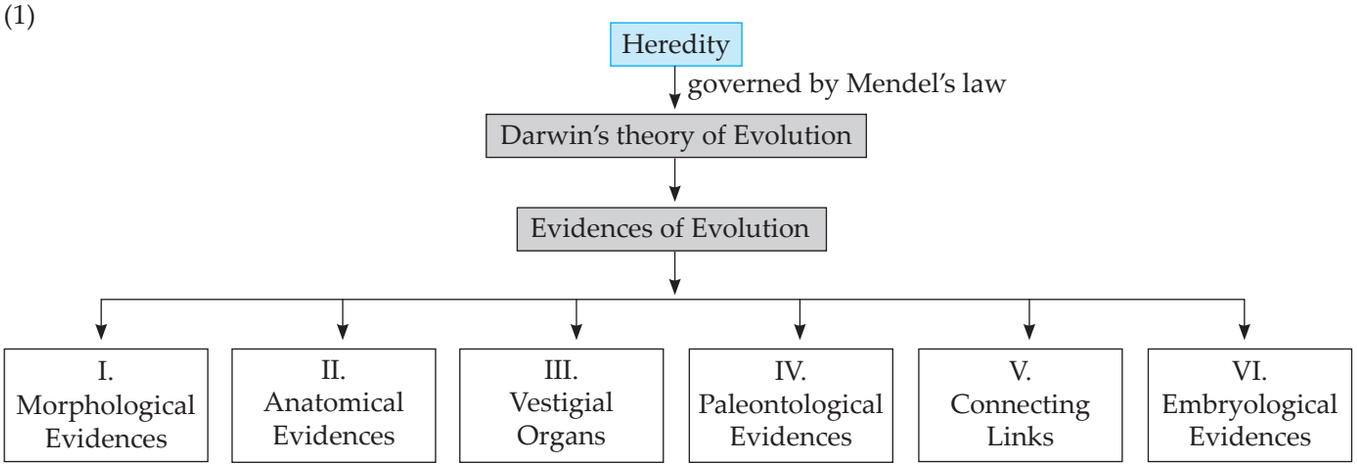
1 Heredity and Evolution

CONCEPT MAP

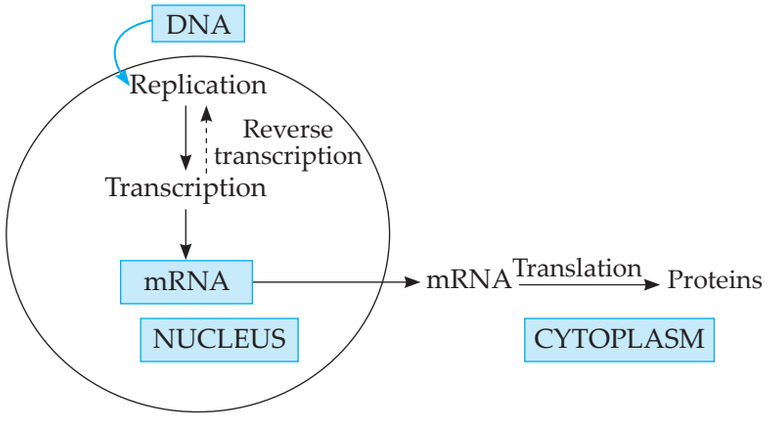
(1)



(2)

	Scientist and Year	Discovery / Contribution
1	Gregor Johann Mendel, 1886	Series of experiments on pea plant to explain inheritance of characters.
2	Hugo de Vries, 1901	Reasons behind sudden changes.
3	Walter and Sutton, 1902	Paired chromosomes in grasshopper cells.
4	Ostwald Avery, Maclyn, McCarthy and Colin Macleod (1944)	All living organisms have genetic material in the form of DNA. (except viruses)
5	Francois Jacob and Jack Monad, 1961	A model process of protein synthesis with the help of DNA in bacterial cells.
6	Dr. Har Govind Khorana, 1968	Discovering of triplet codons.
7	Willard Libby, 1960	Developed carbon dating method.
8	Charles Robert Darwin, (1809 - 1882)	Proposed the theory of evolution.
9	Jean - Baptiste Lamarck, (1744 - 1829)	Activities of the organisms are responsible for their evolution.

(3) Central Dogma of life



Points to Remember:

- **Heredity and hereditary changes**
  - Heredity is the transfer of **biological characters** from one generation to another with the help of **genes**.
  - **Johann Gregor Mendel** is pioneer of modern genetics.
  - In **1901**, mutational theory was given by **Hugo de Vries**.
  - In **1902**, paired chromosomes in the cells of grasshopper were observed by **Walter Sutton.'**
  - In **1944**, all living organisms **except viruses** have **DNA** as genetic material was proved by trio of scientists **Ostwald Avery, Maclyn McCarthy and Colin MacLeod.**
  - In **1961**, a model was proposed for process of **protein synthesis** with the help of **DNA** by **Francois Jacob and Jack Monad.**
  - Science of heredity is useful for **diagnosis**, **treatment** and **prevention** of heredity disorders, production of hybrid varieties of animals and plants and in industrial processes in which microbes are used.
- **Transcription, Translation and Translocation**
  - Information about protein synthesis is stored in the DNA and synthesis of appropriate proteins as per requirement is necessary for body. These proteins are synthesized by DNA through RNA. This is called as **'Central Dogma'.**
  - Process of **RNA synthesis** is called as **'Transcription'.**
  - The code for each amino acid consists of three nucleotides. It is called as **'Triplet codon'.**
  - **Dr. Har Govind Khorana,** made an important contribution in discovery of triplet codons for 20 amino acids.
  - As per the message on mRNA, amino acids are supplied by the **tRNA**. For this purpose, tRNA has '**anticodon**' having complementary sequence to the **codon on mRNA**. This is called '**Translation**.'
  - The ribosome keeps on moving from one end of mRNA to other end by the distance of one tripletcodon. This is called '**Translocation**' such many chains come together to form complex proteins.
  - These proteins control various **functions** in the body of living organisms and their **appearance** too.
  - Sometimes any nucleotide of the **gene changes its position,** that causes a minor change which is nothing but the **mutation**.
- **Evolution**
  - Formation of new species due to **changes in specific characters** of several generations of living organ isms as a response to **natural selection** is called as **evolution**.
  - **3.5 billion** years ago, life had been non-existent on the earth. First primitive type of cells may have been formed from the mixture of different types of organic and inorganic compounds.
  - There may have been some **differences** among those cells and according to the principle of natural selection, some may have shown good growth and some may have perished which could not adjust with the surrounding.
- **Evidences of evolution** :
  - **Morphological evidences :** Various similarities like structure of mouth in animals and leaf

shape in plants indicate that there are some similarities in those groups and hence, it proves that their origin must be same and must have common ancestors.

- **Anatomical evidences :** There is similarity in structure of bones and bony joints in organs of each of human, cat, bat and whale. This similarity indicates that those animals may have common ancestors.
- **Vestigial organs:** Degenerated or underdeveloped useless organs of organisms are called as vestigial organs. Various vestigial organs like tail bone (coccyx), wisdom teeth and body hair are present in human beings.
- **Paleontological evidences:** Remnants and impressions of organisms remain preserved underground. These are called as fossils.The time passed since the death of a plant or animal can be calculated by measuring the **radioactivity of C-14** and **ratio of C-14 to C-12** present in their body. This is called ' **carbondating**'. It is used in **paleontology** and **anthropology** for determining the age of human fossils and **manuscripts**.
- **Embryological evidences:** Comparative study of embryonic developmental stages of various vertebrates shows that all embryos show similarity during initial stages and those similarities decrease gradually.

- **Darwin's theory of natural selection**.
  - **Charles Darwin** published the theory of natural selection which preaches the **survival of the fittest.**
  - Darwin had published a book titled '**Origin of Species'.**
- **Lamarckism**
  - **Jean-Baptiste Lamarck** proposed that morphological changes occurring in living organisms are responsible for evolution and the reason behind those morphological changes is activities or laziness of that organism.
  - Development of organs due to specific activities or their degeneration due to no use at all was widely accepted but transfer of those characters from generation to generation was rejected. Because it had been verified many times that modifications brought in us are not transferred to next generation and thereby, Lamarck's theory was disproved.
- **Speciation**
  - Formation of new species of plants and animals is the effect of evolution.
  - Geographical or reproductive isolation also leads to speciation.
- **Human evolution**
  - Humans are said to have evolved from ancient animals like lemur approximately 7 crore years ago.
  - There has been consistent evolution in man since then.
  - Apes which started to live on land as forest declined showed gradual developement.
  - Their lumbar bones developed, their posture changed and they started using hands.
  - These apes then grew up in size and became more intelligent.
  - The first human like animal recorded was *"Ramapithecus"*ape from East Africa.
  - Development of apes continued with development of their brains and discovery of fire.
  - These developed apes were called as *Homo sapiens.*
  - Neanderthal man was the first *Homo sapiens.*
  - Since then the evolution has been faster.

MASTER KEY QUESTION SET - 1

Q.1. (A) 1. Fill in the blanks and rewrite the statements:

(1) ..... is pioneer of the modern genetics.

(2) ..... is the transfer of biological characters from one generation to another via genes.

(3) Each mRNA is made up of thousands of.....

(4) Vertebrates have slowly originated from .....

(5) ..... is the connecting link between annelida and arthopoda.

(6) Darwin had published a book titled.....

(7) ..... man can be considered as the first example of wise man.

(8) ..... is produced as per the sequence of nucleotides on DNA.

(9) There is..... in RNA instead of thymine of DNA.

(10) The code for each amino acid consists of three nucleotides, called as .....

(11) ....., a scientist of Indian origin discovered triplet codons for 20 amino acids.

(12) Ribosome keeps moving from one end of mRNA to other end by the distance of one triplet codon. This is called as.....

(13) Sometimes, any nucleotide of the gene changes its position which cause a minor change which is called.....

(14) Carbon dating method is developed by .....

(15) Ape-like animals reached the South and North-East Asia and finally evolved into .....

(16) The first human-like animals with erect posture evolved about ..... years ago.

(17) First record of human-like animal is in the form of ..... ape from East Africa.

(18) Human walking with erect posture was evolved about ..... years ago.

(19) The ..... evolved about 50 thousand years ago.

(20) About ..... years ago, wise-man started to practice agriculture.

Ans. *(1) Johann Gregor Mendel (2) Heredity (3) triplet codons (4) invertebrates (5) Peripatus (6) Origin of Species (7) Neanderthal (8) mRNA (9) Uracil (10) triplet codon (11) Dr. Har Govind Khorana (12) translocation (13) mutation (14) Willard Libby (15) gibbon and orangutan (16) 2 crore (17) Ramapithecus (18) 15 lakh (19) Cro-Magnon man (20) 10 thousand*

***Q.1. (A) 2. Complete the statements by choosing correct options from bracket.**

(Gene, Mutation, Translocation, Transcription, Gradual development, Appendix)

(1) The causality behind the sudden changes was understood due to ..... principle of Hugo de Vries.

(2) The proof for the fact that protein synthesis occurs through .....was given by George Beadle and Edward Tatum.

(3) Transfer of information from molecule of DNA to mRNA is called as ..... process.

(4) Evolution means .....

(5) Vestigial organ ..... present in human body is the proof of evolution.

Ans. *(1) Mutation (2) Gene (3) Transcription (4) Gradual development (5) Appendix*

Q.1. (A) 3. Find the odd one out:

(1) Transcription, translation, translocation, transpiration.

Ans. Transpiration - Others are processes of complex protein synthesis.

(2) Appendix, muscles of ear pinna, wisdom teeth, long neck of giraffe.

Ans. Long neck of Giraffe - Others are vestigial organs

(3) Cocyx, intestine, wisdom teeth, appendix.

Ans. Intestine - It is a fully functional organ in humans, while others are vestigial organs.

Q.1. (A) 4. Match the columns:

(1)

Column 'A'		Column 'B'	
(1)	Walter Sutton	(a)	All living organisms have DNA (1944)
(2)	Ostwald Avery, Mclyn Mccarthy and Colin MacLeod	(b)	Process of protein synthesis (1961)
(3)	Francois Jacob and Jack Monad	(c)	Triplet codons for 20 amino acids
(4)	Dr. Har Govind Khorana	(d)	Carbon dating
(5)	Willard Libby	(e)	Paired chromosomes in the cells (1902)
		(f)	Mutation

Ans. *(1 – e); (2 – a); (3 – b); (4 – c); (5 – d)*

(2)

Column 'A'		Column 'B'	
(1)	Aves and Mammals	(a)	Mesozoic era
(2)	Reptiles	(b)	Cenozoic era
(3)	Reptiles, amphibia, pisces	(c)	Paleozoic era

Ans. *(1 – b); (2 – a); (3 – c)*

Q.1. (A) 5. State whether the following statements True or False. Correct the false statements.

(1) Complex proteins control various functions in the body of living organisms and their appearance too.

(2) Mutation may cause the genetic disorders like sickle cell anemia.

(3) Muscles of ear pinna, which are useful to human, are useless in monkeys for movement of ear pinna.

(4) Evolution is a gradual change occurring in living organisms over a long duration.

(5) Waltor Sutton is the pioneer of modern genetics.

(6) Ostwald Avery, Mclyn McCarthy and Colin Macleod proposed a model for process of protein synthesis with the help of DNA in bacterial cells

(7) Information about protein synthesis is stored in the RNA.

(8) Both the strands of DNA are used in the process of protein synthesis.

(9) The process of RNA synthesis is called translation.

(10) Amino acids are supplied by tRNA .

(11) First living material has been formed in the ocean.

(12) Appendix is useless to humans.

(13) Duckbill *platypus* is a connecting link between annelida and arthropoda.

(14) Geographical or reproductive isolation leads to speciation.

(15) About 10 thousand years ago, wise man started to practice agriculture.

Ans. *(1) True (2) True (3) False. Muscles of ear pinna, which are useless to human are useful in monkeys for movement of ear pinna. (4) True (5) False. Johann Gregor Mendel is the pioneer of modern genetics. (6) False. French geneticists Francois Jacob and Jack Monad proposed a model for process of protein synthesis with the help of DNA in bacterial cells. (7) False. Information about protein synthesis is stored in the DNA. (8) False. Only one of the two strands of DNA are used in the process of protein synthesis. (9) False. The process of RNA synthesis is called as transcription. (10) True (11) True (12) True (13) False. Peripatus is a connecting link between annelida and arthropoda. (14) True (15) True*

Q.1. (A) 6. Name the following

(1) First record of human like animal in the form of ape from East Africa.

Ans. *Ramapithecus*

(2) He called his concept as principle of 'use or disuse of organs'.

Ans. Jean-Baptiste Lamarck

(3) Example indicating that mammals are evolved from reptiles and amphibians from fishes.

Ans. Duck billed platypus, Lungfish

Q.1. (A) 7. Complete the analogy:

(1) Similarities in characters: Morphological evidence :: Similarities in structure of bones and joints : ..... .

Ans. Anatomical Evidences - Similarities in characters and similarities is structure of bones and joints indicates similar origin with common ancestors.

(2) Similarities in initial stages : .... :: Organisms remain preserved underground : Paleontological evidences.

Ans. Embryological evidence - In Embryological evidences similarities in initial stages indicate common origin of animals whereas, Paleotological evidences have organisms remained preserved underground.

(3) .... : 1,50,000 years ago :: Cro-Magnon man : 50,000 years ago.

Ans. Neanderthal man - Cro-magnon man evolved about 50,000 years ago whereas Neanderthal man evolved about 15,00,000 years ago.

(4) 1,00,00,000 years ago : .... :: 40,000 years ago : Australopithecus.

Ans. *Ramapithecus* - In the journey of human, *Ramapithecus* was evolved 1,00,00000 years ago while *Australopithecus* was evolved 40,00,000 years ago.

Q.1. (B) Choose and write the correct option:

(1) ..... proved that except viruses, all living organisms have DNA as their genetic material.

(a) Ostwald Avery (b) Mclyn McCarthy

(c) Colin MacLeod (d) All of these

(2) ..... proposed a model for protein synthesis with the help of DNA in bacterial cells.
(a) Johann Gregor Mendel
(b) Walter and Sutton
(c) Francois Jacob and Jack Monad
(d) Hugo de Vries

(3) Information about protein synthesis is stored in the .....
(a) mitochondria (b) DNA
(c) RNA (d) ribosomes

(4) ..... brings in the coded message from the DNA.
(a) mRNA (b) tRNA (c) rRNA (d) Ribosomes

(5) As per the message on mRNA, amino acids are supplied by tRNA. This is called as .....
(a) Transcription (b) Translation
(c) Translocation (d) Transportation

(6) ..... is a gradual change occurring in living organisms over a long duration.
(a) Evolution (b) Mutation
(c) Variation (d) Heredity

(7) The theory of natural selection was proposed by .....
(a) Mendel (b) Lamarck
(c) Charles Darwin (d) Hugo de Vries

(8) Carbon dating method measures the radioactivity of C-14 and the ratio of ..... present in the organism's body.
(a) C-12 to C-14 (b) C-6 to C-7
(c) C-14 to C-12 (d) C-14 to O-16

(9) Mammals have evolved from .....
(a) aves (b) reptiles
(c) amphibians (d) fishes

(10) ..... is not a vestigial organ in man.
(a) Appendix (b) Wisdom tooth
(c) Body hair (d) Duodenum

Ans. *(1) (d) All of these (2) (c) Francois Jacob and Jack Monad (3) (b) DNA (4) (a) m RNA (5) (b) Translation (6) (a) Evolution (7) (c) Charles Darwin (8) (c) C-14 to C-12 (9) (b) reptiles (10) (d) Duodenum*

Q.2.1. Define the following:

(1) Heredity

Ans. Heredity is the transfer of biological characters from one generation to another via genes.

