

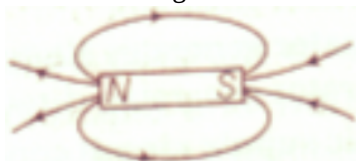
## Solution

### Class 10 - Science

#### 2020-21 paper 4

#### Section A

1. The poles of a magnet are marked in the figure as we know that out side magnet field lines moves  $N \rightarrow S$  and inside the Magnet field lines moves  $S \rightarrow N$ .



2. Man does not prepare its own food. It eats food prepared by plants and animals and therefore, only a consumer.
3. The strength of the magnetic field is directly proportional to the relative closeness of field lines, therefore, region A has a stronger magnetic field.
4. Organisms that depend on the producers either directly or indirectly for food - **Consumers/heterotrophs.**

OR

The degree of closeness of magnetic field lines near the poles represents that the magnetic field is stronger near the poles.

5. Direct current always flows in one direction but the alternating current reverses its direction periodically. The frequency of AC in India is 50 Hz and in each cycle, it alters direction twice. Therefore AC changes direction 250=100 times in one second.
6. In terrestrial ecosystem green plants capture about 1% of the energy of sunlight falling on earth into food by photosynthesis. On an average 10% energy is transferred from one trophic level to next higher one.

OR

Aerosols, CFCs (chloro fluoro carbons).

7. Place a compass near the wire, if the needle gets deflected then it indicates the presence of the magnetic field around the wire.
8. Solar energy, wind power, tidal power, rainfall and even atomic energy are some examples of inexhaustible resources at global level.

OR

The magnetic field lines are closed curves because magnetic field lines originate from the north pole of a magnet and end at its south pole and inside the magnet, it is directed from south pole to north pole.

9. A piece of magnetic material can be magnetized by rubbing the north pole of a magnet on the magnetic material.
10. Peacock will have maximum concentration of this chemical in its body because it lies at the top most level in the given food chain and due to biomagnification of chemicals at each increasing trophic level.
11. **(a)** Both A and R are true and R is correct explanation of the assertion.  
**Explanation:** Both A and R are true and R is correct explanation of the assertion.
12. **(a)** A is true but R is false.  
**Explanation:** A is true but R is false.
13. i. (b) large carnivore  
ii. (a) unidirectional  
iii. (a) photosynthetic  
iv. (c) frog  
v. (d) The population of tigers decrease and the population of grass increase
14. i. (a) UV rays  
ii. (c) Increase skin cancer  
iii. (d) All of these  
iv. (b) UV radiation  
v. (b) CFC
15. i. (c) biomagnification

- ii. (b) convert organic material to inorganic forms
- iii. (c) birds
- iv. (b) producer
- v. (a) goat

OR

- i. Pine wood for matchbox industry.
  - ii. Bamboo for paper industry.
16. i. (a) 1%
- ii. (c) primary consumer to secondary consumer
  - iii. (b) zooplankton
  - iv. (d) 5000 J
  - v. (c) transfer of chemical energy from one organism to another
17. When the direction of motion of the conductor is at a right angle to the magnetic field, the induced current is maximum.
18. The shape of magnetic field lines around the straight current carrying conductor is in the form of concentric circles.

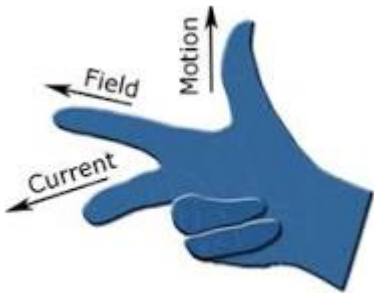
OR

Reduce, Recycle and Reuse.

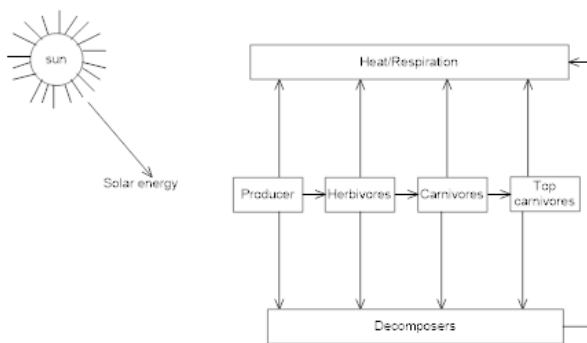
19. Phytoplanktons will have minimum concentration of harmful chemical because it lies at the first trophic level and as we move above in the food chain the concentration increases with each trophic level.
20. Natural resources can be broadly categorized into two types, viz. exhaustible and non-exhaustible.

### Section B

21. a. If the current in the coil X is changed then some current will definitely be induced in the coil Y. When the current in coil X is changed, the magnetic field associated with it also changes. As a result, the magnetic field around coil Y also changes. This change in magnetic field lines around coil Y induces an electric current in it. This process is known as electromagnetic induction.
- b. **Fleming's Right-hand Rule:** According to Fleming's right-hand rule, Adjust your right-hand thumb, forefinger and middle finger in such a way that all are perpendicular to one another. If forefinger shows the direction of magnetic field and Thumb shows the direction of motion of the conductor then middle finger gives the direction of current.



