5.Towards Green Energy

Q State whether the following statements are true or false with proper explaination : (1M)

1. In thermal Power plants, the turbines work on solar energy.

Ans : False – In thermal power plants, the turbines work on steam. The turbines working on solar energy are not used.

2. How to dispose the nuclear waste safely is a big challenge before the scientists.

Ans : True. Nuclear waste disposal is the greatest problem. It produces highly toxic effects in any eco-system. Therefore, disposing such radioactive sub stand become a major challenge.

3. The efficiency of power generation using coal plant is higher than that of power generation plant based on natural gas.

Ans : False. The efficiency of power generation using natural gas plant is higher than that of power generation plant based on coal.

4. Energy obtained from nuclear fission is eco-friendly.

Ans : False. Energy obtained from nuclear fission is not eco-friendly, because if accidents happen it leads to hazardous accidents.

5. In hydroelectric power plant, the kinetic energy in water stored in dam is converted into potential energy of water.

Ans : False. In hydroelectric power plant the potential energy in water stored in dam is converted into kinetic eergy of water. The forceful down pour of flowing water causes this kinetic energy.

Q. Match The Columns:

Column A	Column B
6. Polluting Energy	i. Disposal of wastes
7. Eco-friendly Energy	ii. Rainy season and darkness
8. Nuclear Energy	iii. Rehabilitation of displaced people
9. Solar Energy	iv. Wind Energy
10. Hydroelectric Energy	v. Thermal Energy
	vi. Limited Reserves

Ans :

6. Polluting Energy = v. Thermal Energy

7. Eco-friendly Energy = iv. Wind Energy

8. Nuclear Energy = i. Disposal of wastes

9. Solar Energy = ii. Rainy season and darkness

10. Hydroelectric Energy = iii. Rehabilitation of displaced people.

Q. Find the odd one out : (1M)

11. kundankulam, Tarapur, Ravatabhata, Anjanvel.

Ans : Anjanvel. (All other are places having nuclear power plants).

12. Samarakota, Kundankulam, Bavanaa, Kondapalli

Ans : Kundankulam (All others are places having power plants based on natural gas.)

13. Tehari, Koyana, Srishailm, Tarapur.

Ans : Tarapur (All others are places having hydroelectric projects.)

14. Edible oil, Crude oil, LPG, CNG

Ans : Edible oil.(All others are fossil fuels.)

15. Hydroelectric Energy, Solar Energy, Nuclear Energy, Wind Energy.

Ans : Nuclear Energy (All others are eco-friendly green energy types)

Q. Answer In one sentence:- (1M each)

1. What is solar photovoltaic effect?

Ans : when solar photovoltaic cells converts the solar radiation energy directly into electrical energy then that effect is called solar photovoltaic effect.

2. As uranium 236 is extremely unstable what reaction do take place in it at the time of nuclear fission?

Ans : Uranium 236 being extremely unstable, it goes converted into atoms of barium and krypton at the time of nuclear fission.

3. How is acid-rain caused?

Ans : When the fossil fuels undergo combustion, they release nitrogen dioxide which is responsible for the acid-rain.

4. At which places natural gas based power plants are located and in which states of India?

Ans : Natural gas based power plants are located at samaralkota, and kondapalli in Andra Pradesh Anjanvel in Maharashtra, Bavanaa in delhi.

5. Which is a perfect site for the installation of wind turbines?

Ans : The wind velocity is usually high near seashore therefore this is the perfect site for the installation of wind turbines.

6. how is electrical energy generated without using the principle of electromagnetic induction?

Ans : Electrical energy can be generated directly from solar radiation without using generator and without using the principle of electromagnetic induction.

7.What is Energy?

Ans : The capacity to do work is called energy.

8. What are different types of Energy?

Ans : Potential energy and kinetic energy are the two types of energy.

9. What are different forms of Energy ?

Ans : Heat, light, electric energy, solar energy, chemical energy, nuclear energy, mechanical Energy etc. are different forms of energy.

10. Where do we use electrical energy in our day to day life?

Ans : We use electric energy in various appliances such as bulb and tube light. Fans, iron, refrigerator, water pumps, cell phone chargers, television sets, tape recorders and computers.