(2) Evolution

Ans. Formation of new species due to changes in specific characters of several generations of living organisms as a response to natural selection is called as evolution.

(3) Vestigial organs

Ans. Degenerated or underdeveloped useless organs of organisms are called as vestigial organs.

(4) Carbon dating method

Ans. The time passed since the death of a plant or animal can be calculated by measuring the radioactivity of C-14 and ratio of C-14 to C-12 present in their body. This is carbon dating method.

(5) Ancestry of acquired characters

Ans. The living organism can transfer the characters which it has acquired, to the next generation. This is called Ancestry of acquired characters.

(6) Central Dogma

Ans. Information about protein synthesis is stored in the DNA and synthesis of appropriate proteins as per requirement is necessary for body. These proteins are synthesized by DNA through RNA. This is called Central Dogma.

(7) Transcription

Ans. The process of RNA synthesis is called as Transcription.

(8) Triplet codon

Ans. The code for each amino acid consists of three nucleotides. It is called as Triplet codon.

(9) Translation

Ans. As per the message on mRNA, amino acids are supplied by the tRNA. For this purpose, tRNA has 'anticodon' having complementary sequence to the codon on mRNA. This is called Translation.

(10) Translocation

Ans. The ribosome keeps on moving from one end of mRNA to other end by the distance of one triplet codon. This is called Translocation.

(11) Mutation

Ans. Any sudden change that occurs in the nucleotide sequence of a gene, causing a minor or considerable change in the characters of an individual is called mutation.

(12) Fossils

Ans. Fossils are remnants and impressions of organisms that remain preserved underground.

(13) Speciation

Ans. The formation of new species of plants and animals as an effect of evolution is termed as speciation.

Q.2.2. Write short notes:

***(1) Connecting link**

Ans.

(i) Some plants and animals show some morphological characters by which they can be related to two different groups; hence, they are called connecting links.

(ii) E.g. In *Peripatus*, characters like segmented body, thin cuticle and parapodia are present like annelida and worms. Similarly, these animals show tracheal respiration and open circulatory system similar to arthropods. This indicates that *Peripatus* is the connecting link between annelida and arthropoda.

(iii) Similarly, Duck Billed Platypus lays eggs like reptiles but shows relationship with mammals too due to presence of mammary glands and hair.

(iv) Lung fish performs respiration with lungs irrespective of being a fish.

(v) These examples indicate that mammals have evolved from reptiles and amphibians from fishes.

***(2) Embryology**

Ans.

(i) Embryology is the science which deals with the study of development of an organism from an embryo.

(ii) Comparative study of embryonic developmental stages of various vertebrates shows that all embryos have extreme similarities during initial stages.

(iii) Those similarities decrease gradually.

(iv) Similarities in initial stages indicate the common origin for all these animals.

(3) Speciation

Ans.

(i) Formation of new species of plants and animals through the effect of evolution is called as speciation.

(ii) Species is the group of organisms that can produce fertile individuals through natural reproduction.

(iii) Each species grow in specific geographical conditions. Their food, habitat, reproductive ability and period is different.

(iv) Genetic variations are responsible for formation of new species from earlier one.

(v) Besides, geographical and reproductive changes are also responsible.

(vi) Similarly, geographical or reproductive isolation also leads to speciation.

***(4) Lamarckism**

Ans.

(i) Jean-Baptiste Lamarck proposed that morphological changes occurring in living organisms are responsible for evolution and the reason behind those morphological changes is activities or laziness of that organism.

(ii) The neck of giraffe has become too long due to browsing on leaves of tall plants by extending their neck for several generations.

(iii) Shoulders of ironsmith have become very strong due to frequent hammering movements.

(iv) Wings of birds like emu and ostrich have become weak due to no use.

(v) Legs of the birds like swan and duck have become useful for swimming due to living in water.

(vi) Snakes have lost their legs by modification in their body for burrowing habit.

(vii) All these examples are types of acquired characters and are transferred from one generation to another This is called as theory of inheritance of acquired characters or Lamarckism.

(viii) Development of organs due to specific activities or their degeneration due to no use at all was widely accepted but transfer of those characters from generation to generation was rejected.

(ix) Because it had been verified many times that modifications brought in us are not transferred to next generation and thereby Lamarck's theory was disproved.

***(5) Dawin's theory of natural selection**

Ans.

(i) Charles Darwin, an English biologist published the theory of natural selection, which preaches the survival of the fittest.

(ii) According to him, all organisms reproduce prolifically.

(iii) These organisms compete with each other and only those organisms who show modification, sustain long.

(iv) Natural selection also plays important role because nature selects only those organisms which are fit to live and the rest perish.

(v) These sustained and selected organisms reproduce and give rise to new species with own specific characteristics.

(vi) This theory was widely accepted for long duration, however it had some objections to it.

(vii) Irrespective of all these objections, Darwin's work on evolution has been a milestone.

***(6) Evolution**

Ans.

(i) Evolution is a gradual change occurring in living organisms over a long duration.

(ii) This is a very slow-going process through which development of organisms is achieved.

(iii) All the stages in changes occurred in various components ranging from stars and planets in space to the biosphere present on the earth should be included in the study of evolution.

(iv) Formation of new species due to changes in specific characters of several generations of living organisms as a response to natural selection is called as evolution.

(v) Different theories about origin and evolution of life have been proposed till today of which theory of gradual development of living organisms is accepted.

(vi) According to this theory, first living material (Protoplasm) has been formed in the ocean. In due course of time, unicellular organism was formed.

(vii) Gradual changes took place in unicellular organisms from which larger and more complex organisms were formed. Duration of all these changes is about 300 crore years.

(viii) Changes and development in living organisms has been all round and multi-dimensional and this led to evolution of different types of organisms.

Hence, this overall process is called as evolution which is organizational.

(ix) Progressive development of plants and animals from the ancestors having different structural and functional organization is called evolution.

Q.2.3. Answer in short:

***(1) Which component of the cellular nucleus of living organisms carries hereditary characters?** *(Can you recall; Textbook Page No. 1.)*

Ans. Cellular nucleus of living organisms contains the genetic material like DNA, which carries hereditary characters.

***(2) What do we call to the process of transfer of physical and mental characters from parents to the progeny?** *(Can you recall; Textbook Page No. 1.)*

Ans. The process of transfer of physical and mental characters from parents to the progeny is called heredity.

***(3) Which are the components of DNA molecule?** *(Can you recall; Textbook Page No. 1)*

Ans. DNA has three types of chemical components: (1) phosphate (2) a sugar called deoxyribose (3) four nitrogenous bases-adenine, guanine, cytosine and thymine.

***(4) What is the function of the appendix of our digestive system?** *(Can you recall; Textbook Page No. 3)*

Ans.

(i) The appendix is a vestigial organ that was once used by our herbivorous ancestors.

(ii) It was found that in herbivorous vertebrates the appendix is comparatively larger and it helped in the digestion of tough herbivorus food such as the bark of a tree.

(iii) It is also supposed to be a store house of good bacteria.

***(5) Are our wisdom teeth really useful for chewing the food?** *(Can you recall; Textbook Page No. 3)*

Ans. No, people do not need wisdom teeth now for chewing the food but earlier they were used for chewing tough plants which were important part of the human diet.

***(6) Why did the huge animals like dinosaur become extinct?** *(Can you recall; Textbook Page No. 3)*

Ans. Inspite of the fact that the cause for dinosaur extinction is still a mystery, following events could have played a role.

(i) Gas seeping and ash evolving from volcanoes suffocated most of the dinosaurs.

(ii) The entire population of dinosaur may have been wiped out due to diseases.

(iii) The dinosaurs could not survive after a big meteorite crashed into earth, drastically changing the climatic conditions.

(iv) Imbalances in food chain leads to starvation of the dinosaurs.

***(7) Why are many species of animals and birds getting extinct?** *(Can you recall; Textbook Page No. 3)*

Ans.

(i) Animals and birds extinction may be caused by natural occurrences such as climatic heating or cooling or changes in sea levels.

(ii) Habitat destruction as farming land expands and forests are cut-down. This is the main cause along with pollution and over fishing or hunting.

(8) What objections were raised against Darwin's theory of natural selection?

Ans. Following are some of the main objections raised against Darwin's theory of natural selection:

(i) Natural selection is not the only factor responsible for evolution.

(ii) Darwin did not mention any explanation about useful and useless modifications.

(iii) There is no explanation about slow changes and abrupt changes.

***(9) Explain the meaning of genetic disorders and give names of some disorders.** *(Can you recall; Textbook Page No. 1)*

Ans.

(i) Genetic disorders is a problem caused genetically due to mutations in the gene. It is present from birth. Types are rare and affect one in million.

(ii) Diabetes, obesity, infertility, cleft palate, heart disease, hemophilia , sickle cell anaemia are some of the genetic disorders.

***(10) Which are the different organs in body of organisms?** *(Can you recall; Textbook Page No. 4.)*

Ans.

(i) In digestive system - (Mouth, Stomach, Liver, Pancreas, intestines, etc.)

(ii) Skeletal system - (Bones)

(iii) Circulatory system - (Heart, Arteries, Veins, etc.)

(iv) Respiratory system - (Diaphragm, Lungs, Larynx, etc) are some of the organs in an organism.

***(11) Is each of the organs useful to organism?** *(Can you recall; Textbook Page No. 4.)*

Ans.

(i) Most of the organs are useful to organisms. At the same time few organs may be present now but they have lost their function in the process of evolution.

(ii) In human beings, appendix, tail-bone (coccyx), wisdom teeth and body hair are not useful now.

***(12) Observe the following images and note the similarities between given animal images and plant images.** *(Try this; Textbook page 4)*

Ans. **Animal Images:** We see similarities in the structure of mouth, position of eyes, ear pinnae, distribution of hair on their bodies, etc.

Fig. 1.1: Morphological evidences

Plant Images : We see similarities in the shape of leaves, its venation, petiole, colour of their leaves, position and the manner in which the fruits hang from the branches, etc.

Q.3.1. Read the following statements and justify the same in your own words with the help of suitable examples.

***(1) Human evolution began approximately 7 crore years ago.**

Ans.

(i) Last dinosaurs disappeared approximately seven crore years ago.

(ii) At that time, monkey like animals were said to be evolved from some ancestors who were more or less similar to the modern lemurs.

(iii) Thus, human evolution began approximately seven crore years ago.

***(2) Geographical and reproductive isolation leads to speciation.**

Ans.

(i) Species is the group of organisms that can produce fertile individuals through natural reproduction.

(ii) Each species grows in specific geographical condition. Their food, habitat, reproductive ability and period is different.

(iii) Along with genetic variation, geographical and reproductive changes are responsible for formation of new species.

(iv) Hence, geographical and reproductive isolation leads to speciation.

***(3) Study of fossils is an important aspect of study of evolution.**

Ans.

(i) Large number of organisms got buried due to disasters like flood, earthquake, volcano, etc.

(ii) Remnants and impressions of such organisms remain preserved underground. These are called as fossils.

(iii) With help of carbon-dating technique, it is easy to determine the age of fossils.

(iv) Once the age of fossil has been determined, it becomes easy to deduce information about other erstwhile organisms.

(v) Hence, study of fossils is an important aspect of study of evolution.

***(4) There is evidences of fatal science among chordates.**

Ans.

(i) It is believed that chordates have originated from invertebrates.

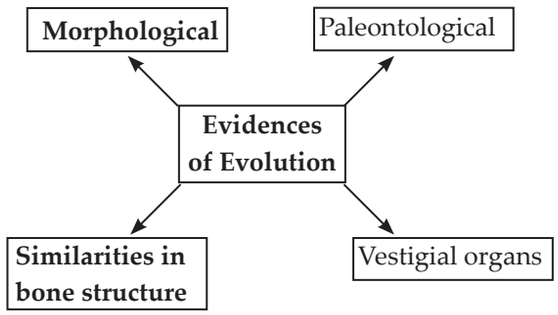
(ii) It is difficult to find out from which invertebrate group the chordates were developed.

(iii) Chordate ancestors were soft bodied animals, hence they were not preserved as fossils.

(iv) Thus, there is evidences of fatal science among chordates.

Q.3.2. Complete the following chart:

***(1)**



(2) Complete the flow chart by writing the answers for 'A' and 'B' and define them:

DNA —A→ mRNA —B→ Chains of Amino Acids

Ans.

(i) A - Transcription. The process of RNA synthesis is called transcription.

(ii) B - Translation. According to the message on mRNA, amino acids are supplied by tRNA and for this, tRNA has anticodon having complementary sequence of the codon on mRNA. This is called translation.

Q.3.3. Draw neat and labelled diagrams of:

(1) Transcription

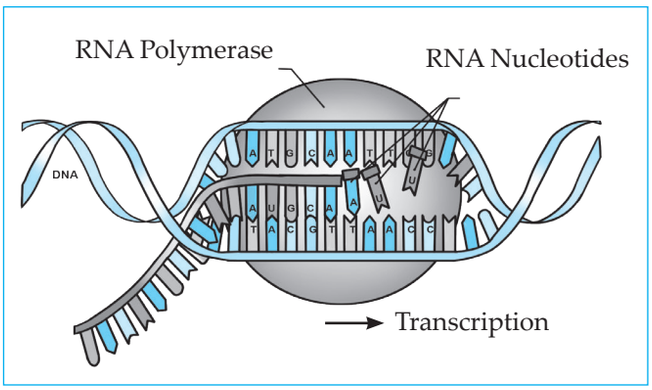


Fig. 1.2: Transcription

(2) Translation and Translocation

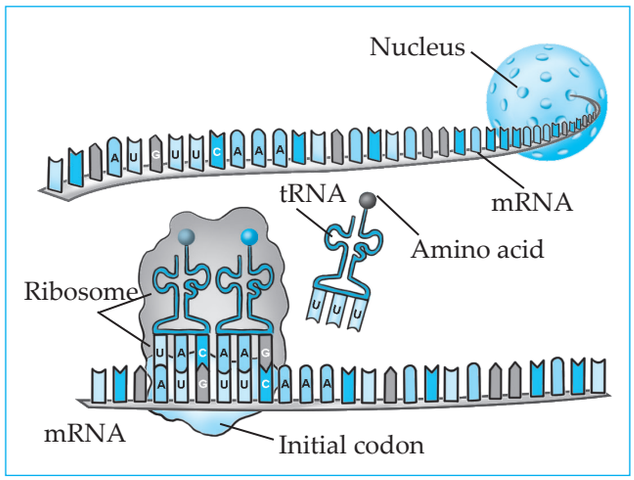


Fig. 1.3: Translation and Translocation

(3) Mutation

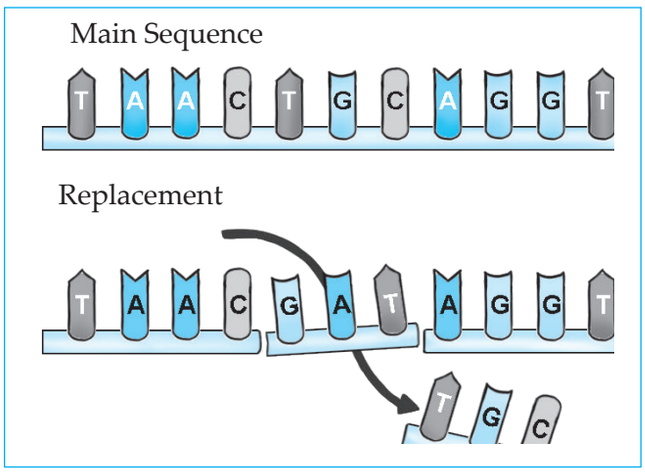


Fig. 1.4: Mutation

Q.3.4. Observe the figure and answer the questions given below:

(1)

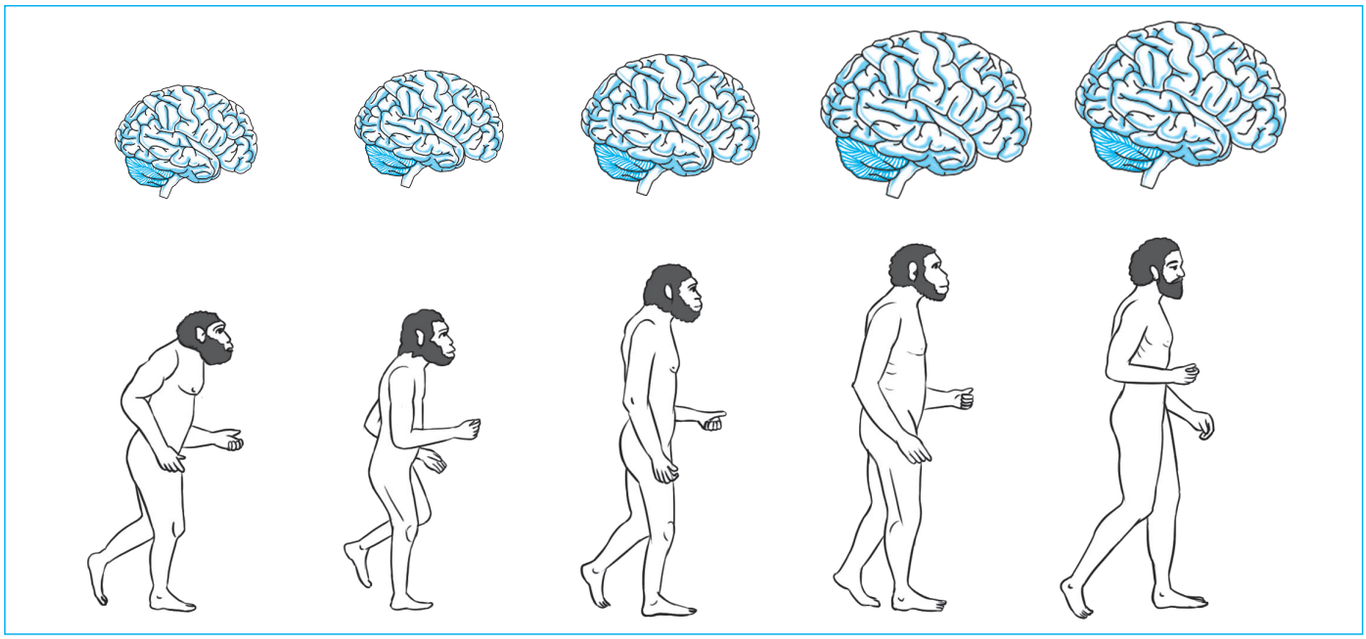


Fig. 1.5. Development of Human Brain

(a) What is the picture about?

