8. Waste Water Management

Part-A

1. Question

An example of water-borne disease is _____.

A. scabies

B. dracunculiasis

C. trachoma

D. typhoid

Answer

Water-borne diseases are those diseases which spread through contaminated drinking water. Typhoid is caused by bacteria Salmonella typhi. This disease occurs when the excreta from someone who is suffering from typhoid get mixed with the drinking water used by the people living nearby.

2. Question

The sedimented and floating materials are removed by this treatment process.

A. primary treatment

B. secondary treatment

C. tertiary treatment

D. peripheral treatment

Answer

The waste water released by our homes, industries, hospitals, offices has various impurities present in it which are removed by treating the waste water. The treatment process consists of various stages such as primary, secondary, tertiary treatment. Primary treatment includes the following steps:

● Wastewater is firstly passed through bar screens to remove larger objects such as plastic bags, cans etc.

● Water is then passed to sand and grit removal tank.

● Water is then allowed to settle in a tank where solids like faeces settle at the bottom called sedimented materials and oil and grease float over water. Sedimented materials are removed with a scraper and floatable materials are removed with a skimmer.

Water thus obtained is further treated for suspended and dissolved impurities which do not settle down and this is a part of secondary and tertiary treatments.

3. Question

Which is a non-renewable resource?

A. coal

B. petroleum

C. natural gas

D. all the above

Answer

Those natural resources which cannot be replaced are called non-renewable resources because it takes a very long time for their formation (millions of years) while their consumption occurs very quickly. So once they are used up they are gone forever.

Coal, petroleum and natural gas all are fossil fuels. Fossil fuels were produced from the remains of ancient plants and animals and their formation took a very long time. So all of the above are non-renewable resources.

4. Question

_____ is the chief component of natural gas.

A. ethane

B. methane

C. propane

D. butane

Answer

Natural gas is primarily composed of methane. So its chief component is methane. Natural gas may also contain a small percentage of ethane, propane and higher hydrocarbons.

Part-B

1. Question

The bar-graph indicates the prevalence / widespread attack of infectious diseases in two cities A and B. Observe it and answer the questions given below:

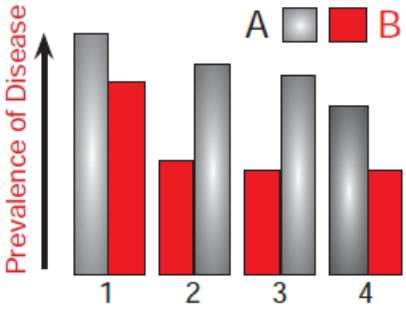
1. Dengue fever 2. Rat fever

3. Cholera 4. Chikungunya

a. What may be the reason for the disease in city A?

b. Which city needs a more effective system of waste-disposal and cleaning?

c. How can the disease be controlled in city A?



Answer

a) We can give reasons for the disease by thinking of the cause of spreads of these particular diseases:

i. <u>The absence of safe supplies of drinking water</u>:

Excreta of someone suffering from an infectious disease like cholera may get mixed with the drinking water used by people leaving nearby. This situation is more likely to happen if the safe supply of drinking water is absent in the city.

ii. <u>Stagnation of waste water</u>:

Mosquitoes breed in stagnated water and then diseases such as dengue fever and chikungunya spread. Mosquito bites transfer the virus into our bodies making us ill.

iii. <u>Lack of proper waste disposal systems</u>:

Unhygienic surroundings lead to breeding of rodents such as rats due to which disease such as rat fever spreads.

b) City A needs a more effective system of waste disposal and cleaning. We arrived at this conclusion by analyzing the bar graph that the diseases are more prevalent in city A. These diseases mainly spread due to unhygienic conditions, water stagnation etc. Therefore if we can provide a more effective waste disposal system (recycling, composting) and cleaning system (proper drainage system to maintain water flow) then we can reduce the prevalence of infectious diseases in city A to a large extent.

c) The diseases in city A can be controlled by eliminating the reasons for their spread. So we can take

following steps to eliminate the disease-causing reasons:

i. Proper drainage system

With a proper drainage system flow of waste water is maintained. Thus water does not stagnate and it can help in preventing various water-related diseases. For example, mosquito breeding will be reduced and thus diseases like dengue fever, chikungunya can be controlled.

ii. Availability of clean and safe drinking water

Clean drinking water will prevent the spread of water-borne diseases such as cholera.

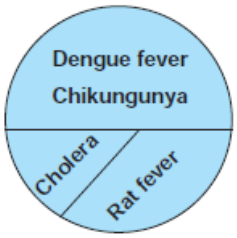
iii. Waste disposal systems

To ensure cleaner surroundings waste must be disposed off properly. Waste must be dumped in sanitary landfills away from the city. Waste water must be treated first before dumping into rivers.