11. How electric energy is produced?

Ans : Electric energy is produced in the generators by using the principle of electromagnetic induction, the magnetic field around conduction wires is changed and this creates the potential difference this result in the formation of electric energy.

12. Why is the energy in the coal called chemical energy?

Ans : The atoms and molecules present in the coal are formed due to chemical bonds. The energy is stored in chemical bonds. When the coal is burnt, this energy is released. The chemical energy in coal is transformed into thermal energy.

13. Why steam is used to rotate the turbine?

Ans : When water is heated, it converts into steam. This steam in under high pressure and temperature this force of steam rotates the turbines. The same steam is again condensed and converted back into water. The excess heat in turbine again makes this water turn into steam. In this way turbine rotates very effectively due to steam, hence, steam is used to rotate the turbine.

14.How does nuclear fission take place?

Ans : There are proton and neutron in nucleus of an atom. During nuclear fission, the nucleus undergoes fission either due to natural radiations or due to bombardment of other neutrons on it. The fission liberates the energy which is known as nuclear energy or atomic energy.

15. Write note on formation of nuclear energy.

Ans : upon bombardment by neutrons on atom of uranium-235 absorption of neutron takes place. It converts uranium-235 into its isotope Uranium-236.

- Being extremely unstable, uranium-236 transforms into Barium and krypton atoms through a process of fission. This releases three neutrons and 200 Mev energy.
- Three more Uranium-235 atoms undergo fission due to three neutrons generated in this process. Thus, more fission releases more energy.
- Thus a chain reaction take place in which the process of fission of Uranium-235 atoms continues.
- In this way a controlled chain reaction is carried out to release thermal Energy, which in turn is used for generating electric energy.

Q. Explain the Difference. (2M)

16. Conventional and Non-conventional sources of Energy.

Ans :

Conventional source of Energy	Non-Conventional source of Energy
i. Conventional source of energy are largely polluting they release lot of carbon through its emissions.	i. Non-conventional source of energy are not polluting, they do not release carbon or other toxic gases.
ii. Conventional source of energy are not eco-friendly.	ii. Non-conventional source of energy are eco-friendly.
iii. It is non-renewable	iii. It si renewable.
iv. It requires less area and its management cost is also less.	iv. It requires more area and its management coast is also more.

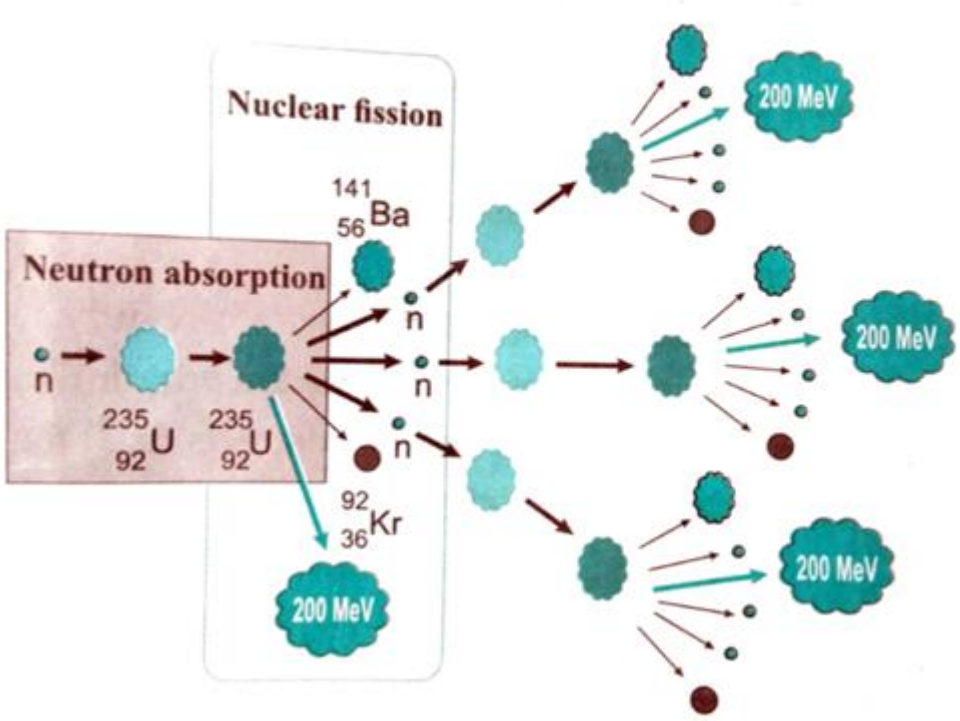
17. Thermal Electricity generation and Solar thermal Electricity generation.