Ans. It is about the changes in the development of Human brain.

(b) What does the picture of the last man indicate to us and what was he called?

Ans. The picture of the last man indicates that the man is wisest of all as his brain is most developed. He was called as Homo sapiens.

(c) How did the change happen from first man to the last man as shown in the picture?

Ans. Evolution of the upright man continued in the direction of developing its brain 20 lakh years ago upto this age. Many discoveries were made like fire, practice of agriculture, rearing cattle-herds, establishing cities, etc. about 10000 years ago. Cultural development and art of writing developed about 5000 years ago.

Modern sciences and industrial society developed in recent 200-400 years.

(2)

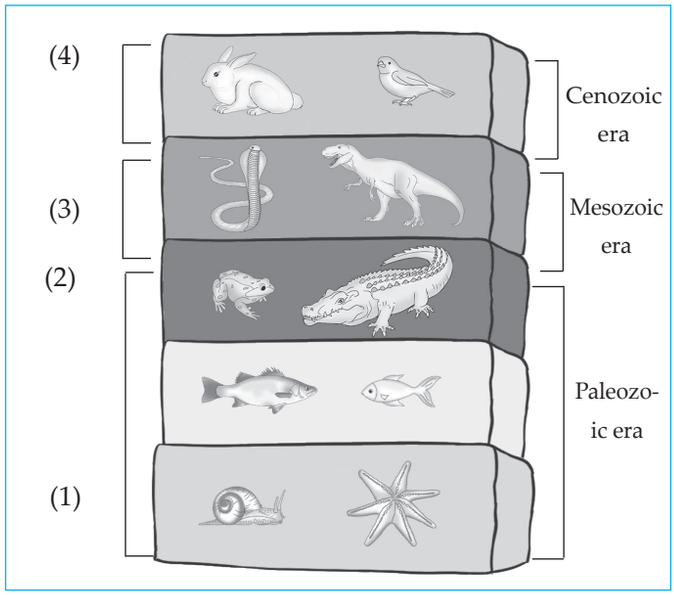


Fig. 1.6: Structure of ground level and fossils

(a) Label parts 1 to 4

Ans. 1 - Invertebrates, 2 - Pisces, Amphibia, Reptiles, 3 - Reptiles, 4 - Mammals, Aves

(b) What is the evidence of evolution shown in the picture?

Ans. Paleontological evidence is shown in the picture by the study of fossil found in the layers of the ground.

(c) What is Carbon dating?

Ans. (i) Carbon dating is a method used in determining the age of fossils and manuscripts (ii) The time

passed since the death of a plant or animal can be calculated by measuring the radioactivity of C-14 and the ratio of C - 14 and C - 12 present in their body.

(3)

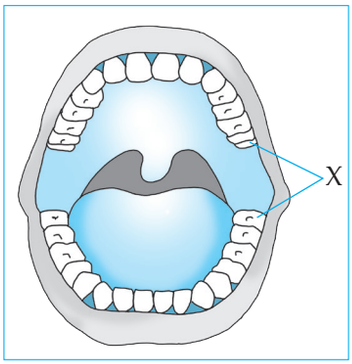


Fig. 1.7

(a) Identify the part labelled as 'X'

Ans. The part labelled as X is Wisdomtooth.

(b) Name the type of organ shown in the given picture.

Ans. Vestigial organ.

(c) State any two other examples of such organs in humans.

Ans. Other examples of vestigial organs in humans are coccyx, muscle of ear pinna, body hail, appendix, etc.

Q.4.1. Answer in detail:

***(1)** **Sketch and explain the structure of DNA and various types of RNA.** *(Can you recall; Textbook Page No. 1)*

Ans.

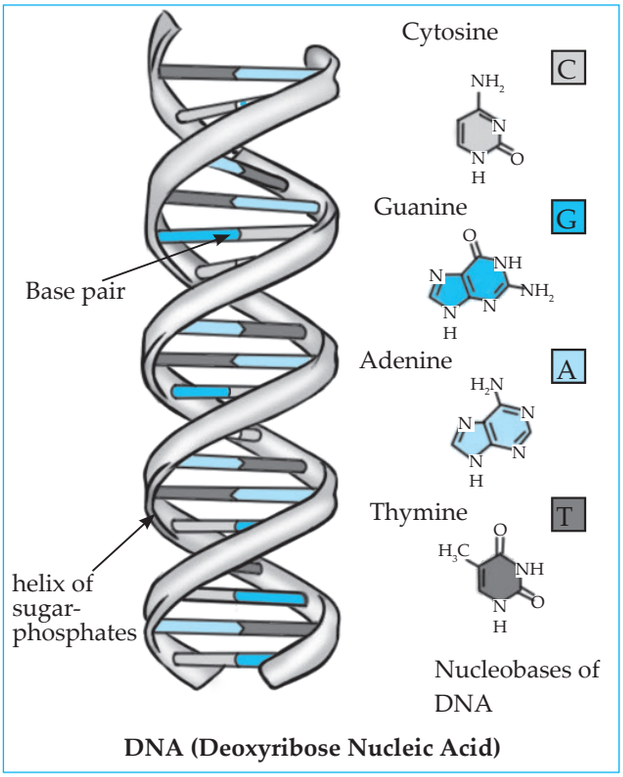


Fig. 1.8: Structure of DNA

(i) DNA is made up of nucleotide molecules. A phosphate group, a sugar group and a nitrogen base are present in each nucleotide.

(ii) The nitrogen base is of four types. cytosine (C), guanine(G), thymine (T), and adenine(A).

(iii) The order in which there nitrogen bases are present determines the genetic code.

(iv) Human DNA has around 3 billion bases and most of the bases are the same in all human beings.

(v) The order of nitrogen, bases forms genes which instructs cells how to prepare proteins.

(vi) Nucleotides are joined together to form two long strands that twist to create a structure called a double helix.

(vii) Adenine pairs with thymine and guanine pairs with cytosine.

(viii) DNA is coiled tightly to form chromosomes which are found inside the nucleus.

Various types of RNA

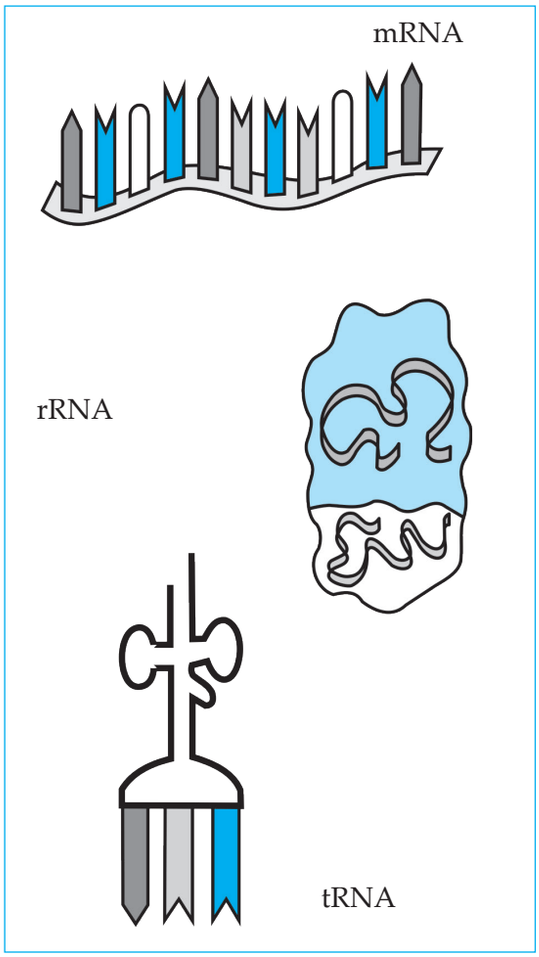


Fig. 1.9: Types of RNA

(i) Types of RNA are mRNA, rRNA and tRNA.

(ii) Ribonucleic acid (RNA) is a nucleotide polymer, which is made of ribose sugar, a phosphate and bases such as adenine, guanine, cytosine and uracil.

(iii) The ribose sugar of RNA has a hydroxyl group and it is absent in DNA. RNA has a structure similar to DNA .

(iv) rRNA : It is a component of the ribosome organelle and helps in protein synthesis

(v) mRNA : It carries information of protein synthesis from genes to the ribosomes.

(vi) tRNA : It carries amino acids up to the ribosomes.

***(2) How are the hereditary changes responsible for evolution?**

Ans.

(i) Formation of new species due to changes in specific characters of several generations of living organisms as a response to natural selection is called as evolution.

(ii) At present, crores of species of plants, range from *Chlorella* to Banyan tree and animals ranging *Amoeba* to giant whale are existing on earth.

(iii) First primitive cell may have been formed from the mixture of different types of organic and inorganic compounds.

(iv) There may have been some differences among these cells and according to the principle of natural selection, some may have shown good growth and some may have perished which could not adjust with surrounding.

(v) Sustaining and selected organisms can perform reproduction and thereby, give rise to the new species with their own specific characters.

***(3) Explain the process of formation of complex proteins.**

Ans.

(i) Information about protein synthesis is stored in the DNA. Synthesis of appropriate proteins as per requirement is necessary for the body.

(ii) These proteins are synthesized by DNA through the RNA. This is called as The Central Dogma of life.

(iii) mRNA is produced as per the sequence of nucleotides on DNA. Only one of the two strands of DNA are used in this process.

(iv) The sequence of nucleotides in mRNA being produced is always complementary to the DNA strand used for synthesis. This process of RNA synthesis is called transcription.

(v) The mRNA formed in the nucleus comes in cytoplasm. It brings in the coded message from DNA.

(vi) The message contains the codes for amino acids. The code for each amino acid consist of three nucleotides. It is called as triplet codons.

(vii) mRNA is made up of thousands of triplet codons.

(viii) As per the message on mRNA, amino acids are supplied by the tRNA.

(ix) For this purpose, tRNA has 'anticodon' having complementary sequence to the codon on mRNA. This is called as 'translation'.

(x) The amino acids brought in by tRNA are bonded together by peptide bonds with the help of rRNA.

(xi) During this process, the ribosome keeps on moving from one end of the mRNA to the other end by the distance of one triplet codon. This is called as 'translocation'.

(xii) Many such chains come together to form complex proteins.

***(4) Explain the theory of evolution and mention the proof supporting it.**

Ans.

(i) According to the theory of evolution, first living material (protoplasm) has been formed in ocean.

(ii) In due course of time, unicellular organism was formed.

(iii) Gradually, changes occurred in the unicellular organism from which larger and more complex organisms were formed.

(iv) All those changes were slow and gradual. Duration of all these changes is about 300 crore years.

(v) Changes and development in living organisms has been all round and multi-dimensional and this led to evolution of different types of organisms.

(vi) Hence, this overall process is called as evolution which is organizational.

(vii) Progressive development of plants and animals from the ancestors having different structural and functional organization is called evolution.

(viii) To support the theory of evolution, various types of evidences are available.

(ix) Inspite of many adaptive differences in protoplasm and cell, the manifestation of life processes like growth, reproduction, metabolism are essentially same in all organisms.

(x) Morphological evidences support the theory. It is seen that all plants have stem, root, leaf and are green in colour and those having green colour carry out photosynthesis. Similarly, it is

seen that animals have appendages, eyes, nose, ears, etc.

(xi) Anatomical evidences like the bone structure of a human arm, a bulls leg, a bat's wing and a whale fin have similar structures attributing that they have developed from common ancestors.

(xii) Vestigial organs like tail bone or coccyx present in humans indicate the link between humans who have lost a tail and monkeys who have a tail.

(xiii) At embryological level, similarities are observed during initial stage which indicates common origin.

(xiv) Thus, there are a few evidences which support the fact that evolution is sequential.

***(5) Explain with suitable examples importance of anatomical evidences in evolution.**

Ans.

(i) There doesn't seem any superficial similarity between a human hand, a cat's foreleg, flipper of a whale and patagium of a bat.

(ii) Use of each of these structures is different in respective animals.

(iii) However, there is a similarity in structure of bones and bony joints in organs of each of these animals.

(iv) This similarity indicates that these animals show anatomical evolution.

***(7) Write the evolutionary history of modern man.**

Ans.

***(6) Define fossil. Explain importance of fossils as proof of evolution.**

Ans.

(i) Remnants and impressions of organisms which get buried remain preserved underground. These are called as fossils. Study of fossils is an important aspect of study of evolution.

(ii) Carbon consumption of animals and plants stops after death and since then, only the decaying process of C-14 occurs continuously.

(iii) In case of dead bodies of plants and animals, instead of remaining constant, the ratio between C-14 and C-12 changes continuously as C-12 is non-radioactive.

(iv) The time passed since the death of a plant or animal can be calculated by measuring the radioactivity of C-14 and the ratio of C-14 to C-12 present in their body.

(v) This is carbon dating method. It is used in determining the age of human fossils and manuscripts.

(vi) Once the age of fossil has been determined, it becomes easy to deduce information about other erstwhile organisms.

It seem that vertebrates have been slowly originated from invertebrates.

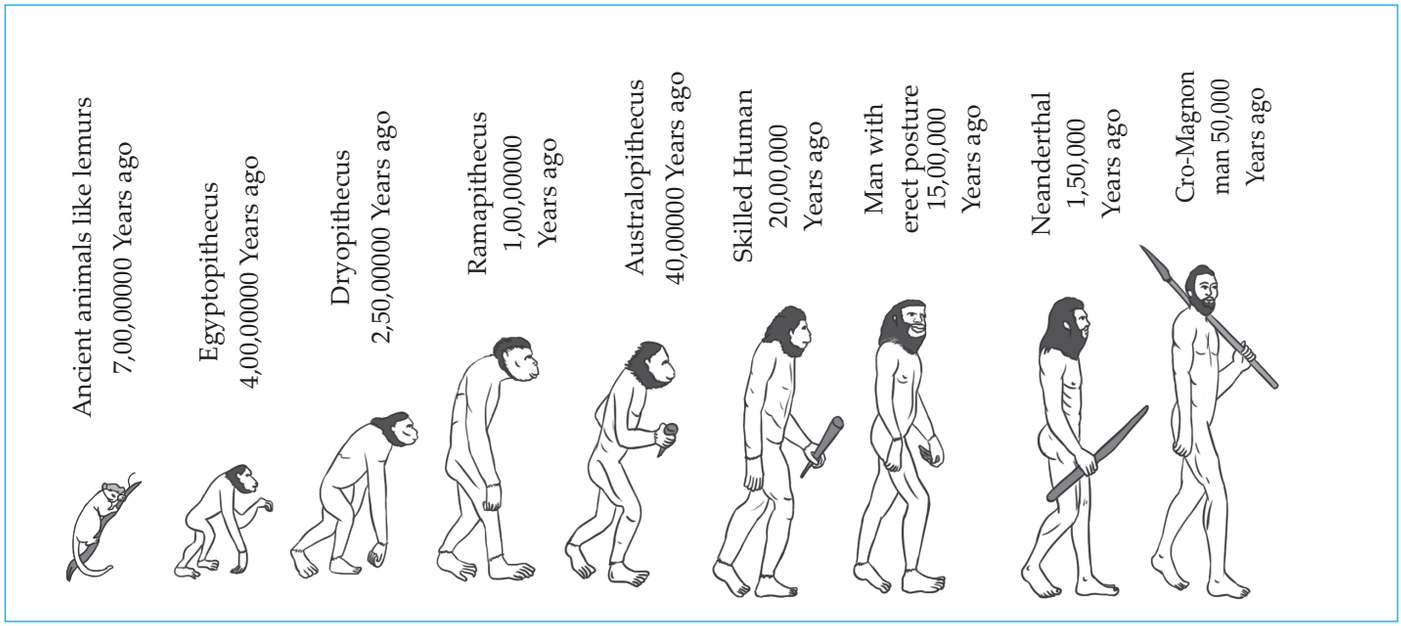


Fig. 1.10: Journey of human

(i) Approximately seven crore years ago, monkey like animals are said to be evolved from some ancestors who were more or less similar to the modern lemurs.

(ii) Tail of these monkey like animals of Africa is said to have disappeared about 4 crore years ago.

(iii) Evolution of some of the 2 crore years old species of apes seems to have occurred in different ways. They had to use their hands more for eating food and other work.

(iv) First human like animal recorded was *'Ramapithecus'* ape from East Africa.

(v) This ape grew up in size and became more intelligent and evolved about 40 lakh years ago.

(vi) Skilled humans appeared to be the member of genus *Homo.*

(vii) About 15 lakh years ago, humans walking with erect posture evolved and existed in China and Indonesia of Asian continent.

(viii) Evolution of upright man continued in the direction of developing its brain for the period of about 1 lakh years.

(ix) Brain of 50 thousand year old man had been sufficiently evolved to the extent that it could be considered as member of the class-wise-man *(Homo sapiens)*.

(x) Neanderthal man can be considered as the example of wise-man.