22.



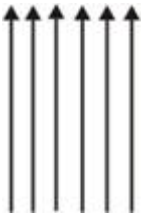
Transfer of energy in a food chain

23. There are many things which increase pressure on our natural resources. But some of them are very important.
- 1. Increase in population and their demand.

2. Increase in heavy duty super vehicles(less fuel efficient) which runs over fossil fuels.
  3. Increase in food demand.
  4. Rise in temperature, increasing load on electricity.
24. A current carrying coil contains charged particles which experiences a force ( $F=Bqv$ ). The total force experienced by the charged particle is equal to the force experienced by the conductor which is perpendicular to both the magnetic field and the direction of current in the conductor.
25. Biodiversity means the number and variety of species of organisms found in a specific area. The range of different life forms like bacteria, fungi, ferns, flowering plants, birds, reptiles, amphibians etc, living in a particular area make up the biodiversity of that area.  
It is important to conserve biodiversity as its loss would lead to ecological imbalance by disturbing the whole food chain and which might lead to extinction of particular species from the area in the future.
26. A solar cell is a device which converts solar energy directly into electricity. A group of solar cells is called a solar cell panel. It consists of a large number of solar cells joined together in a definite pattern. It provides a lot of electric energy required by artificial satellites, water pumps, street lighting, etc. For joining the various solar cells in a solar panel, silver wires are used because silver metal is the best conductor of electricity having a very low resistance and which also increases efficiency.

OR

Uniform magnetic field is shown by equidistant and parallel lines as shown. The parallel lines are close to each other, if the field is strong. Stronger the field, closer are the lines.



### Section C

27. In case of movement of a charged particle, the magnetic field is created around the path on which the charged particle moves
- i. Yes, because  $\alpha$ -particles are charged particles so when they move they create a magnetic field around it.
  - ii. No, as neutrons carry zero charges, so no magnetic field would be produced around its path.
28. An aquarium is an artificial and incomplete ecosystem in contrast to a pond/lake which are natural, self-sustaining and complete ecosystems. Ponds and lakes have their own cleaning mechanisms because of presence of various microorganisms but Aquarium lacks decomposer microbes which convert the complex organic compounds of dead organisms into simple substances that can be reused by plants. Hence the dead fishes of the aquarium are not decomposed. so it needs regular cleaning.
29. i. Decomposers are essential in a biosphere as they return nutrients back to the environment by breaking down dead complex organic matter into recyclable simpler compounds.  
ii. The flow of energy through different steps in the food chain is unidirectional as the food chain progress the energy passes from lower trophic level to upper but never vice versa.
30. 1. The government issued a ban on felling trees in himalaya regions, until the green cover was fully restored.  
2. It become a symbol of many popular movements that emerged in different parts of the country during the 1970s and later.  
3. It stimulated an all around debate on the problems of economic and social development. Mr. Bhahuguna presented the plan of conservation of soil and water through ban on felling trees, at UNEP meeting held in London 1982.
31. Fleming's left hand rule states that stretch the forefinger, the central finger and the thumb of your left hand mutually perpendicular to each other. If the forefinger shows the direction of the magnetic field and central finger that of the current, then the thumb will point towards the direction of motion of the conductor.
32. Use of fertilisers adds nutrients to the waterbody leading to eutrophication and thus, results in loss of fishes in lake. Since people used excessive fertilisers in the fields, these added fertilisers flow away with rain into the waterbody.  
As many fertilisers contain phosphates and nitrates, the waterbody become enriched with these chemicals. This enriches the nutrients in water leading to excessive growth of small, green, aquatic plants and the surface of water was completely covered with plants (eutrophication).

These small plants consume most of the dissolved oxygen of the water leading to its deficiency. Due to this, the fishes and the other aquatic life in the lake die because of oxygen starvation and depletion of light.

OR

The household waste produced from various activities is called garbage and its proper disposal is done in such a way that it does not cause environmental pollution.

Methods of waste disposal include:

- i. Recycling : The processing of certain wastes to form new products is called recycling, e.g. paper, glass etc., are recyclable.
  - ii. Composting : It is the process of collecting biodegradable wastes like leftovers of food items, peels, etc. and burying them in a pit and using it as manure.
  - iii. Incineration : It is burning of a substance at high temperature to reduce it to ashes.
  - iv. Landfills : Dumping of non-biodegradable waste in low-lying areas is called landfill.
  - v. Sewage treatment : In sewage treatment plants, the sewage is processed and decomposed into simpler inorganic chemicals.
33. The S.I unit of magnetic field is Tesla (T). The magnetic field strength is said to be one Tesla if one meter long conductor placed perpendicular to the direction of magnetic field ,carrying one ampere current experiences one newton of force.

#### Section D

34. The word "electromagnetic" is related to the interrelation between electric current I and magnetic field B. While "Induction" is the process of giving rise to something. So the process of generation of an electric current I from magnetic effects B is called electro -magnetic induction.