2. Question

The pie diagram represents a survey result of infectious diseases in a village during

2008 – 2009. Analyse it and answer the following:



i) Which diseases affect the majority of the population?

ii) How are these diseases transmitted?

iii) Mention any three measures that can control the other two diseases.

Answer

i) From the pie diagram we can see that around 50% of the population suffered from dengue fever and chikungunya whereas cholera-affected least people and rat fever affected the intermediate number of people. Therefore, dengue fever and chikungunya are the diseases that affected the majority of the population.

ii) Mode of transmission for both dengue fever and chikungunya is a mosquito bite. Dengue virus (DENV) and chikungunya (CHIKV) virus responsible for these diseases are transmitted from mosquito to our blood when mosquitoes bite us.

iii) Cholera can be controlled by following measures:

● By drinking boiled water(because boiling of water kills various disease-causing germs)

● By not leaving the food items uncovered:

Flies may sit on the human excreta lying in open and then the same flies can sit on our food items which are left uncovered. So we must keep our food items and drinking water covered.

● By using toilet facilities.

Rat fever can be controlled through following measures:

● By avoiding contact with rats:

Rat fever can be caused by a rat bite or by coming in contact with an infected rat. So we must avoid the contact with rats.

● By keeping our surroundings clean:

This can be insured by proper waste disposal. Rodents tend to live in unhygienic and unclean areas so we must keep our surroundings clean to prevent their breeding.

3. Question

Match the suitable renewable and non-renewable sources.

Sources	A	B	C
Renewable	Coal	Wind	Petroleum
		Natural	Solar
Non- Renewable	Hydrogen	gas	energy

Answer

Sources	A	B	C
Renewable	Hydrogen	Wind	Solar energy
Non- Renewable	Coal	Natural gas	Petroleum

Renewable sources are those sources which can be replaced after they are used. Hydrogen, wind and solar energy all are inexhaustible and present in surplus amount. Thus they all are renewable sources of energy.

Non-renewable sources are those sources which cannot be replaced. Once they are used they are gone forever because their formation takes a very long time whereas they are consumed quickly. All fossil fuels are non-renewable sources because they are formed in a span of millions of years. Coal, natural gas, and petroleum all are fossil fuels thus they all are non-renewable sources of energy.

4. Question

Find the odd one out:

i) bioalcohol, green diesel, brothers, petroleum

ii) cholera, typhoid, scabies, dysentery

Answer

i) Petroleum

Petroleum is the odd one out among the given options. This is because petroleum is a fossil fuel while bioalcohol, bioethers, green diesel are bio-fuels. Fossil fuels are non-renewable sources of energy while bio-fuels are developed by humans from vegetables/crops/seeds which can be cultivated as per our need.

ii) Scabies

Scabies is a water-washed disease while cholera, typhoid and dysentery are water-borne diseases. Water-washed diseases are infections caused due to poor personal hygiene which may result from lack of water availability while water-borne diseases are those diseases which are transmitted by drinking contaminated water.

5. Question

A non-renewable resource is a natural resource if it is replaced by the natural process at a rate equal to or faster than its rate of consumption by humans.

Read this statement and say whether it is correct or incorrect. If it is incorrect, give the correct statement.

Answer

The given statement is incorrect. The correct statement is:

A renewable resource is a natural resource if it is replaced by the natural process at a rate equal to or faster than its rate of consumption by humans.

A non-renewable source cannot be replaced once it is used because its formation takes place a very long time whereas consumption occurs quickly. Therefore the above statement is incorrect which basically says that a non-renewable source can be replaced. On the other hand, the above statement is true for a renewable source. Thus we replaced the non-renewable source with renewable source while correcting the statement.

6. Question

Pick out the appliances that can conserve electric energy.

Florescent bulbs, copper choke, solar water heater, electric water heater, tungsten bulbs, electronic choke.

Answer

Following appliances can conserve electric energy:

● Florescent bulbs

● Solar water heater

● Electronic choke

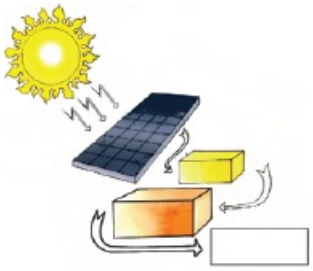
● When compared to tungsten bulbs, florescent bulbs produce the same amount of light by using lesser energy input. Thus they consume less electrical energy. Similarly, electronic chokes are more energy efficient as compared to copper chokes.

● Solar water heaters make use of solar energy to heat the water. Thus they do not consume electrical energy and hence can be used to conserve electricity.