(xi) The Cro-Magnon man evolved about 50 thousand years ago and afterwards, this evolution had been faster than the earlier.

***(7) Define vestigial organs. Write names of some vestigial organs in human body and write the names of those animals in whom same organs are functional.**

Ans.

(i) Degenerated or underdeveloped useless organs of organisms are called as vestigial organs.

(ii) Appendix is a vestigial organ in humans, but is fully functional in ruminants.

(iii) Muscles of ear pinna are vestigial in humans but are useful in monkey for movement of ear pinna.

***(8) Define heredity. Explain the mechanism of hereditary changes.**

Ans.

(i) Heredity is the transfer of biological characters from one generation to another via genes.

(ii) Living organisms can produce new individuals like themselves due to genes only and some of those genes are transmitted to the next generation without any changes.

(iii) Due to this, some of the characters of parents are transmitted to their offsprings.

(iv) However, sometimes sudden changes occur in those genes.

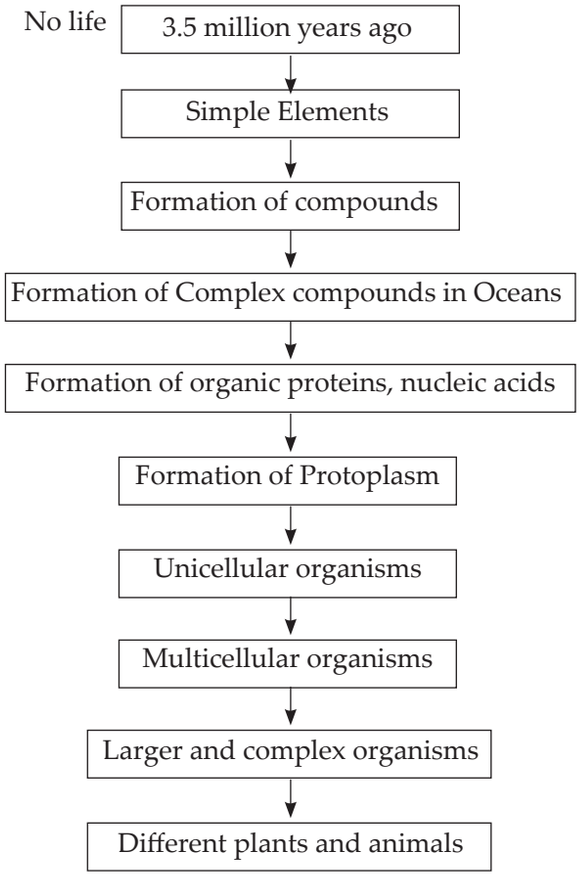
(v) Sometimes any nucleotide of the gene changes its position and that causes a minor change which is called as mutation.

(vi) Some mutations may be minor but some may be considerable.

E.g. Mutation may cause the genetic disorder like sickle cell anaemia.

(9) Explain with the help of a flow chart the theory of Evolution.

Ans.



Q.4.2. (1) Observe the picture and answer the questions:

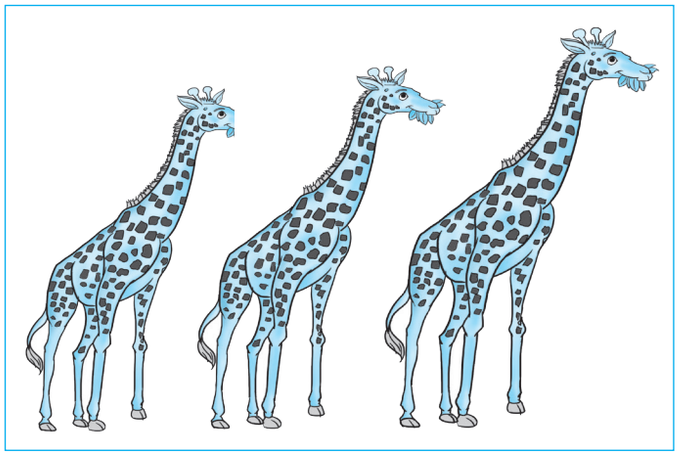


Fig. 1.11. Lamarckism

(a) The picture depicts a theory of use or disuse of organs. Name it.

Ans. The name of the theory is Lamarckism.

(b) Name the scientist who proposed it.

Ans. Jean - Baptiste Lamarck proposed this theory.

(c) Give one example and explain the theory with its help.

Ans. Lamarck said that the morphological changes occur gradually either due to specific activities or laziness of a particular organism eg. Giraffe's neck is long due to browning on leaves of tall plants by extending its neck.

(d) Why was this theory disproved?

Ans. Lamarck's theory of inheritance of acquired characters was disproved because the modifications brought about in an individual are not transferred to the next generation.

Q.4.2. (2)

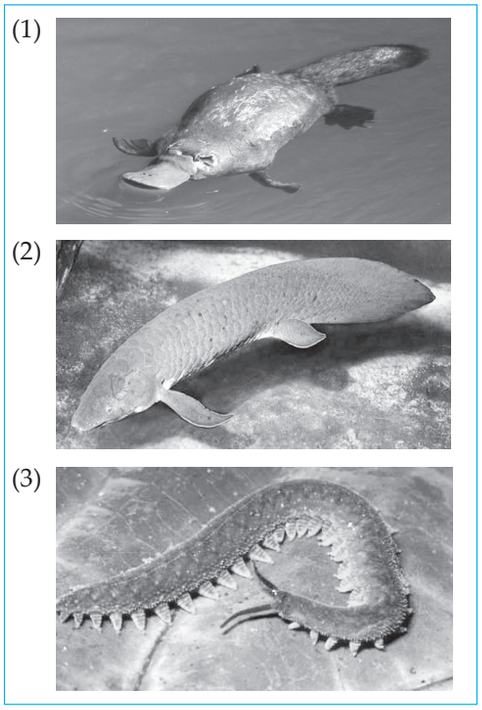


Fig. 1.12: Some animals with special characteristics

(a) Observe the picture and identify each organisms.

Ans. (i) 1 - Duckbill platypus, 2 - Lungfish, 3 - *Peripatus*

(b) Explain their role in proving the process of evolution.

Ans.

(i) Duckbill platypus lays eggs like reptiles and has hair and mammals glands like mammals and therefore it is a link between reptiles and mammals.

(ii) Lungfish is a fish but breathes with lungs therefore it is a link between amphibians and pisces.

(iii) Peripatus is a connecting link between Phylum Annelida and Arthropoda with segmented body, parapodia-like appendages and thin cuticle (Annelida) and breathes through trachea with open circulatory system (Arthropoda).

❖❖❖

ASSIGNMENT - 1

Time : 1 Hr. **Marks : 20**

Q.1 (A) Answer the following: **(3)**

1. Fill in the blanks.

(a) The code for each amino acid consist of three nucleotides called ..... .

(b) Darwin had published a book titled ..... .

2. Example indicating mammals are evolved from reptiles.

Q.1. (B) Choose and write the correct option: **(2)**

(1) Information about protein synthesis is stored in the .....

(a) mitochondria (b) DNA (c) RNA (d) ribosomes

(2) ..... is not a vestigial organ in Human.

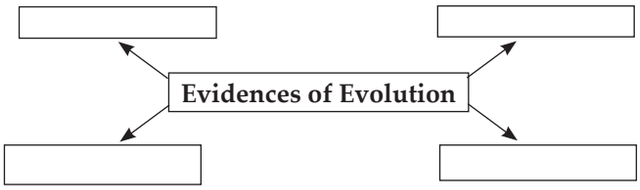
(a) Appendix (b) Wisdom tooth (c) Body hair (d) Duodenum

Q. 2. Answer the following (Any 2) **(4)**

(1) Give reason : Geographical and reproductive isolation of organisms gradually leads to speciation.

(2) What is carbon dating method?

(3) Complete the flow chart.



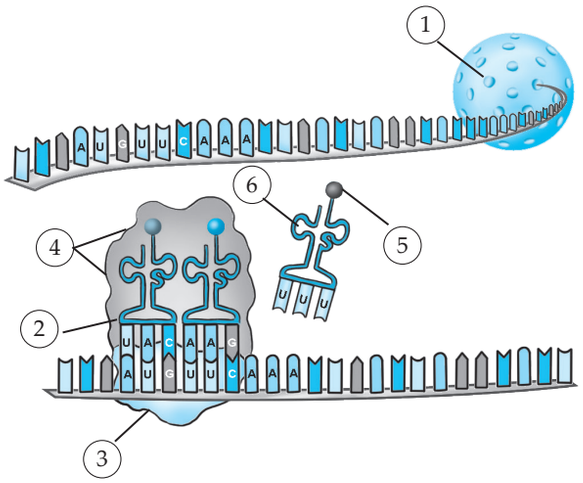
Q. 3. Answer the following (Any 2) **(6)**

(1) Write short note on connecting link.

(2) With the help of diagram explain different types of RNA.

(3) Study of fossil is an important aspect of study of evolution. Explain.

Q.4. Answer in detail (Any 1) **(5)**



(a) Identify 6 state its function. Label parts 1, 2, 3, 4 & 5.

(b) Which two processes are shown in this diagram? Define them.

(c) Observe the diagram carefully and explain in brief.

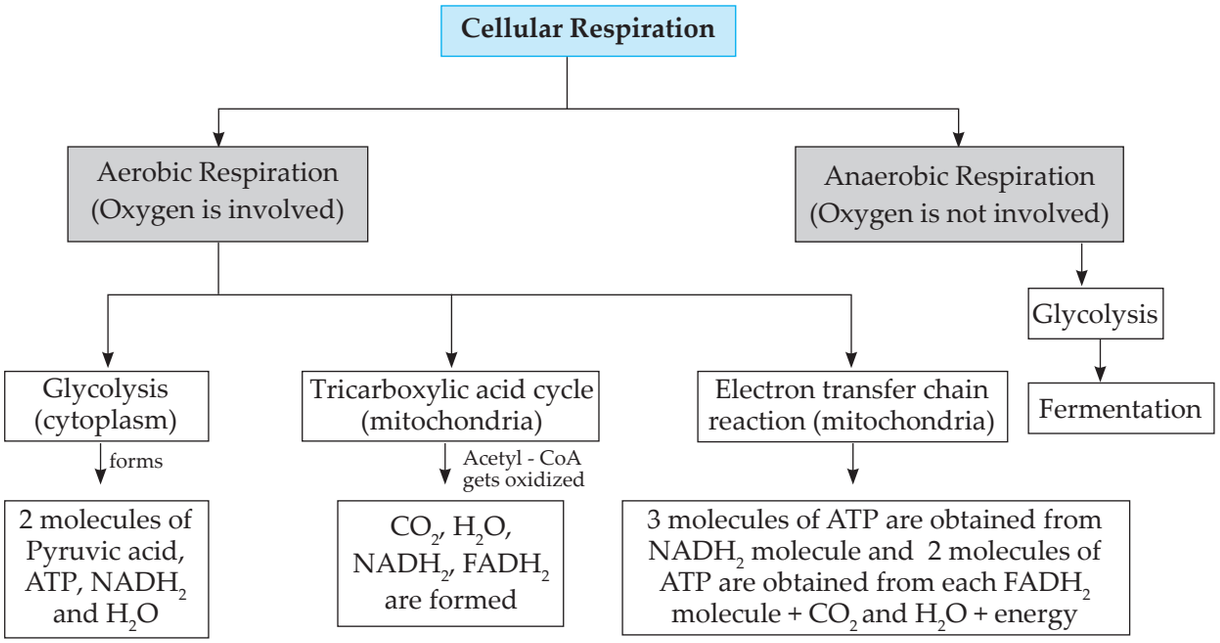
(2) Explain three evidences of evolution giving examples.

❖❖❖

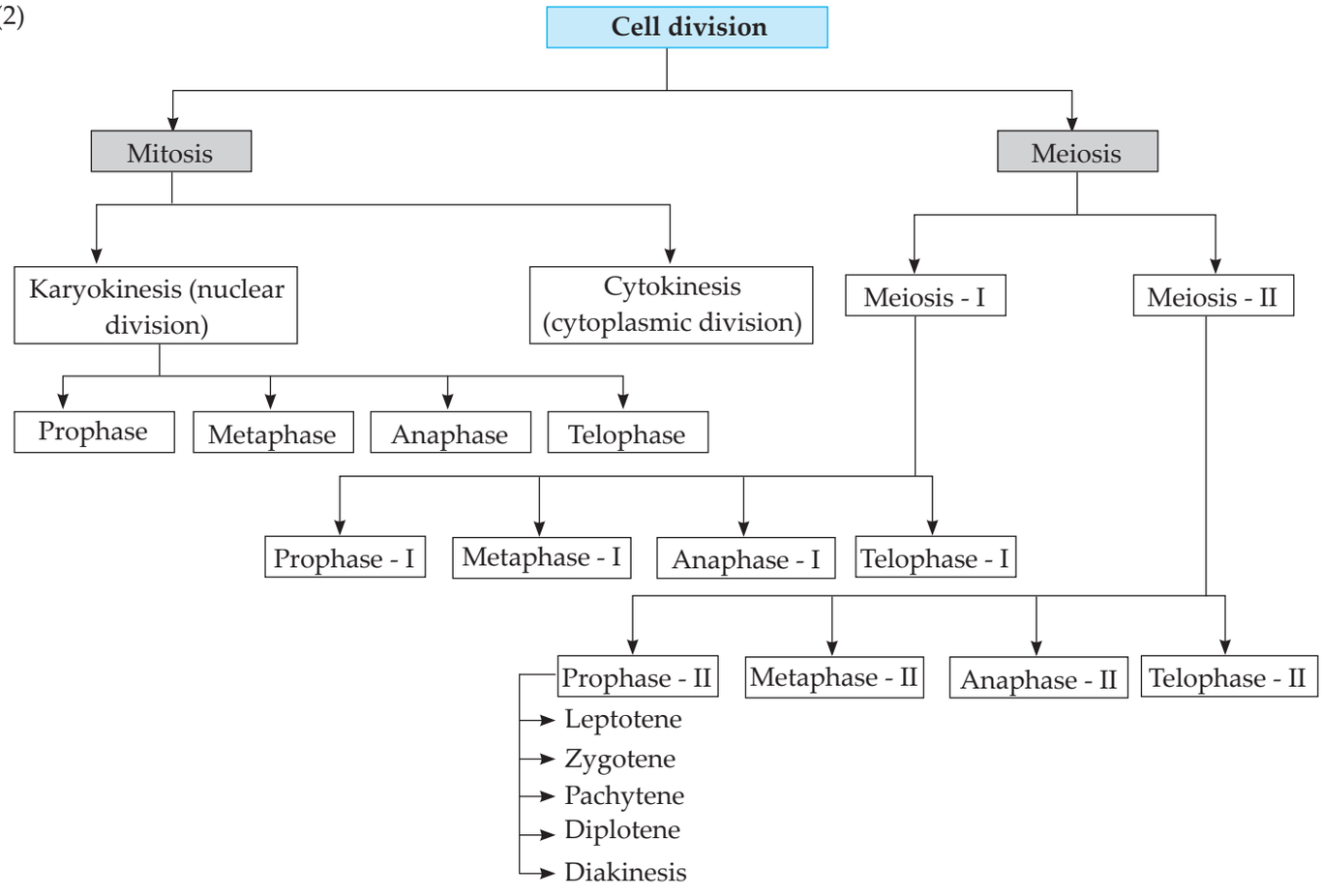
2 Life Processes In Living Organisms Part - 1

CONCEPT MAP

(1)



(2)



Points to Remember:

- **Living organisms and life processes:**
- Various organ-systems are continuously performing their functions in human body. Along with the various systems like **digestive, respiratory, circulatory, excretory** and **control systems**, different external and internal organs are performing their functions independently but through a complete co-ordination.
- **Living organisms and energy production :**

  In living organisms, respiration occurs at two levels as **body** and **cellular** level.
- **Oxygen** and **Carbon dioxide** are exchanged between body and surrounding in case of respiration occuring at body level.
- Cellular respiration occurs among the living organisms by two methods:
  - **aerobic respiration (oxygen is involved).**
  - **anaerobic respiration (oxygen is not involved).**
- In aerobic respiration, glucose is oxidized in three steps: -
  - **Glycolysis**
  - **Tricarboxylic acid cycle**
  - **Electron transfer chain reaction**
- ATP - **Adenosine triphosphate** is an energy rich molecule and energy is stored in the bonds by which phosphate groups are attached to each other.
- **Fatty acids** and **amino acids** are converted into **acetyl-CoA** and energy is obtained through complete oxidation of acetyl-CoA by the process of kreb's cycle in **mitochondria**.
- Energy Production in micro-organisms is through **anaerobic respiration**. Bacteria perform anaerobic respiration for energy production.
- Some higher plants, animals and aerobic micro-organisms also perform anaerobic respiration instead of aerobic respiration if there is **depletion in oxygen level in the surroundings**.
- **Glycolysis** and **fermentation** are two steps of anaerobic respiration.
  - **Seeds** perform anaerobic respiration if the soil in submerged under water during germination.
  - Our **muscle** cells perform anaerobic respiration while performing exercise.
- Energy from different food components:
  - We get **4 kcal** energy per gram of **carbohydrates**.
  - We get **4 kcal** of energy per gram of **proteins**.
  - We get **9 kcal** energy per gram of **lipids**.
  - **Vitamins** are a group of heterogeneous compounds of which, each is essential for proper operation of various processes in the body.
  - **Water** is an essential nutrient.
  - Functioning of cells and thereby whole body disturbs even if there is a **little loss of water** from the body.
  - **Fibres** help in the digestion of other substances and egestion of undigested substances. Fibre is also an essential nutrient.
- **Cell Division: It is an essential life process.**
- Cell division is one of the very important properties of cells and living organisms. Due to this property only a **new organism is formed from an existing one.**
- There are two types of cell division - **Mitosis and Meiosis**.
- Mitosis occurs in **somatic cells** and **stem cells** of the body, whereas meiosis occurs in **germ cells**.
- Mitosis is essential for growth of the body. Besides, it is necessary for **restoration** of the emaciated body, **wound healing, formation of blood cells,** etc.

