybrid PV/Wind power plants are connected on a grid to feed an average load of 300 kW. The Wind source consists of eight wind turbines; each turbine has the data given in question 4.d. The PV solar source consists of 7000 modules; each module has the data given in question 2.c. If the cost of one kWh of wind turbine source is 1.2 E.L., whereas that given from PV solar source is 1.7 E.L. and that given from the grid is 2.0 E.L. Find the energy drawn from the grid through one month in kWh to cover the need of the demand.

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Marks = 15

*With best wishes*