Part-C

1. Question

Observe the picture given below and find out what type of energy is produced



i) Identify whether this energy is conventional or non-conventional.

ii) Draw the given diagram and label it with the parts given below:

(battery, battery charger controller, solar incidence, DC load, battery system)

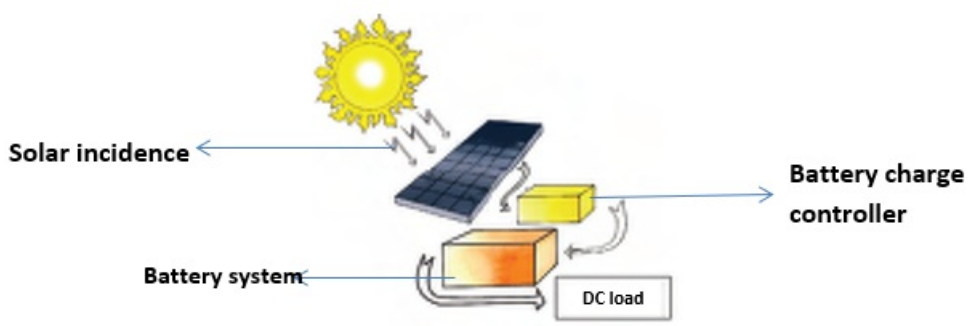
iii) In the given picture, _____energy is transformed into _____energy.

Answer

In the given picture, solar energy is produced

i) Solar energy is a non-conventional source of energy. Non-conventional sources are those sources of energy which have been recently developed and are renewable sources of energy. They are also pollution free and eco-friendly.

ii)



Role of different components:

1. **<u>Solar incidence</u>:** it is not any physical component. Solar incidence means falling of the sun rays on the solar cell panel.

2. **Solar panel:** it consists of a large number of solar cells which convert solar energy into electrical energy.

3. **Battery charge controller:** it regulates the electric current coming from the solar panel and going to the battery system/battery.

4. **DC load:** The current from the battery is withdrawn as direct current.

iii) In the given picture, solar energy is transformed into electrical energy.

In the above picture, solar cell panel is doing the work of converting solar energy into electrical energy. As we can see that when the sun rays fall on the solar cell panel, solar energy is converted into electrical energy by solar cells and the generated current is then stored in a battery for later use.

2. Question

i) What type of energy is produced in this picture?

ii) What difficulties do we face in harnessing this energy? Explain.

iii) Why do we say that this energy is better than solar energy and atomic energy?

Answer

i) Wind energy is produced in the given picture. Wind is a renewable source of energy and energy from the wind can be harnessed using wind mills which are shown in the picture.

ii) We face following difficulties while harnessing wind energy:

● Wind farms can be established only in those areas where the wind blows for a greater part of the year. Also, the speed of wind should be higher than 15 km/h to run the wind mills.

● Establishment of wind farms requires large areas in plains.

● Since blade and towers of a wind mill are exposed to sun, storm, rain, therefore they need a high level of maintenance.

● The initial cost of establishment is quite high.

iii) Wind energy can be said better than solar and atomic energy in following ways:

● Wind energy does not produce any waste material whereas the atomic energy involves the production of radioactive waste which is very harmful to the environment.

● Harnessing wind energy is cheaper than harnessing solar energy and atomic energy. Solar cells are made up of expensive materials and elements used for harnessing atomic energy are also very costly.

● Wind energy does not involve any risks of accidents whereas atomic energy possesses a huge threat of nuclear disasters.

3. Question

Fossil fuels are formed by decomposition of biomass buried under the earth over millions of years ago.

i) Name any three fossil fuels.

ii) Which fuel is used in the production of fertilizers?

iii) What is natural gas made up of?

Answer

i) We can list three fossil fuels as follows:

● Coal

● Petroleum

● Natural gas

Since coal, petroleum and natural gas all were formed from the dead remains (fossils) of living organisms, they all are examples of fossil fuels.

ii) Natural gas is used in the production of fertilizers. Natural gas is used as the source of hydrogen to combine with nitrogen to make ammonia (NH_3) which is the foundation of a nitrogen fertilizer.

iii) Natural gas is primarily composed of methane (greater than 90%). Natural gas may also contain a small percentage of ethane, propane and higher hydrocarbons.

4. Question

Wind power is generated from uneven heating of the earth's surface by the sun and the hot core.

i) Which country is called the country of winds?

ii) Which country leads the world in harnessing wind energy?

iii) In which district of Tamil nadu do we have wind energy farm?

iv) In which of the following land forms will you be able to harness maximum amount of wind energy?

(plains, canals, valleys)

Answer

i) **Denmark** is called the country of winds. This is so because more than 25% of their electricity needs are generated through wind energy.

ii) **Germany** leads the world in harnessing wind energy i.e. the total output of electric energy from wind energy is maximum in Germany.

iii) In **Kanyakumari** district of Tamil Nadu, we have largest wind energy farm in India. It generates 380 MW of electricity.

iv) We will be able to harness maximum wind energy in plains. To harness wind energy a large are of land is required where wind farm can be built. Such large areas of land are easily available in plains so there we can easily establish wind farms to harness maximum wind energy.