Ans :

Thermal Electricity generation	Solar thermal Electricity generation.
i. After burning the coal, the heat that is produced is used	i. Solar radiations are used in solar thermal electricity

in the generation of thermal electricity.	production.
ii. Thermal energy is polluting and not eco-friendly.	ii. Solar energy is not polluting, it is eco-friendly.
iii. The fuel here is coal, its reserves are limited.	iii. The solar radiations are in abundance and are sustainable and persistent.
iv. For producing heat, the coal is burnt in the boilers.	iv. For production of heat, many reflectors are used which reflect the radiation of the sun into the absorbent.

18. Observe the figure and answer the questions given below (note : Draw fig)



a) Name the reaction

b) Where is this reaction used?

c)Which element is used in it.

Ans : - a) Name the reaction :- The reaction shown in nuclear fission or chain reaction.

b) This reaction is used in nuclear power plants where electricity is generated.

c) Uranium-235 is used in the nuclear fission reaction.

19. What are the advantages and limitations of solar energy?

Ans : *Advantages of solar energy :

i. While generating the power through solar radiations, no fuel is burnt.

ii. Solar energy generation thus does not create any type of pollution. The technology can be completely utilized in regions with abundant sunlight.

iii. Solar energy is eco-friendly, green energy.

***Limitations of solar energy :-**

i. Sunlight is available only during day time thus solar cells can generate power only during day.

ii. In rainy season and in cloudy conditions, solar power generation suffers.

iii. The power present in the solar cells is DC while most of the domestic equipment's work on AC.

20.What are the advantages of hydro electric power generation?

Ans : Advantages of hydroelectric power generation

i. Hydroelectric energy does not cause pollution.

ii. Generation of hydroelectric energy does not involve burning of fossil fuel.

iii. If sufficient water storage is available then electricity generation can be done as per requirement.

iv. Rain water can replenish the water storage and power generation can thus be done uninterrupted.

20.What is meant by green energy? Which energy sources can be called green energy sources and why? Give Examples.

Ans : Green energy means eco-friendly form of energy which does not cause environmental problem and are non-exhaustible, perpetual and sustainable.

- These sources of energy do not produce toxic gases or other pollutants, therefore they are safe.
- Examples of Green Energy :
  i. Hydroelectric Energy.
  ii. Wind Energy.
  iii. Solar Energy.
  iv. Energy obtained biofuels.

22. Explain with diagram step by step energy conversion in Thermal power plant. (4M)

Ans : Thermal Power Plant:

- In Thermal Power Plant the turbines are rotated using steam. Here the coal is burnt the heat energy liberated from this burning is used to heat the water in the boiler.
- This water produces steam of very high temperature and pressure
- The kinetic energy in the steam rotates the turbines.
- The rotation of turbines produces its own mechanical kinetic energy.
- The generator connected to turbines produce electrical energy.
- The steam is condensed in a condenser and converted back into water. In this way in thermal power plant, Thermal energy to kinetic energy, kinetic energy into mechanical energy and mechanical energy to electrical energy are the conversion takes place.

23. Which types of power generation involve maximum number of steps of energy conversion, In which power generation is the number minimum? (2M)

Ans : The steps of energy conversion are maximum in thermal power generation and they are minimum in wind energy generation.

24. Write short note on Electrical energy generation and Environment. (4M)

Ans : - The energy obtained through the fossil fuels as well as nuclear energy can cause degradation of the environment. If such energy sources are used, they can cause harm to the environment.

- The burning of fossil fuels cause air pollution the incomplete combustion of fossil fuels cause release of carbon monoxide. Some more toxic gases and soot particles cause various respiratory diseases.
- The carbon dioxide produced is creation global warming and climate change. The nitrogen dioxide released through burning is responsible for acid rains.
- Fossil fuels are limited. They are getting fast depleted. It has taken millions of years for the fossil fuels to form. The exploration of such fuels also cause environmental degradation and marine pollution too.
- Tn production of nuclear energy, there is a great risk of accidents. The safe disposal of nuclear waste is also a problem.
- Hydroelectric power from water reservoirs, wind power from wind, solar energy from sun and electricity from biofuels are eco-friendly alternatives.