MASTER KEY QUESTION SET - 2

***Q.1. (A) 1. Fill in the blanks and explain the statement:**

(1) After complete oxidation of a glucose molecule, ... number of ATP molecules are formed.

(2) At the end of glycolysis, ... molecule are obtained.

(3) Genetic recombination occurs in ..... phase of prophase of meiosis I.

(4) All chromosomes are arranged parallel to equatorial plane of cell in ..... phase of mitosis.

(5) For formation of plasma membrane, ... molecules are necessary.

(6) Our muscles cells perform ..... type of respiration during exercise.

Ans.

(1) *38.* The 34 ATP molecules generated through the electron transfer chain, along with 2 molecules each of ATP, are generated through glycolysis and Kreb's cycle form a net total of 38 ATP molecules.

(2) *Pyruvic acid.* A molecule of glucose is oxidized step by step in the process of glycolysis where two molecules of each, i.e. pyruvic acid, ATP, $NADH_2$ and water are formed.

(3) *Pachytene.* During Meiosis-I, in pachytene stage, recombination / crossing over, i.e. exchange of genetic material takes place between non-sister chromatids of homologous chromosomes.

(4) *Metaphase.* Nuclear membrane completely disappears in metaphase. Chromosomes completely condense and become clearly visible along with sister chromatids. The chromosomes get parallely arranged to the equatorial plane of the cell.

(5) *Phospholipids.* They form the basic structure of cell membrane which are essential for the semi-permeability of the plasma membrane.

(6) *Anaerobic.* During exercise, the oxygen supply may not be enough for the need of muscles. Hence, anaerobic respiration occurs in the muscle cells and lactic acid accumulates, which is a result of fermentation during which glucose is broken down by anaerobic respiration.

Q.1. (A) 2. Fill in the blanks and rewrite the statement:

(1) Energy from food is obtained in the form of ..... .

(2) Process of glycolysis occurs in ..... .

(3) Pyruvic acid formed in glycolysis is converted into two molecules of ..... .

(4) Tricarboxylic acid cycle (Kreb's cycle) takes place in ..... .

(5) Chemically ATP is triphosphate molecule formed from ..... .

(6) ATP is called as ..... of the cell.

(7) Process of glycolysis was discovered by ..... .

(8) The cylical reactions of tricarboxylic acid were discovered by ..... .

(9) ..... and ..... are two steps of anaerobic respiration.

(10) During exercise, ... accumulates in the muscles due to which we feel tried.

(11) We get ..... energy per gram of carbohydrates and per gram of protein.

(12) Electron transfer chain reaction is operated in ..... only.

(13) Excess of carbohydrates are stored in liver and muscles in the form of ..... .

(14) Proteins are the macromolecules formed by bonding together many ..... .

(15) ..... are obtained after digestion of proteins.

(16) Excess protein are converted into glucose by the process of ..... .

(17) An enzyme ..... present in the plant chloroplasts is most abundant protein found in nature.

(18) The substances formed by specific chemical bond between fatty acids and alcohol are called as ..... .

(19) ..... are required to form the covering around the axons of nerve cells.

(20) We get ..... of energy per gram of lipids.

(21) Excess of lipids are stored in ..... in the body.

(22) ..... are mainly utilized for production of energy required for daily need.

(23) There is about ..... water in our body.

(24) ..... occurs in formatic cells and stem cells of the body.

(25) The two main steps of cell division are ..... and ..... .

(26) Condensation of thin thread like chromosomes starts in ..... .

(27) Nuclear membrane completely disappears in ..... .

(28) Special type of flexible protein fibres called ..... are formed between centromere of each chromosome and both centrioles.

(29) Chromosomes complete their condensation and become clearly visible along with their sister chromatids during ..... .

(30) The chromosomes reach opposite poles of the cell and start to decondense during ..... .

(31) ..... is essential for growth, restoration of emaciated body wound healing, formation of blood cells, etc.

(32) In ..... , recombination / crossing over occurs between homologous chromosomes.

(33) Process of gamete formation and spore formation occurs by ..... .

(34) Proteins of animal origin are called ..... proteins.

Ans. *(1) ATP (2) cytoplasm (3) Acetyl - coenzyme A (4) mitochondria (5) Adenosine ribonucleoside (6) energy currency (7) Gustav Embden, Otto Meyrhof and Jacob Parnas. (8) Sir Hans Kreb (9) Glycolysis, fermentation (10) lactic acid (11) 4 Kcal (12) mitochondria (13) glycogen (14) amino acids (15) Amino acid (16) gluconeogenesis (17) RuBisCO (18) lipids (19) Fatty acids (20) 9 Kcal (21) Adipose connective tissue (22) Carbohydrates (23) 65 - 70% (24) Mitosis (25) Karyokinesis, Cytokinesis (26) Prophase (27) Metaphase (28) spindle fibres (29) Metaphase (30) telophase (31) Mitosis (32) Meiosis - I (33) Meiosis (34) first class*

Note: RuBisCO - It stands for Ribulose - 1, 5, - Bisphosphate carboxylase Oxygenase. It is written as 'RuBisCo.

Q.1. (A) 3. Complete the correlation:

(1) Carbohydrates : 4 Kcal of energy : : Lipids : ..... .

Ans. 9 Kcal of energy - We get 4 Kcal of energy per gram of carbohydrates, whereas we get 9 Kcal of energy per gram of lipids.

(2) Glycolysis : EMP Pathway : : Tricarboxylic acid cycle : ..... .

Ans. Kreb's cycle - Another name for Glycolysis is EMP pathway, similarly another name for Tricarboxylic acid cycle is Kreb's cycle.

(3) $NADH_2$: 3 molecules of ATP : : $FADH_2$: .....

Ans. 2 molecules of ATP - 3 molecules of ATP are obtained from each $NADH_2$ molecule while 2 molecules of ATP are obtained from each $FADH_2$ molecule.

(4) $NADH_2$: Nicotinamide Adenine Dinucleotide : : $FADH_2$: .....

Ans. Flavin Adenine Dinucleotide - $NADH_2$ stands for Nicotine Amide Dinucleotide and $FADH_2$ stands for Flavin Adenine Dinucleotide

(5) Glycolysis : Cytoplasm : : Tricarboxylic acid cycle : ..... .

Ans. Mitochondria - Glycolysis takes place in the cytoplasm, whereas TCA cycle (Tri-carboxylic acid) takes place in the mitochondria.

(6) Fats : Fatty acids : : Proteins : ..... .

Ans. Amino acids - Fats are broken down into fatty acids whereas, proteins are broken down into amino acids.

(7) Vitamins A, D, E, K ; Fat-soluble : : Vitamins B and C : ..... .

Ans. Water soluble - Vitamins A, D, E and K are fat-soluble vitamins, whereas vitamin B and C are water soluble vitamins.

(8) Mitosis : Somatic cells : : Meiosis : ..... .

Ans. *Germ cells - Mitosis occurs in somatic cells of the body, whereas meiosis occurs in the germ cells of the body.*

(9) Nuclear division : karyokinesis : : Cytoplasmic division : ..... .

Ans. *Cytokinesis - Karyokinesis is the process of division of nucleus of a cell during phase of division, while cytokinesis is the process of division of cytoplasm of the cell.*

(10) Blood : Haemoglobin : : Bones : ..... .

Ans. *Ossein - Haemoglobin is a protein present in blood whereas, ossein is a protein present is bones.*

(11) Vitamin B_3 : Nicotinamide : : Vitamin B_2 : ..... .

Ans. *Riboflavin - Vitamin B_3 is also called as Nitotinamide, whereas Vitamin B_2 is also known as Riboflavin.*

(12) Fermentation of yeast : Alcohol : : Fermentation of erythrocytes: ..... .

Ans. *Lactic acid - Alcohol is produced by fermentation in yeast, whereas lactic acid is produced by fermentation in erythrocytes.*

Q.1. (A) 4. Match the following:

(1)

Column A	Column B
(1) Aerobic respiration	(a) Nuclear division
(2) Anaerobic respiration	(b) Oxygen is involved
(3) Karyokinesis	(c) Cytoplasmic division
(4) Cytokinesis	(d) Oxygen is not involved

Ans. *(1 – b), (2 – d), (3 – a), (4 – c)*

(2)

Column A	Column B
(1) Formation of spindle fibres	(a) Prophase
(2) Sister chromatids are pulled apart	(b) Telophase
(3) Nuclear membrane and nucleolus reappear	(c) Metaphase
(4) Centrioles duplicate and move to opposite poles	(d) Anaphase

Ans. *(1 – c), (2 – d), (3 – b), (4 – a)*

(3)

Column A	Column B
(1) Actin and Myosin	(a) Pancreas
(2) Ossein	(b) Skin
(3) Insulin	(c) Bones
(4) Melanin	(d) Muscles

Ans. *(1 – d), (2 – c), (3 – a), (4 – b)*

Q.1. (A) 5. State whether the following statements are True or False. Correct the false statements:

(1) Only food stuff is sufficient for energy production.

(2) Process of glycolysis occurs in cyloplasm.

(3) Amino acids are obtained after digestion of proteins.

(4) Meiosis occurs in somatic cells and stem cells of the body.

(5) Nucleolus does not appear in each daughter nucleus.

(6) Meiosis II is just like mitosis.

(7) We get 9 Kcal of energy per gram of carbohydrates.

(8) Tricarboxylic acid cycle (Kreb's cycle) occurs in mitochondria.

(9) Glycolysis is also called Kreb's cycle.

(10) During anaerobic respiration of muscles, citric acid accumulates in the muscles due to which we feel tired.

(11) Glucose is incompletely oxidised in anaerobic respiration.

(12) Proteins of plant origin are called as first class proteins.

(13) Excess of amino acids obtained from proteins are not stored in the body.

(14) We get 4 Kcal of energy per gram of lipids.

(15) Each cell contains 50% water by weight.

(16) Blood plasma contains 90% of water.

(17) Vitamins B and C are water - soluble vitamins.

(18) We can digest fibres.

(19) 2 molecules of ATP are obtained from each $FADH_2$ molecule.

(20) Before cell division, the cell doubles up its chromosome number.

(21) All chromosomes are arranged parallel to the equatorial plane of the cell in anaphase.

(22) Condensation of thin thread - like chromosomes starts in telophase.

(23) Sister chromatids are pulled apart in metaphase.

(24) Plant cell divides by formation of a notch at the equatorial plane of the cell.

(25) Seeds perform anaerobic respiration if the soil is submerged under water.

Ans. *(1) False. Only food stuff is not sufficient for energy production, but oxygen is also necessary. (2) True (3) True (4) False. Meiosis occurs in germ cells. (5) False. Nucleolus also appears in each daughter nucleus. (6) True (7) False. We get 4 Kcal of energy per gram of carbohydrates. (8) True (9) False. Glycolysis is also called as EMP pathway. (10) False. During anaerobic respiration of muscles, lactic acid accumulates in the muscles due to which we feel tired. (11) True (12) False. Proteins of animal origin are called as first class proteins. (13) True (14) False. We get 9 Kcal of energy per gram of lipids. (15) False. Each cell contains 70% water by weight. (16) True (17) True (18) False. We cannot digest fibres. (19) True (20) True (21) False. All chromosomes are arranged parallel to the equatorial plane of the cell in metaphase. (22) False. Condensation of thin thread - like chromosomes starts in prophase. (23) False. Sister chromatids are pulled apart in anaphase. (24) False.Plant cell divides by formation of a cell plate along the midline of the cell. (25) True*

Q.1. (A) 6. Name the following:

(1) Organ systems performing their functions in human body.

Ans. Digestive, respiratory, circulatory, excretory systems

(2) Main sources of energy needed to perform organ systems.

Ans. Carbohydrates, Fats and Lipids

(3) Two methods of cellular respiration.

Ans. Aerobic respiration and Anaerobic respiration

(4) Enzymes formed in the cells and used in celluar respiration.

Ans. $NADH_2$ and $FADH_2$

(5) Three scientists who discovered process of glycolysis.

Ans. Gustav Embden, Otto Meyerhof and Jacob Parnas

(6) Scientist who discovered cyclical reaction of TCA cycle.

Ans. Sir Hans Kreb

(7) Two steps of anaerobic respiration

Ans. Glycolysis and Fermentation

(8) Process through which excess of proteins are converted into other useful substances like glucose

Ans. Gluconeogenesis

(9) Six types of vitamins

Ans. A, B, C, D, E and K

(10) Fat soluble vitamins

Ans. A, D, E and K

(11) Water soluble vitamins

Ans. B, C

(12) Two types of cell division

Ans. Mitosis and Meiosis

(13) Two steps of Mitosis

Ans. Karyokinesis and Cytokinesis

(14) Four steps of Karyokinesis

Ans. Prophase, Metaphase, Anaphase and Telophase.

(15) Two steps of Meiosis

Ans. Meiosis I and Meiosis II

(16) Most abundant protein found in nature.

Ans. RuBisCO

(17) Energy currency of the cell

Ans. ATP

(18) Phase in which chromosomes reach opposite poles of the cell

Ans. Anaphase

(19) Protein found in skin

Ans. Melanin, keratin

(20) Protein found in muscles

Ans. Actin and Myosin

Q.1. (A) 7. Write the full form of:

(1) **FAD :** Flavin adenine dinucleotide

(2) **FMN :** Flavin mononucleotide

(3) **NADP :** Nictoninamide adenine dinucleotide phosphate

(4) **TCA cycle :** Tricarboxylic acid cycle

(5) **$NADH_2$:** Nicotinamide Adenine dinucleotide

(6) **$FADH_2$:** Falvin adenine dinucleotide

(7) **EMP pathway :** Embden - Meyerhof - Parnas pathway

(8) **ATP :** Adenosine triphosphate

(9) **RuBisCO :** Ribulose - 1, 5 - Bisphosphate Carboxylase Oxygenase

Q.1. (B) Choose and write the correct option:

(1) Which of the following protein is present in skin?

(a) Haemoglobin (b) Insulin
(c) Keratin (d) Ossein

(2) Which one of the folowing vitamin is not fat soluble?

(a) D (b) K (c) A (d) C

(3) Water content of Blood Plasma is ..... .

(a) 70% (b) 90% (c) 65% (d) 50%

(4) In which stage the nuclear membrane completely disappears during nuclear division?

(a) Prophase (b) Metaphase
(c) Anaphase (d) Telophase

(5) Number of chromosomes in diploid cell ..... .

(a) n (b) 3n (c) $\frac{n}{2}$ (d) 2n

(6) In which type of cells meiosis occurs?

(a) Germ cells (b) Stem cells
(c) Somatic cells (d) Epithelial cell

(7) Which vitamin is called riboflavin?

(a) A (b) B_5 (c) B_2 (d) C

(8) In which part of cell, electron transfer chain reaction occurs?

(a) Cytoplasm (b) Mitochondria
(c) Nucleus (d) Golgi body

(9) Which of the following vitamins are required for the production of $FADH_2$ and $NADH_2$?

(a) Vitamin E (b) Nicotinamide
(c) Vitamin C (d) Vitamin D

(10) The protein ossein is produced in ..... .

(a) blood (b) muscles
(c) bone (d) pancreas

(11) The Spindle fibres start appearing from ..... stage of Karyokinesis.

(a) Prophase (b) Metaphase
(c) Anaphase (d) Telophase

(12) In case of plants, which of the following is not present during cytokinesis?

(a) Spindle fibres (b) Cell Plate
(c) Chromosomes (d) Nucleolus

Ans. *(1) (c) Keratin (2) (d) C (3) (b) 90% (4) (b) Metaphase (5) (d) 2n (6) (a) Germ cells (7) (c) B_2 (8) (b) Mitochondria (9) (b) Nicotinamide (10) (c) bone (11) (b) Metaphase (12) (a) Spindle fibres*

Q.2.1. Define the following:

***(1) Nutrition**

Ans. The process of intake of food and its utilization by an organism is called as nutrition.

***(2) Nutrients**

Ans. Nutrients are components of food which provide energy and help in growth and maintenance of the body.

***(3) Proteins**

Ans. Proteins are the macromolecules formed by bonding together many amino acids.

***(4) Cellular respiration**

Ans. Cellular respiration is a process where foodstuffs are oxidised either with or without the help of oxygen to produce energy.

***(5) Aerobic respiration**

Ans. Aerobic respiration is the process of producing energy from foodstuffs with the help of oxygen.

***(6) Glycolysis**

Ans. Glycolysis is the process in which a molecule of glucose is oxidized in a step by step process and two molecules of each, i.e. pyruvic acid, ATP, $NADH_2$ and water are formed.

(7) Fermentation

Ans. Pyruvic acid produced through glycolysis is converted into other organic acids or alcohol with the help of some enzymes. This is called fermentation.

(8) Lipids

Ans. The substances formed by specific chemical bonds between fatty acids and alcohol are called as lipids.

(9) Homologous Chromosomes

Ans. A pair of chromosomes that are similar by shape and organisation are called homologous chromosomes.

(10) Vitamins

Ans. Vitamins are a group of heterogeneous compounds of which each is essential for proper operation of various processes in the body.

(11) Anaerobic Respiration:

Ans. Anaerobic Respiration is the process of producing energy from foodstuff without the help of oxygen.

(12) Coenzyme

Ans. A coenzyme is a non protein compound that is necessary for the functioning of an enzyme.