Three factors which affects the electro-magnetic induction are:

- i. The number of turns in a coil
- ii. The strength of magnet used and
- iii. The speed by which magnet is pushed into the coil.

Fleming's right-hand rule used to determine the direction of induced current.

Electric generator is based on the principle of electromagnetic induction.

OR

#### Conserve our natural resources :

- i. Saved electricity by switching off electricity of unnecessary light and fans.
- ii. Used disposable paper cups and plates during my journey in the train.
- iii. Reused the envelopes by turning inside out.
- iv. Planted five plants in my school.
- v. Educated the people in my locality regarding conservation of natural resources for sustainable development.

#### Pressure on natural resources :

- i. Wasted food.
  - ii. Used scooter to consume petrol.
  - iii. Added to air pollution and sound pollution.
  - iv. Used plastic bags.
  - v. Used DDT at my home.
35. i. The producers convert solar energy into chemical energy in the form of organic compounds. The primary consumers (herbivores) derive their nutrition from the producers. According to the energy transfer law, only 10% of energy is transferred from one trophic level to the other. So the energy that is captured by the producers does not revert to the Sun and subsequently the energy transferred to the herbivores does not come back to the producers. It just keeps on moving to the next trophic level in one direction. That is why the flow of energy in the food chain is always unidirectional.
- ii. A large number of pesticides and chemicals are used to protect our crops from pests and diseases. Some of these chemicals are washed down from the soil, while some enter the water bodies. From the soil, they are absorbed by plants along with water and minerals, and from the water bodies, they are taken up by aquatic plants and animals. This is how these chemicals enter the food chain. As these chemicals cannot decompose, they accumulate progressively at each trophic level with increased

concentration at each tropic level, by process well-known as bio magnification. We human beings occupy the top most level in any food chain, these chemicals get accumulated in our bodies in maximum amount.

36. **Biodiversity:** (Gk-bios = life; diversity = form). It is occurrence of different kinds of organisms and the complete range of varieties adapted to different climates, environments and areas being constituents of food chains and food web of biotic interrelationship. Biodiversity refers to totality of genes, species and ecosystems of a region. Biodiversity differs from place to place.

As there is continuous loss of biodiversity due to increasing population, resources consumption, urbanization and pollution, it is important to conserve it. The basic reason for concern is that biodiversity is being lost even before it attains its size. Loss of biodiversity would check evolutionary capability of biota to cope up with environmental loss.

OR

Take a straight conducting wire AB which passes through a horizontal cardboard. The ends of the wire are connected to a battery as shown in fig. When the key is closed, the current flows through the wire from B to A as shown in fig. (a), it produces magnetic field around it

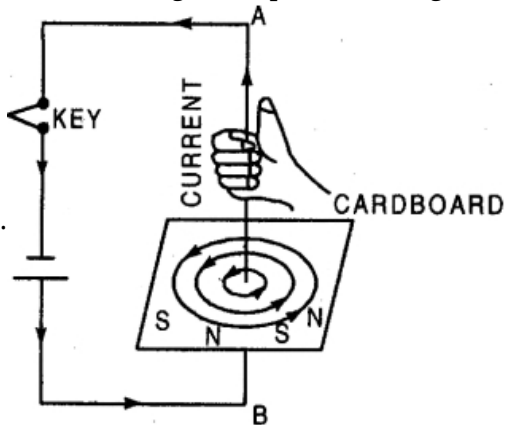
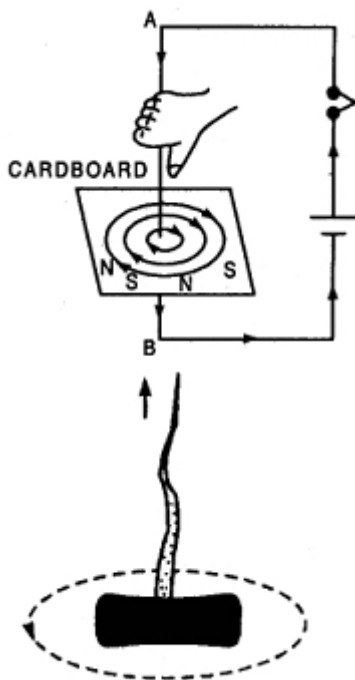


fig. (a)

The magnetic lines of force can be drawn with the help of a compass needle. The magnetic lines of force can also be visualized by sprinkling iron filings on the cardboard. On tapping the cardboard sheet, the iron filings arrange themselves in circles around the wire. The direction of the field is indicated by compass needle (a) The direction of magnetic field is given by right hand grip rule and by right hand cork screw rule.

Right hand grip rule is stated below : Grasp the wire in the right hand so that the thumb points along the wire in the direction of current, the fingers will then point in the direction of magnetic field.



Right hand cork-screw rule : Imagine a right handed cork-screw to be lying with its direction coinciding with

the conductor carrying current and to be revolved so that it travels in the direction in which thumb rotates gives the direction of lines of force.