25. Which fuel is used in thermal power plant? What are the problems associated with this type of power generation? (3M)

Ans : The coal used in the thermal power plants coal. Coal contains chemical energy. upon burning it releases heat energy. This heat is used for generation of electricity in the thermal power plants.

Problems associated with power generation by thermal power plant :

a. Air Pollution :- Due to burning of coal, there is emission of carbon dioxide, carbon dioxide, sulpher dioxide and nitrogen dioxide gases. These are harmful and toxic to health.

b. Soot particles emitted during combustion can cause severe respiratory problems such as asthma.

c. The coal reserves in the world are limited. They will be finished in next few hundred years and will not be replenished later. The scarcity of coal would result in energy crisis.

26. Explain the following sentences- saving energy is the need of the hour. (2M)

Ans : In modern civilization, continuous energy supply is needed for the technology and development. The energy has become a basic need for man.

- Most of the energy used in India is obtained from thermal poer plant. For this energy generation, various fuels are used.
- The coal and fossil fuels are getting fast depleted. Use of fossil fuels is also resulting in pollution and climate change.
- Nuclear energy can be very hazardous. Lot of research is being done in the field of green energy, but the tremendous human population always is in need of more energy.
- Therefore, each and every person should have to save energy, as saving energy is the need of the hour.

27. The construction of turbine is different for different types of power plants. Give scientific reason. (2M)

Ans : Generators work on the principles of electro- magnetic induction. For this the generator must be rotated. For this purpose, there is a turbine for each generator. For rotation of a turbine, energy is needed. The turbines are different

according to the type of energy source that is used for its rotation. Therefore the construction of turbine is different for each power plant.

28. Hydroelectric energy, solar energy and wind energy are called renewable energies give scientific reason. (2M)

Ans : Hydroelectric energy, solar energy and wind energy is obtained respectively form flowing water, solar radiations and flowing wind. These sources i.e water reservoirs, sun and the wind are inexhaustible and sustainable they will not be finished. On the contrary, the conventional energy sources such as coal and fossil fuels have limited reserves. They cannot be renewed and may get exhausted in future. Hydroelectric energy, solar energy and wind energy can be replenished and hence they are called renewable.

29. How is electricity produced in the solar power plant fed into the electricity distribution network? (2M)

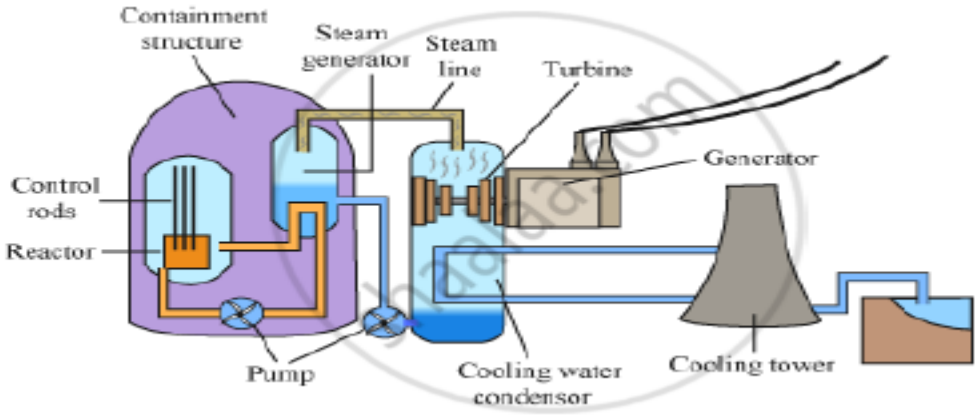
Ans : The DC Power is generated in the solar panels which is first converted into AC Power then a transformer the voltage and current levels of the generated power and then it is fed into the electricity distribution network.