(13) Gluconeogenesis

Ans. Formation of glucose through non carbohydrate sources such as a protein is called Gluconeogenesis.

Q.2.2. Answer the following in one or two sentences:

***(1) How many atoms of C, H and O are respectively present in a molecule of glucose?**
(Can you recall - Textbook Page No. 13)

Ans. There are 6 atoms of C, 12 atoms of H and 6 atoms of O present in a molecule of glucose ($C_6H_{12}O_6$).

***(2) Which types of chemical bonds are present between all atoms in a molecule of glucose?**
(Can you tell - Textbook Page no. 13)

Ans. Covalent bonds are present between all atoms in a molecule of glucose.

(3) How much energy do we get from carbohydrates, lipids and protein?

Ans. We get 4 kcal of energy per gram of carbohydrates and proteins, and 9 kcal of energy per gram of lipids.

***(4) What do you mean by diploid cell?**
(Brain power - Textbook Page No. 20)

Ans. A diploid cell is a cell that contains two sets of chromosomes. (2n)

***(5) What do you mean by haploid cell?**
(Brain power - Textbook Page No. 20)

Ans. Haploid cell is a cell that contains a single set of chromosomes. (n)

***(6) Which type of cellular respiration performs complete oxidation of glucose?**
(Can you tell - Textbook Page no. 16)

Ans. Aerobic respiration performs complete oxidation of glucose.

***(7) Which cell organelle is necessary for complete oxidation of glucose?**
(Can you tell; Textbook Page no. 16)

Ans. Mitochondria is necessary for complete oxidation of glucose.

***(8) What is the importance of balanced diet for our body?** *(Can you recall - Textbook Page no. 12)*

Ans.

(i) Balanced diet is vital for the body and its systems to function properly.

(ii) It will help to maintain a healthy weight, reduce body fat, provide your body with energy, promote good sleep, helps to fight diseases and generally make you feel better.

***(9)** **What is the importance of digestive juices in the digestive system?**

(Can you recall - Textbook Page no. 12)

Ans.

(i) Digestive juices create conditions required for digestion of food.

(ii) Digestive juices contain enzymes which break down different components of food like carbohydrates proteins and fats, so that the essential nutrients are absorbed and properly utilized by the body.

***(10)** **What is the role of circulatory system in energy production?** *(Can you recall - Textbook Page no. 12)*

Ans. The circulatory system allows the transport of energy rich substances and oxygen in the blood to the body's cells so that they can produce energy for their functioning.

***(11)** **What happens to the cells of injured tissue?**

(Can you tell - Textbook Page no. 17)

Ans. The cells of the injured tissue start dividing and increase in numbers to repair and heal the injured tissue.

***(12)** **What is the source of proteins? What are they made up of?**

Ans.

(i) Sources of proteins: Milk and milk products, eggs, meat, legumes and pulses.

(ii) Proteins are made up of amino acids.

***(13)** **Whether new cells are formed during healing of wound?** *(Can you recall - Textbook Page no. 17)*

Ans.

Yes, the injured cells are restored by the formation of new cells.

***(14)** **Which system is in action for removal of waste materials produced in human body.**

(Can you recall - Textbook Page no. 12)

Ans. Excretory system in is action for removal of waste materials produced is human body.

***(15)** **How the individual of a species is formed from existing one of same species?**

(Can you tell - Textbook Page no. 17)

Ans.

(i) New individual of a species is formed from the existing one of the same species by the process of reproduction.

(ii) It involves cell division - mitosis and meiosis.

***(16)** **Whether the gametes are diploid or haploid? Why?** *(Use your Brain power-Textbook Page No. 20)*

Ans. The gametes are haploid as they have half the number of chromosomes (n).

***(17)** **How are the haploid cells formed?**

(Use your Brain power-Textbook Page No. 20)

Ans. Haploid cells are formed by a type of cell division called meiosis.

***(18)** **What is the importance of haploid cells?**

(Use your Brain power-Textbook Page No. 20)

Ans. When haploid cells or gametes fuse, they form a diploid zygote so that the chromosome number in the organism is restored.

***(19)** **From where do we obtain lipids?**

(Can you recall - Textbook Page no. 16)

Ans. We obtain lipids from milk, butter, cheese, oil, ghee, meat, nuts and oilseeds, etc.

Q.2.3. Write short notes on:

(1) Adenosine triphosphate (ATP)

Ans.

(i) Adenosine triphosphate (ATP) is energy rich molecule and energy is stored in the bonds by which phosphate groups are attached to each other.

(ii) These molecules are stored in the cells as per need.

(iii) Chemically, ATP is a triphosphate molecule formed from Adenosine ribonucteoside.

(iv) It contains a nitrogenous compound adenine, pentose sugar ribose and three phosphate groups.

(v) As per the need, energy is derived by breaking the phosphate bond of ATP. Hence, ATP is called as the energy currency of the cell.

(2) Proteins

Ans.

(i) Proteins are the macromolecules formed by bonding together many amino acids.

(ii) Proteins of animal origin are called as first class proteins.

(iii) We get 4 kcal of energy per gram of proteins.

(iv) Amino acids are obtained after digestion of proteins.

(v) These amino acids are absorbed in the body and transported upto each organ and cell via blood.

(vi) From these amino acids, organs and cells produce various proteins necessary for themselves and the whole body. Eg. Melanin, Keratin, Ossein, hemoglobin, etc.

(3) Vitamins

Ans.

(i) Vitamins are a group of heterogeneous compounds of which each is essential for proper operation of various processes in the body.

(ii) These are main six types of vitamins, namely A, B, C, D, E and K.

(iii) Out of these A, D, E and K are fat soluble whereas B and C are water soluble.

(iv) Vitamins like riboflavin (vitamin B_2) and nicotinamide (vitamin B_3) are necessary for production of $FADH_2$ and $NADH_2$ respectively which are produced in processes like glycolysis and Kreb's cycle.

Q.2.4. Distinguish between:

***(1) Glycolysis and TCA cycle**

Ans.

Glycolysis	TCA cycle
(i) Glycolysis occurs in the cytoplasm	(i) TCA cycle occurs in the mitochondria
(ii) Two molecules each of pyruvic acid, ATP, $NADH_2$ and water are formed	(ii) Molecules of CO_2, H_2O, $NADH_2$ and $FADH_2$ are formed.
(iii) It is also called as EMP pathway.	(iii) It is also called as Kreb's cycle.
(iv) No carbon dioxide is released.	(iv) Carbon dioxide is released.

***(2) Mitosis and Meiosis**

Ans.

Mitosis	Meiosis
(i) Mitosis takes places in the somatic cells.	(i) Meiosis takes place in the germ cells.
(ii) Occurs in both sexually as well as asexually reproducing organisms.	(ii) Occurs only in sexually reproducing organisms.
(iii) The cell divides only once.	(iii) There are two cell divisions, Meiosis I and Meiosis II.
(iv) Chromosome number remains constant at the end of mitosis.	(iv) Chromosomal number is reduced from diploid to haploid, at the end of meiosis.

***(3) Aerobic and Anaerobic respiration**

Ans.

Aerobic respiration	Anaerobic respiration
(i) Process occurs in the presence of oxygen.	(i) Process occurs in the absence of oxygen.
(ii) Common in all higher plants and animals.	(ii) Common in certain microorganisms but very rare in all higher plants and animals.
(iii) Energy is released in greater amounts in the form of ATP.	(iii) Energy is released in lesser amounts in the form of ATP.
(iv) Glucose is completely oxidised.	(iv) Glucose is incompletely oxidised.
(v) The end products are CO_2 and water.	(iv) The end products are CO_2 and organic acids or alcohol.

(4) Telophase and Prophase

Ans.

Telophase		Prophase	
(i)	It is the last stage of karyokinesis.	(i)	It is the first stage of karyokinesis.
(ii)	Nuclear membrane is formed around each set of chromosome.	(ii)	Nuclear membrane starts disappearing.
(iii)	Nucleolus starts being visible again.	(iii)	Nucleolus starts to disappear.
(iv)	Chromosomes are present at the opposite poles of the cell.	(iv)	Chromosomes are randomly arranged in the cell.

Q.2.5. Give scientific reasons :

***(1) Oxygen is necessary for complete oxidation of glucose.**

Ans.

(i) Aerobic cellular respiration is the process by which cells use oxygen to help them convert glucose into energy.

(ii) Without oxygen, glucose will be incompletely oxidized and very less energy (2ATP) is produced.

(iii) In the presence of oxygen glucose is completely oxidised to produce more energy (38 ATP).

(iv) Therefore, oxygen is necessary for complete oxidation of glucose.

***(2) Fibers are one of the important nutrients.**

Ans.

(i) We cannot digest fiber but they help in the digestion of other substances and egestion of undigested substances.

(ii) Hence, fibers are one of the important nutrients.

***(3) Cell division is one of the important properties of cells and organisms.**

Ans.

(i) Due to the property of cell division only, a new organism is formed from the existing one, a multicellular organism grows up and emaciated body can be restored.

(ii) It is required for wound healing and formation of blood cells.

(iii) Hence, cell division is one of the important properties of cells and organisms.

***(4) Sometimes, higher plants and animals too perform anaerobic respiration.**

Ans.

(i) The process of respiration yields energy which occurs by the oxidation of foodstuffs.

(ii) To perform aerobic respiration, higher plants and animals perform aerobic respiration.

(iii) Cases when oxygen gets depleted these organisms respire anaerobically to obtain energy.

(iv) Therefore, sometimes higher plants and animals too perform anaerobic respiration.

***(5) Kreb's cycle is also known as citric acid cycle.**

Ans. Kreb's cycle is also known as critric acid cycle because citric acid is the very first stable product generated, in this cycle.

(6) We feel tired when we exercise.

Ans.

(i) Our muscle cells perform anaerobic respiration while performing the exercise.

(ii) Due to this, less amount of energy is produced in our body and lactic acid accumulates due to which we feel tired.

(7) Water is an essential nutrient.

Ans.

(i) There is about 65-70% water in our body.

(ii) Each cell contains 70% water weight by weight.

(iii) Blood plasma also contains 90% of water.

(iv) Functioning of cells and thereby whole body gets disturbed even if there is a little loss of water from the body.

(v) Hence, water is an essential nutrient.

***(8) Many times, we experience dryness in mouth.**

(Use your Brain power - Textbook Page no. 17)

Ans. We experience dryness in the mouth due to drinking less fluids or loss of water from the body resulting in dehydration.

***(9) Oral rehydration solution (salt-sugar-water) is frequently given to a person experiencing loose motions.**

(Use your Brain power - Textbook Page no. 17)

Ans.

(i) When loose motions occur, essential fluids and

salts are lost from the body causing dehydration and must be quickly replaced.

(ii) ORS drink contains the main elements that are lost from the body during loose motions. Hence, ORS solution is frequently given to person experiencing loose motions.

***(10) We sweat during summer and heavy exercise.**
(Use your Brain power - Textbook Page no. 17)

Ans.

(i) Human beings are warm-blooded. We need to maintain a constant body temperature irrespective of the surrounding conditions.

(ii) In summer and during heavy exercise, lot of heat is generated which raises our body temperature.

(iii) Sweating leads to loss of excess body heat and brings down the body temperature to normal.

(iv) Therefore, we sweat during summer and heavy exercise.

***(11) Many times, you cannot eat hot food due to inflammation / ulceration in mouth.**
(Think - Textbook Page no. 17)

Ans.

(i) One of the reason for ulcer is deficiency of Vitamin B_{12}.

(ii) The inflammation / ulceration in mouth makes it painful and irritate the injured cells causing discomfort.

(iii) Therefore many times, you cannot eat hot food due to inflammation / ulceration in mouth.

***(12) Some persons experience difficulty in night vision since their childhood or adolescence.**
(Think - Textbook Page no. 17)

Ans.

(i) The difficulty in night vision is called night blindness.

(ii) This is due to the deficiency of vitamin A.

(iii) As a result, some persons experience difficulty is night vision.

Q.2.6. What would happen if :

(1) Soil with seeds is submerged under water during germination.

Ans. If the soil is submerged under water during germination, seeds perform anaerobic respiration.

(2) There is insufficient amount of carbohydrates in body due to exceptional conditions like fasting and hunger.

Ans. If there is insufficient amount of carbohydrates in body due to exceptional conditions like fasting and hunger, then lipids and proteins are used for energy production.

Q.3.1. Draw a neat labelled diagram of:

***(1) Human respiratory system.** *(Observe, Textbook Page No. 13)*

Ans.

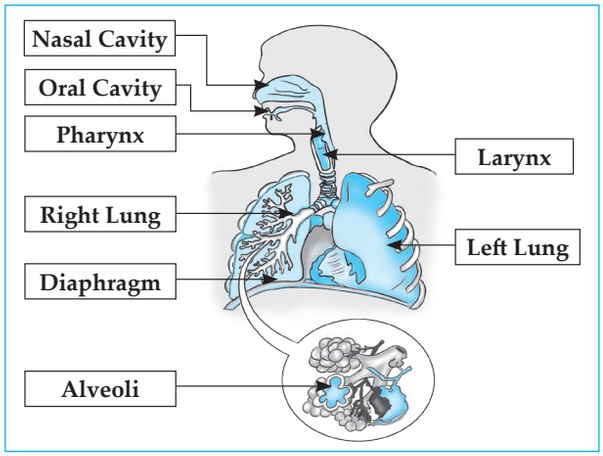


Fig. 2.1: Human Respiratory system

(2) Mitochondria and Tri-carboxylic acid cycle.

Ans.

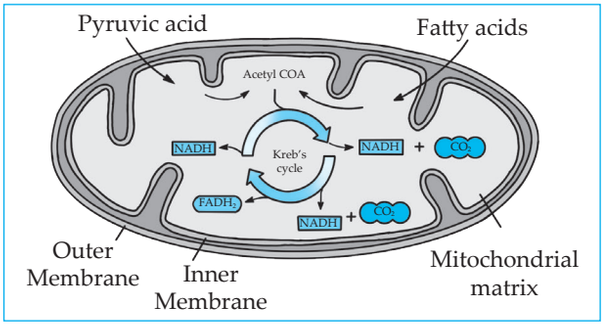


Fig. 2.2: Mitochondria and Tri-carboxylic acid cycle

Q.3.2. Answer the following :

***(1) Explain glycolysis in detail.**

Ans.

Glucose $\rightarrow$ Pyruvic acid $\rightarrow$ Acetyl–CoA $\rightarrow$ $CO_2 + H_2O$ + Energy
(glycolysis) (Kreb's cycle)

(i) Process of glycolysis occurs in cytoplasm.

(ii) A molecule of glucose is oxidized step by step in the process and two molecules of each i.e. pyruvic acid, ATP, $NADH_2$ and water are formed.

(iii) Molecules of pyruvic acid formed in this process are converted into molecules of Acetyl - Coenzyme A.

(iv) Two molecules of $NADH_2$ and two molecules of CO_2 are released during this process.

***(2) How are the various processes occurring in the human body controlled? In how many ways?**
(Can you recall - Textbook Page no. 12)

Ans.

(i) Various organ systems are continuously performing their functions in human body.

(ii) Along with the various systems like digestive, respiratory, circulatory, excretory and control systems, different external and internal organs are performing their functions independently but through a complete co-ordination.

(iii) This is controlled in two ways - Nervous control by nervous system and chemical control by the hormones secreted by the endocrine glands.

***(3) In terms of chemistry what happens actually, when a molecule is oxidized?**

(Can you tell - Textbook Page no. 13)

Ans. In terms of chemistry when a molecule is oxidized it gains oxygen or loses electrons or hydrogen.

***(4) Do the plants get injured when we pluck the flowers? How are those wounds healed?**

(Can you tell - Textbook Page no. 17)

Ans.

(i) Yes, plants get injured when we pluck flowers.

(ii) The wounds are healed by formation of new cells by cell division.

***(5) How does the growth of any living organism occur? Does the number of cells in their body increase? If yes, how?**

(Can you tell - Textbook Page no. 17)

Ans.

(i) Growth of any living organism occurs due to cell division.

(ii) Yes, the number of cells in their body increase.

(iii) The number of cells increases by the process of mitosis.

***(6) What is the shape of a chromosome? Give its name in the figure.**

(Can you recall - Textbook Page no. 18)

Ans. The shape of the chromosome is metacentric. (as the centromere is in the centre)

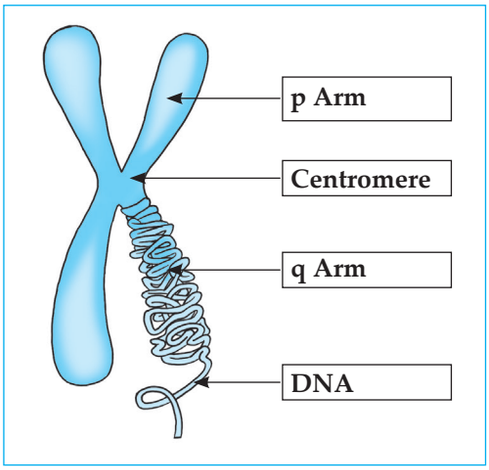


Fig. 2.3: Structure of chromosome

***(7) What is respiration? How does it occur?**

(Can you recall - Textbook Page No. 12)

Ans.

(i) The process of release of energy by oxidation of food is called as respiration.

(ii) In living organisms, respiration occurs at two levels - body and cellular level.

(iii) In case of body level, oxygen and carbon dioxide are exchanged between the body and surrounding.

(iv) In case of cellular level, food is oxidized either with or without the help of oxygen to release energy.

***(8) How are the food stuffs and their nutrient contents useful for body?**

(Can you recall - Textbook Page No. 12)

Ans. The following table shows how food stuffs and their nutrient contents are useful for body.