5. Question

Match the following:

Water borne diseases	Water related diseases	Water based diseases
Typhoid	dengue	scabies
Malaria	amoebiasis	cholera
filariasis	lice	trachoma

Answer

The above-stated diseases can be placed in the columns of respective types to which they belong:

Water borne diseases	Water-related diseases	Water-based diseases
Typhoid	dengue	scabies
amoebiasis	malaria	lice
cholera	filariasis	trachoma

● **Water-borne disease:** These are transmitted by drinking contaminated water.

● **Water-related disease:** Here water is not directly responsible but acts as a breeding ground for vectors which transmit disease-causing germs to us.

● **Water-based diseases:** These are worm infections caused due to poor personal hygiene which can be a result of lack of availability of water.

6. Question

Water contaminated by human beings, chemical or industrial wastes can cause a variety of communicable diseases through ingestion or physical contact.

i) Name any two diseases caused by polluted water.

ii) Why do we drink boiled water?

iii) How can you reuse waste water in your houses?

Answer

i) When water gets contaminated, it can spread various diseases through its ingestion or physical contact. This is because the disease-causing germs (pathogens) get a medium to spread themselves. Examples of two such diseases which are transmitted through water are:

1. Cholera

2. Typhoid

ii) The practice of boiling the water kills various pathogens (disease-causing germs) that might be present in the water. Heat destructs their cell components. Most of the bacteria are killed on boiling water and viruses become inactive. Thus we should drink boiled water to prevent ourselves from water-borne diseases.

iii) Waste water is the water which is released from our kitchens, bathrooms, and toilets. This water can be reused by us in following ways:

● We can build channels so that water from our kitchens and bathrooms can flow to our gardens.

● Water used for washing clothes can later be reused to wash cars.

● Water used to wash pulses and rice in our kitchens can be collected to feed cattle.

7. Question

Water, a precious physical substance, is essential to all living organisms.

i) Which is the largest water resource?

ii) What are the various sources of water?

iii) Which is the primary source of water?

iv) What are the ways by which you can raise the ground water level in your house?

Answer

i) Oceans are the largest resource of water on earth. They contain almost 97% of the total water present on earth. The water from oceans is unfit for drinking.

ii) The various sources of water are as follow:

● Oceans (unfit for drinking and other uses)

● Glaciers and poles (fresh water is in ice form)

● Ponds

● Rivers

● Lakes

● Groundwater

iii) Rainfall is the primary source of water on earth. Groundwater, ponds, rivers, lakes all get filled with rain water. Thus we can say that rainfall is the primary source of water on earth.

iv) Ground water is the water that is available beneath the land surface in aquifers. Aquifers are the rocks that store ground water. Water sips through the soil and gets stored beneath the land surface. In this way,

ground water level rises.

We can raise the groundwater level in our houses by following ways:

● By rain water harvesting:

We should not let the rain water to waste. Instead, we can collect the rain water from our roofs using pipes into underground tanks:

● By using kitchen water for gardening

● By reusing waste water

8. Question

An energy audit is an inspection, survey, and analysis of energy flow to ensure energy conservation in a building, process or system.

i) How will you measure consumption of electrical energy at home?

ii) What are the benefits of implementing this method in your school?

Answer

i) Consumption of electrical energy can be measured by analyzing the electric consumption of various appliances individually such as AC, refrigerator, TV etc. We can also measure our daily electrical consumption by analyzing the monthly electricity bills. These bills mention our monthly consumption of energy which can be divided by 30 to get our daily electricity consumption.

ii) By analyzing electricity consumption and then ensuring energy conservation benefits school by saving money on electricity bills which then can be used for other school funds. Thus this method must be followed in our schools so that school funds can be used to increase the excellency of the school rather than spending on electricity/ fuel bills.

9. Question

We should manage the waste water in order to prevent water pollution and its harmful effects.

i) What are the ways by which water gets contaminated?

ii) How will you control water contamination in your house?

Answer

i) Water gets polluted/ contaminated in following ways:

● By discharges from industries, households etc.

● By movement of rain water over land which picks up fertilizers, insecticides and carries them into the river, lakes etc.

● People wash their clothes on the bank of rivers which pollutes them.

● By dumping garbage into rivers

● By dumping statues of deities in water bodies.

ii) Water contamination in our houses can be controlled in following ways:

● By using toilets which are connected to septic tanks. Septic tanks are underground tanks where sewage is collected and then drained later on.

● By preventing the stagnation of water around our houses.

● By not using herbicides, insecticides in our gardens.

● By using biodegradable detergents instead of synthetic ones.

● By not disposing the waste material from our houses to nearby water bodies.