30. Why nuclear power generation can be hazardous? (1M)

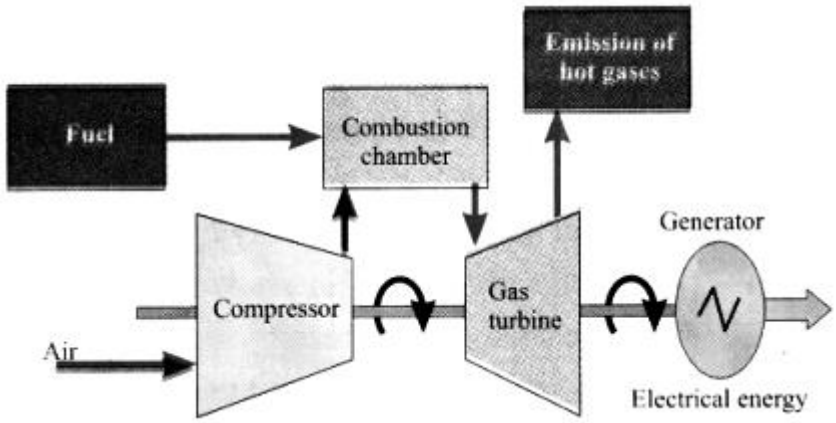
Ans : If accidents happen in the nuclear power plant, this can be very fatal due to radiation therefore nuclear power generation can be hazardous.

31. Explain with diagram step-by-step energy conversion in nuclear power plant. (3M)

Ans : In nuclear power plant, the energy is releases by fission of nuclei of atoms like Uranium or Plutonium. This energy is used to generate the steam of high temperature and high pressure. The kinetic energy in the steam rotates the turbines. The turbine in turn drives the generator to produce electricity.



32. Observe the diagram and answer the questions. (3M)



a) Which energy is generated from the power plant?

b) State its source.

c) Which is more eco-friendly power generation form coal or power generation from natural gas? Why?

Ans : a) the diagram shows electricity generated from natural gas.

b) The energy is generated form natural gas.

c) Power generation of natural gas is more eco-friendly. Natural gas does not contain sulphur and hence its burning does not cause major pollution by forming sulphur dioxide. The efficiency power generation by natural gas is also high.

33. Give your opinion about whether hydroelectric plants are environment friendly or not? (4M)

Ans : Hydroelectric power generation does not need burning of fuels . Therefore, there is no problem regarding combustion of fuels and release of toxic pollutants.

- Electricity can be obtained as and when required if there is enough water in the reservoir.
- Water is replenished every time when there is sufficient rainfall
- All the above facts give an impression that hydroelectric power generation is eco-friendly but it is not.
- Many villages and settlements are submerged when Adam and reservoir is constructed. The displaced people are given re-settlement, but it causes lot of emotional trauma to people.
- Biodiversity is affected as forest lands is submerged. The river flow is obstructed by the dam which affects the aquatic organisms residing in such water.
- Due to excessive pressure of water on land, it is said that the region gets prone to earthquakes.

34. How can we get the required amount of energy by connecting solar panels? (4M)

Ans : The photovoltaic solar cells can be connected in a series or in parallel to make a solar panel.

- When solar cells are connected in a series, the potential difference of individual cells are added in the combination, however the currents from individual cells are not added.
- When solar cells are connected in parallel, the current of the individual cells are added in the combination, but the potential differences from individual cells are not added.
- Through such connections the required potential difference and current can be obtained.
- Many such solar panels are connected in series and in parallel to generate required current and potential difference.
- When many solar panels connected in series from solar string. Many solar strings connected in parallel make a solar array. In such manner we can get the required amount of energy by connecting solar panels.

35. Other than thermal power plant, which power plants use thermal energy for power generation? In what different ways is the thermal energy obtained? (4M)

Ans : The power plant based on natural gas and the nuclear power plants also used thermal energy for the power generation. A part from these, solar energy is also used to produce heat and there by create the power.

- In nuclear power plant the energy is released by carrying out fission of nuclei of atoms like uranium or plutonium. This energy is used to generate the steam of high temperature and high pressure.
- The steam rotates the turbines the kinetic energy in steam drives the turbine and turbine in turn drives the generator.
- The combustion of natural gas produces gas which is used to run the turbine. This gas is under high pressure and high temperature. This is used to produce thermal energy.
- In solar thermal power plants, thermal energy is generated with the help of solar radiation. For this reflectors and absorbers are used for concentrating solar radiation and converting it into thermal energy.