Food stuff	Nutrients present	Health benefits
(1) Fruits and vegetables	carbohydrates, vitamins, fibers and sugar.	reduce risk of chronic diseases, build immunity, prevent constipation.
(2) Wheat flour	carbohydrates, proteins, vitamins and minerals.	promote healthy digestion support metabolism, provide energy.
(3) Honey	carbohydrates, vitamins, minerals and antioxidants.	build immunity.
(4) Milk	carbohydrates, proteins, fats, vitamins, minerals, etc.	maintain healthy blood pressure, provides energy, supports growth.

***(9) Which different functions are performed by muscles in body?**

(Can you recall - Textbook Page no. 12)

Ans.

(i) Muscles bring about movement of arms and legs, running, speaking, walking etc.

(ii) Muscles also bring about movement of eyelids, passage of food through the alimentary canal, contraction and relaxation of blood vessels.

(iii) Cardiac muscles bring about contraction and relaxation of the heart.

***(10) Why may be the players seen consuming these food stuffs?** *(Use your Brain power, Textbook Pg. 12)*

Ans.

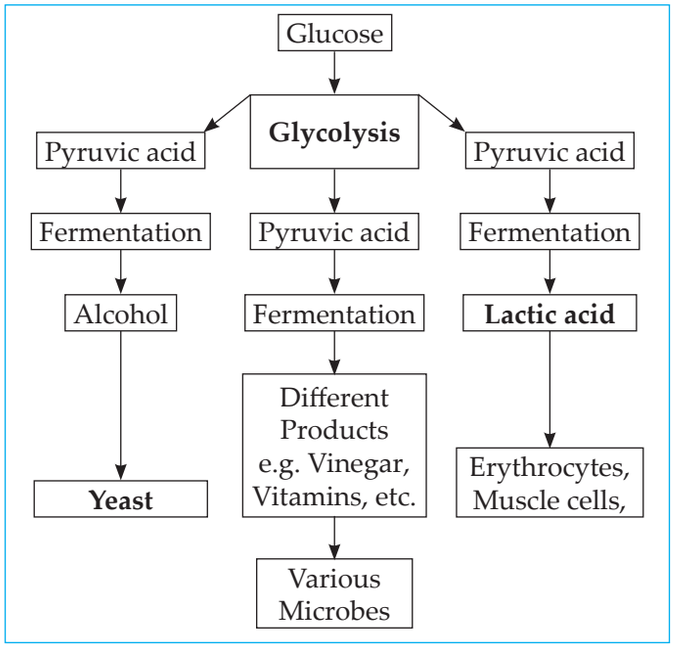
(i) Players are in need of continuous energy during games.

(ii) Carbohydrates (glucose) are major and quick source of energy.

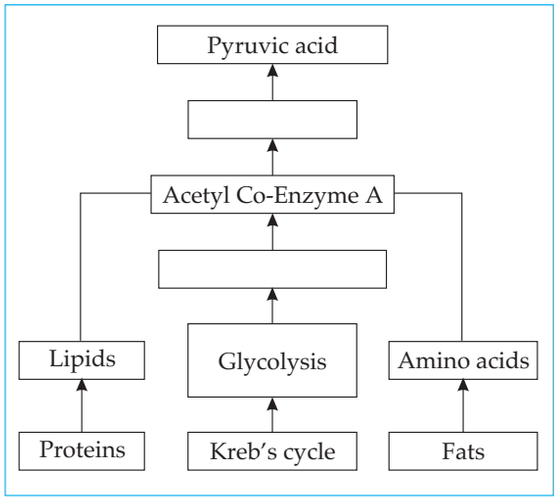
(iii) Hence, players are seen consuming food stuffs rich in carbohydrates during breaks of the game.

Q.3.3. Complete the given table:

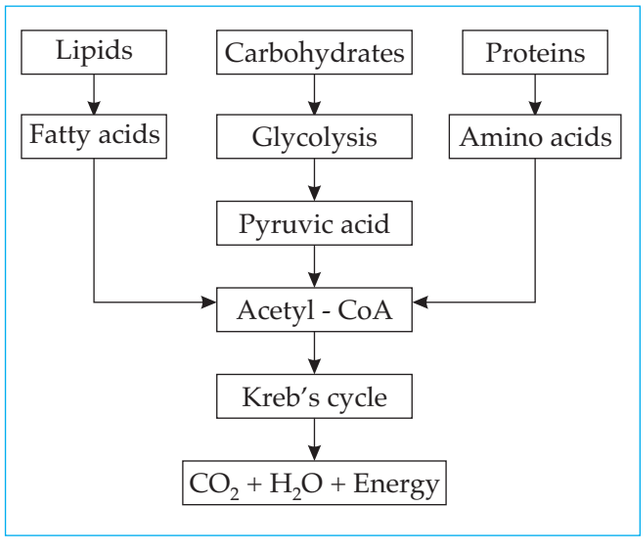
(1) Anaerobic respiration in living organisms/ cells



***(2) How energy is formed from oxidation of carbohydrates, fats and protein? Correct the diagram given below.**



Ans.



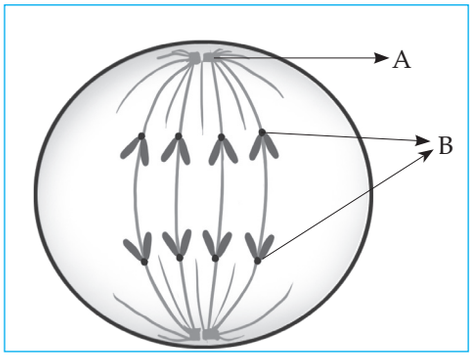
(3) Give examples of different proteins formed in various parts of our body from amino acids:

Ans.

Body Part	Protein
Skin	Melanin, Keratin
Bones	Ossein
Cells	Various proteins of cell membrane, various enzymes
Pancreas	Insulin, Trypsin
Pituitary gland	Various hormones
Muscles	Actin and Myosin
Blood	Haemoglobin, antibodies

Q.3.4. Observe the figure and answer the following questions.

(1)



(a) Label the parts A and B.

Ans. (A) Centriole (B) Chromatids

(b) Identify the phase of cellular division.

Ans. The phase is Anaphase of mitosis cell division.

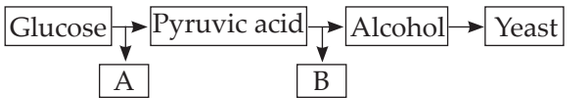
(c) What phase comes before this phase?

Ans. Metaphase is before this phase.

(d) Define the term Karyokinesis.

Ans. Karyokinesis means division of the nucleus.

(2)



(a) Name the processes A and B.

Ans. A - Glycolysis

B - Fermentation

(b) What type of energy production is shown above?

Ans. Anaerobic energy production.

(c) Give one point of difference between yeast cells and muscle cells in relation to the above process.

Ans. In yeast cell, the end product is alcohol and in muscle cells, the end product is Lactic acid.

Q.4. Answer in detail :

***(1) With the help of suitable diagrams explain the mitosis in detail.**

Ans.

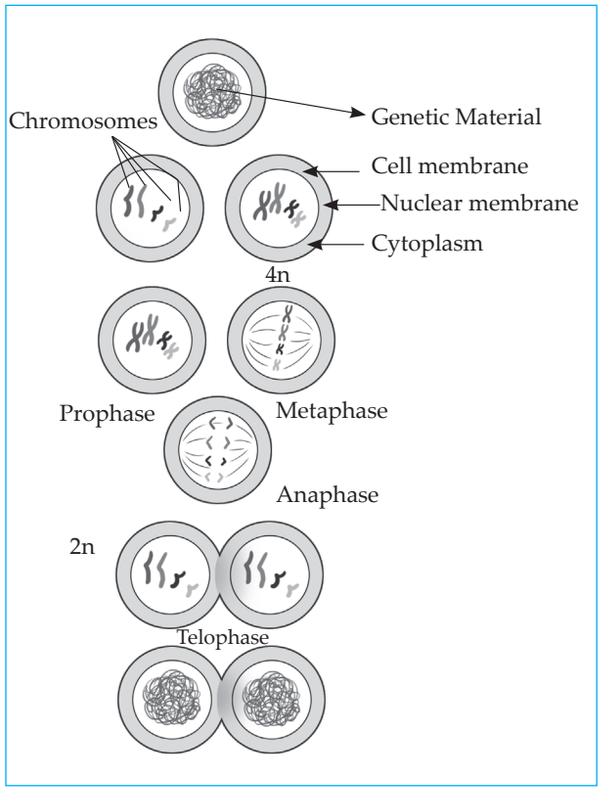


Fig. 2.4. Mitosis

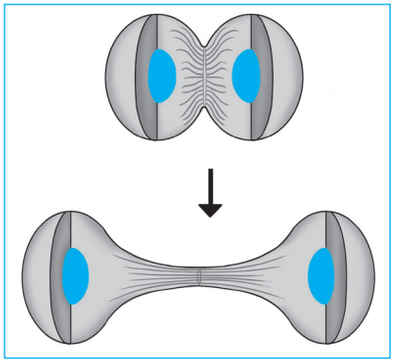


Fig. 2.5 Cytokinesis

Ans.

(1) Somatic cells and stem cells divide by mitosis.

(2) Mitosis is completed through two main steps,

(a) Karyokinesis (nuclear division)

(b) Cytokinesis (cytoplasmic division)

(3) **Karyokinesis** is completed through 4 steps.

(a) **Prophase :** (i) Condensation of basically thin thread - like chromosomes starts.

(ii) Due to this, they become short and thick and they start to appear along with the pairs of sister chromatids.

(iii) Centrides duplicate and each centride moves to opposite poles of the cell.

(iv) Nuclear membrane and nucleous start to disappear.

(b) **Metaphase :** (i) Nuclear membrane completely disappears. Chromosomes complete their condensation and become clearly visible.

(ii) All chromosomes are arranged parallel to equatorial plane (central plane) of the cell.

(iii) Special type of flexible protein fibres (spindle fibres) are formed between centrioles and centromere of each chromosome.

(c) **Anaphase :** (i) Centromeres split and thereby sister chromatids of each chromosome separate and they are pulled apart in opposite directions with the help of spindle fibres.

(ii) Separated sister chromatids are called daughter chromosomes.

(iii) In this way, each set of chromosomes reach at two opposite potes of the cell.

(d) **Telophase :** (i) The chromosoms which have reached at opposite poles of the cell now start to decondense due to which they again become thread like thin and invisible.

(ii) Nuclear membrane is formed around each set of chromosomes reached at poles.

(iii) Thus two daughter nuclei are formed in a cell.

(iv) Nucleolus also appears in each daughter nucleus. Spindle fibres completely disappear.

(4) In this way, karyokinesis completes and cytokinesis begin.

(5) **Cytokinesis :** The cytoplasm divides by cytokinesis and two new cells are formed which are called as daughter cells. In this process, a

notch is formed at the equatorial plane of the cell which deepens gradually and thereby two new cells are formed.

(6) However, in case of plant cells, instead of the notch, a cell plate is formed exactly along the midline of the cell and thus cytokinesis is completed.

***(2) With the help of suitable diagrams, explain the five stages of prophase I of meiosis.**

Ans. (i) Prophase I is the most important stage of meiosis and differs considerably from the prophase of mitosis. (ii) It is divided into 5 stages leptotene, zygotene, pachytene, diplotene and diakinesis. (iii) It involves essentially the crossing over and recombination of genetic material between non sister chromatids.

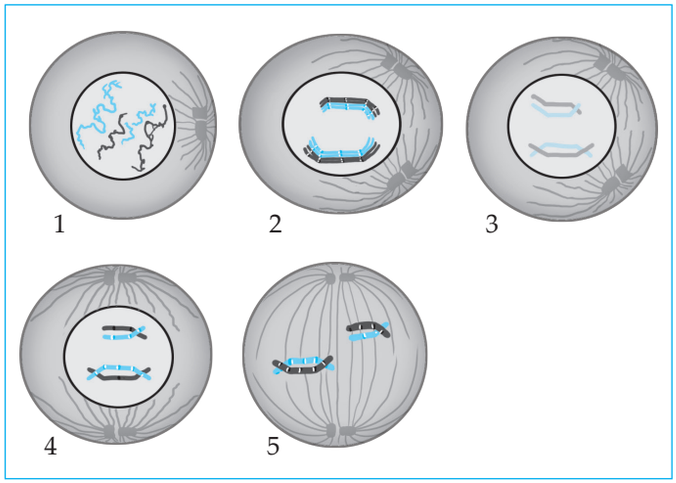


Fig. 2.6 Prophase - I (1 - 5)

(iv) Phase - I - Leptotene : In this stage already replicated chromatin network condenses and start converting into long thin thread like chromosomes.

(v) Phase - II - Zygotene : It this stage homologous chromosomes come closer to each other. This pairing is called **'Synapsis'**.

(vi) Phase - III - Pachytene : Sister chromatids become visible in this stage. Crossing over occurs between non-sister chromatids of the homologous chromosomes. The crossing over is called as 'Chiasma or Chiasmata' and this leads to genetic recombination causing variations.

(vii) Phase - IV - Diplotene : In this stage, recombined sister chromatids start repelling. Nucleolus and nuclear membrane start disappearing.

(viii) Phase - V - Diakinesis : Chromosomes further condense and shorten. Nucleolus and nuclear membrane completely disappear, spindle fibres begin to appear.

***(3) How all the life processes contribute to the growth and development of the body?**

Ans.

(i) Various organ systems are continuously performing their functions in human body.

(ii) Along with the various systems like digestive, respiratory, circulatory, excretory and control system, different external and internal organs are performing their functions independently but through complete co-ordination.

(iii) This overall system is in need of continuous source of energy.

(iv) Besides, it is co-ordinated by the control system of the body i.e. each life process contributes in its own way in the process of energy production.

(v) Thus, all life processes contribute to the growth and development of the body.

***(4) Explain the Kreb's cycle with reaction.**

Ans.

(i) Both molecules of acetyl-CoA produced from pyruvic acid (from glycolysis) enter the mitochondria.

(ii) Cyclic chain of reactions called as tricarboxylic acid cycle is operated on it in the mitochondria.

(iii) Acetyl part of acetyl-CoA is completely oxidized through this cyclical process and molecules of CO_2, H_2O, $NADH_2$, $FADH_2$ are formed.

(iv) Net reaction of Kreb's cycle:

$$\text{Acetyl-CoA} + 3NAD^+ + FAD + GDP + Pi + 3H_2O \rightarrow 2CO_2 + CoA + 3(NADH + H^+) + FADH_2 + GTP)$$

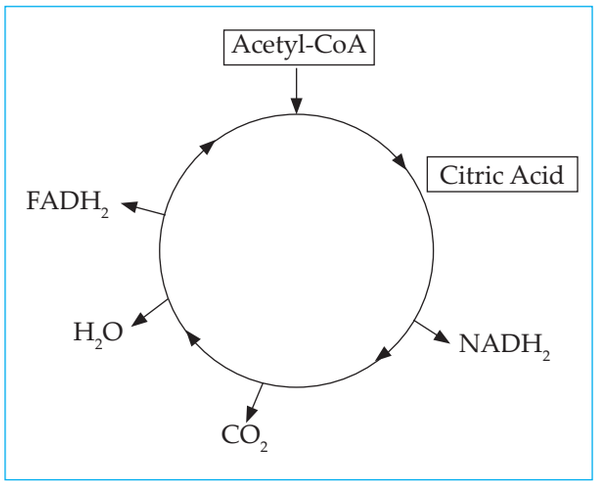


Fig. 2.9 Kreb's Cycle

(5) What are lipids? What is their role in our body?

Ans.

(i) The substance formed by specific chemical bond between fatty acids and alcohol are called as lipids.

(ii) Digestion of lipids is their conversation into fatty acids and alcohol.

(iii) Fatty acids are absorbed and distributed everywhere within the body.

(iv) From these fatty acids, different cells produce various substances necessary to themselves.

(v) For example, phospholipids which are essential for producing plasma membrane are formed from fatty acids.

(vi) Fatty acids are also used for producing hormones like progesterone, estrogen, testosterone, aldosterone, etc and the covering around axons of nerve cells.

(vii) We get 9 Kcal of energy per gram of lipids.

(viii) Excess of lipids are stored in adipose connective tissue in the body.

(6) Describe Anaerobic respiration.

Ans.

(i) Some organisms cannot live in presence of oxygen. E.g. Many bacteria.

(ii) Such living organisms have to perform anaerobic respiration for energy production.

(iii) Glucose is incompletely oxidised and less amount of energy is obtained in anaerobic respiration.

(iv) Glycolysis and fermentation are two steps of anerobic respiration.

(v) Pyruvic acid produced through glycolysis is converted into other organic acids or alcohol with the help of some enzymes. This is called as fermentation.

(vi) Some higher plants, animals and aerobic microorganisms also perform anaerobic respiration instead of aerobic respiration if there is depletion of oxygen level in the surrounding.

(vii) Example: Seeds perform anaerabic respiration if the soil is submerged under water during germination.

(viii) Similarly, our muscle cells also perform anaerobic respiration while performing the exercise.

(ix) Due to this less amount of energy is produced in our body and lactic acid accumulates in the muscles due to which we feel tired.

(7) Explain with the help of a diagram - ATP is called as the energy currency of the cell.

OR

Explain the importance of ATP in a cell with a diagram.

Ans.

(i) ATP (Adenosine Tri-phosphate) is an energy rich molecule.

(ii) Energy is stored in the bonds by which phosphate groups are attached to each other.

(iii) As per energy need, energy is derived by breaking the phosphate bond of ATP.

(iv) Hence, ATP is called as the energy currency of the cell.

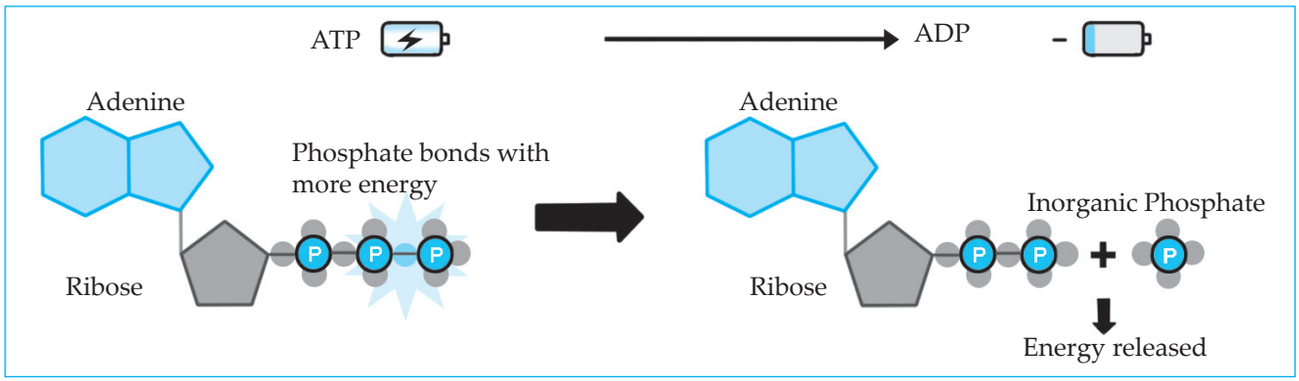


Fig. 2.8 : Energy currency of the cell

❖ ❖ ❖

ASSIGNMENT - 2

Time : 1 hour **Marks : 20**

Q.1. (A) Answer the following: **(3)**

(1) Fill in the blank: Our muscle cells perform ..... type of respiration during exercise.

(2) Write the full form of NADH.

(3) Name the water soluble vitamins.

Q.1. (B) Choose and write the correct option: **(2)**

(1) Water content of Blood Plasma is ..... .

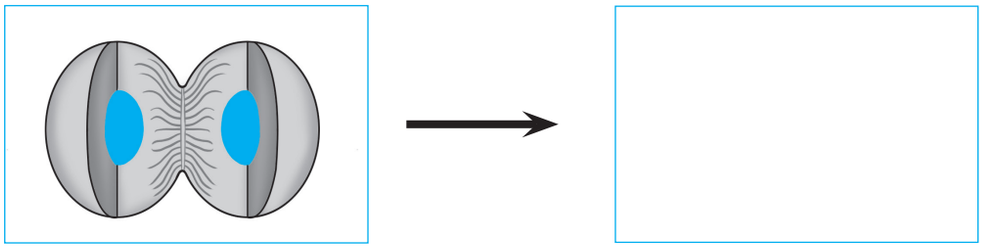
(a) 70% (b) 90% (c) 65% (d) 50%

(2) In which part of cell, electron transfer chain reaction occurs?

(a) Cytoplasm (b) Mitochondria (c) Nucleus (d) Golgi body

Q.2. Answer the following : (Any 2) **(4)**

(1) Complete the diagram.



(2) Give scientific reason: We feel tired when we do exercise.

(3) Distinguish between : Anaphase and Telophase.

Q.3. Answer in brief: (Any 2) **(6)**

(1) Explain the Metaphase and Telophase of Mitosis.

(2) What are proteins ? What is their role in our body?

(3) How are the various processes occurring in the human body controlled? In how many ways?

Q.4. Answer in detail : (Any 1): **(5)**

(1) Explain glycolysis and Kreb's cycle in detail.

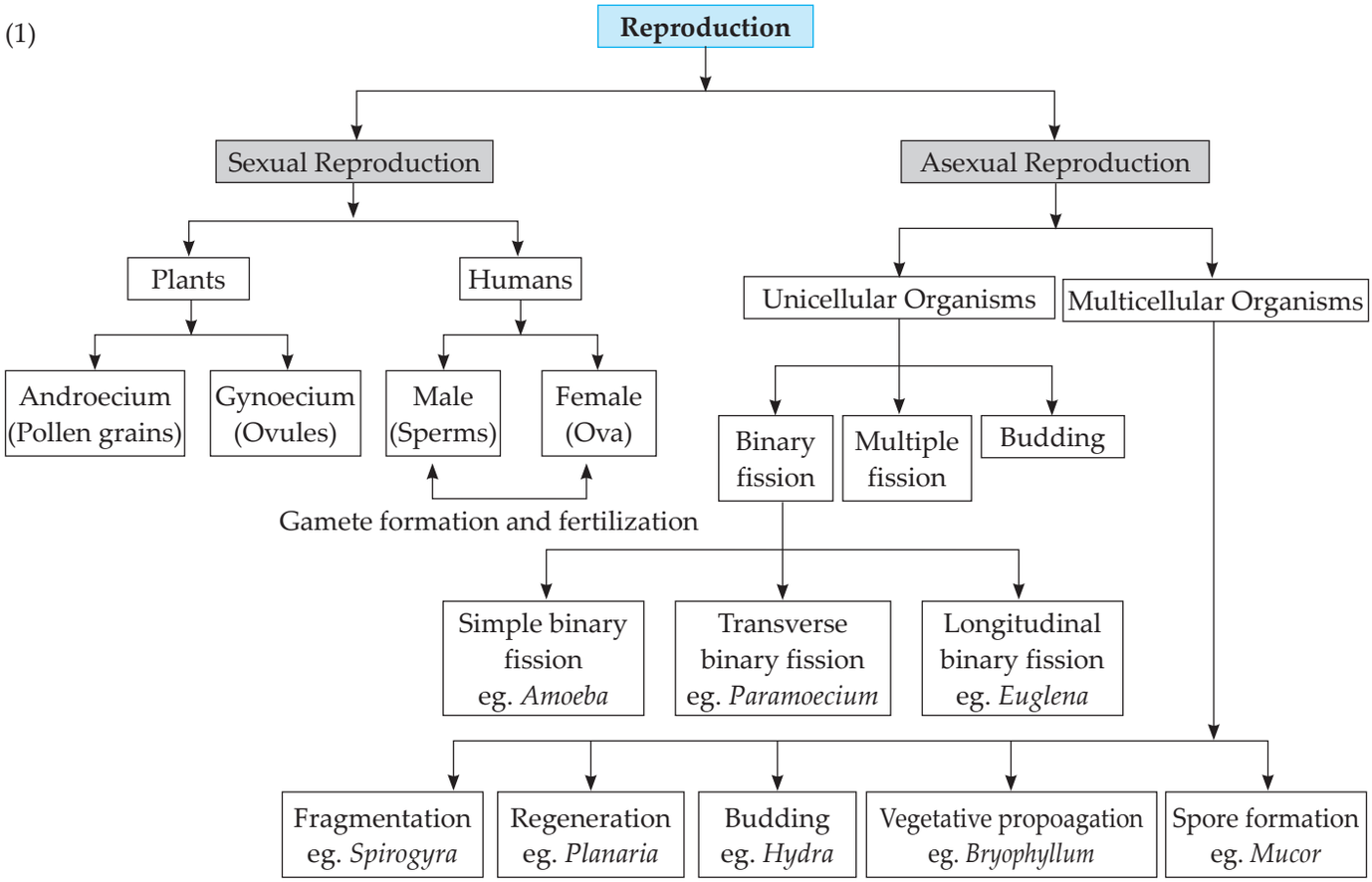
(2) With the help of a suitable diagram explain five stages of prophase I - in meiosis.

❖ ❖ ❖

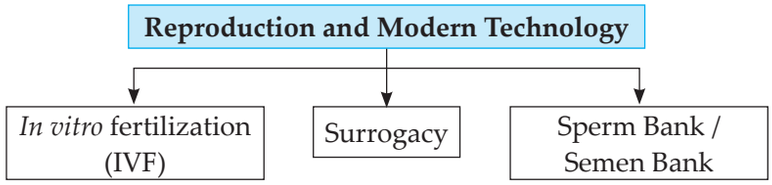
3 Life Processes in Living Organisms Part - 2

CONCEPT MAP

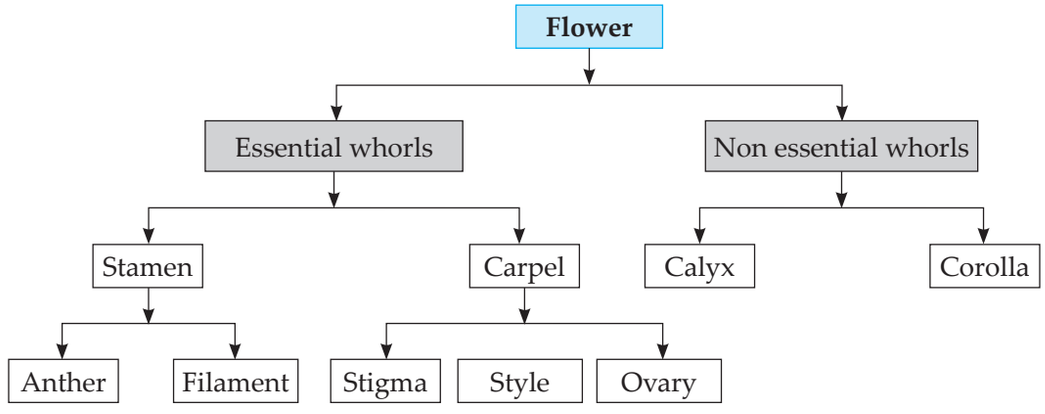
(1)



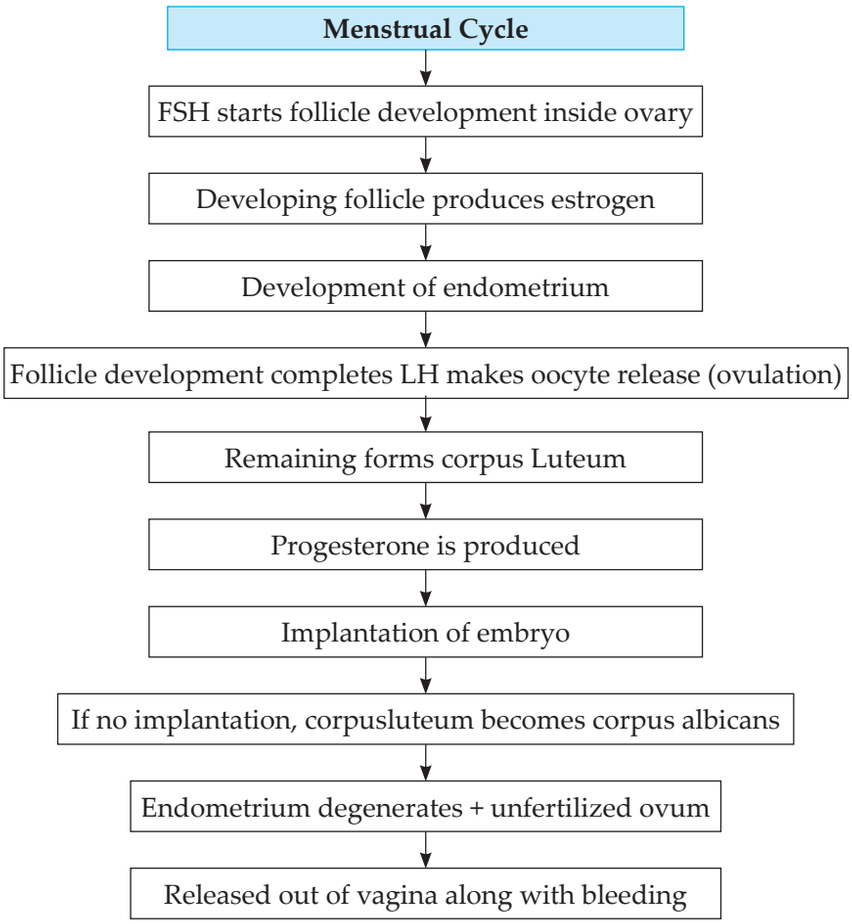
(2)



(3)



(4)



Points to Remember:

- Formation of new organisms of same species by earlier existing organism is called as reproduction.
- Reproduction is one of the various important characters of living organisms.
- It is one of the reasons for evolution of species.
- Reproduction occurs mainly by two methods : Asexual reproduction and Sexual reproduction.
- **Asexual Reproduction:**
  - Process of formation of new organism by an organism of same species without involvement of gametes is called as asexual reproduction.
  - Absence of genetic recombination is a disadvantage, whereas fast process is advantage of this reproductive method.
- **Asexual reproduction in unicellular organisms:**
  - **Binary fission**
    - In this process, the parent cell divides to form two similar daughter cells.
    - Binary fission occurs either by mitosis or amitosis.
    - Axis of fission/division is different in different protists.
  - **Multiple Fission**
    - Asexual reproduction by multiple fission is performed by *Amoeba* and other similar protists.
    - Many nuclei are formed by repeated nuclear division in the cyst.
    - It is followed by cytoplasmic division and thus many amoebulae are formed.

- Cyst breaks open on arrival of favourable condition and many amoebulae are released.

- **Budding**
  - Asexual reproduction occurs by budding in yeast - unicellular fungus.
  - Yeast reproduces by mitotic division.
  - A small bulge appears on the surface of the parent cell.
  - This bulge is actually a bud. One of the two daughter nuclei enters this bud.
  - After sufficient growth, bud separates from the parent cell and starts to live independently as a daughter yeast cell.

- **Asexual reproduction in multicellular organisms:**
  - **Fragmentation**
    - In this type of reproduction, the body of parent organism breaks into many fragments and each fragment starts to live as an independent new organism.

      e.g. *Spirogyra* and *Sycon*
  - **Regeneration**
    - Under certain situation, an animal- *Planaria* breaks up its body into two parts and thereafter each part regenerates remaining part of the body. Thus, two new *Planaria* are formed. This is called as Regeneration.
  - **Budding:**
    - *Hydra* reproduces with this process under specific conditions.
    - An outgrowth is formed by repeated division of regenerative cells of body wall.
    - This bud formed grows progressively and finally forms small *Hydra*.
  - **Vegetative Propagation:**
    - Reproduction in plants with the help of vegetative parts like root, stem, leaf and bud is called as vegetative reproduction. e.g. *Bryophyllum*, carrots and raddish.
  - **Spore formation:**
    - Fungi like mucor have filamentous body. They have sporangia.
    - Once spores are formed sporangia bursts and spores are released.
    - Spores germinate in moist and warm place and new fungal colony is formed.

- **Sexual Reproduction** - Sexual reproduction always occur with the help of two germ cells : female gamete and male gamete.

- **Two main processes occur in the sexual reproduction**
  - Gamete formation - Haploid gametes are formed by meiosis.
  - Fertilization - A diploid zygote is formed in this process by union of haploid male and female gametes. This zygote divides by mitosis and embryo is formed. The embryo develops to form new individual.

- **Sexual reproduction in plants:**
  - A flower is the structural unit of sexual reproduction in plants.
  - A flower consists of four floral whorls as calyx, corolla, androecium and gynoecium.
  - Androecium and gynoecium are called as essential whorls.
  - Calyx and corolla are accessory whorls.
  - Androecium is male whorl and its members are called as stamens.
  - Gynoecium is female whorl and its members are called as carpels.
  - Ovary is present at the basal end of carpel.
  - A hollow style comes up from the ovary.
  - Stigma is present at the tip of style.
  - Ovary contains one or many ovules.
  - Embryo sac formed in each ovule consists of a haploid egg cell and two haploid polar nuclei.

- Transfer of pollen grains from anther to stigma is called as Pollination.
- Pollination occurs with the help of biotic and abiotic agents.
- Pollen grains germinate and fall on sticky stigma.
- Pollen tube carries male gametes which reaches the embryo sac via style.
- One male gamate unites with egg cell to form Zygote.
- This process is called fertilization.
- Second male gamate unites with two polar nuclei and endosperm is formed. This process is called double fertilization.

- **Sexual reproduction in human beings:**
  - **Human male reproductive system:**
    - Male reproductive system of human consists of testes, various ducts and glands.
    - Testes present in the scrotum outside the abdominal cavity, contains numerous seminiferous tubules.
    - Germinal epithelium present in tubules divide by meiosis to produce sperms.
    - Sperms travel through sequence from testes, vas eferens, epididymis, vas deferens, ejaculatory duct and lastly to urinogenital duct.
    - Seminal vesicles secrete their secretion in ejaculatory duct and prostate gland and cowper's glands secrete their secretion in urinogenital duct.
    - Semen is a mixture of sperms and these secretions.
    - Semen is ejaculated through penis.
  - **Human female reproductive system**
    - Female reproductive system includes a pair of ovaries, a pair of oviducts, single uterus and a vagina.
    - A pair of bulbo-urethral gland is present.
    - An ovum is released every month in the abdominal cavity alternately from each ovary.
    - The oviduct which is funnel shape has a free end through which the oocyte enters it.
    - Cilia present on the inner surface of the oviduct push the oocyte towards the uterus.
  - **Gamete formation**
    - Both gametes i.e. sperm and ovum are formed by meiosis.
    - Sperms are produced in testes of men from beginning of maturation till death.
    - 2 - 4 million immature oocytes are present in the ovary from the time of birth.
    - An oocyte matures and is released every month and stops at the age of menopause (i.e. 45 years)
  - **Fertilization**
    - Formation of zygote by union of sperm and ovum is called as fertilization.
    - It is internal in humans.
    - Semen is ejaculated in vagina during copulation and sperms start their journey from vagina-uterus-oviduct.
    - One of the few million sperms fertilize the only ovum present in the oviduct.
    - From the age of puberty upto menopause, an ovum is released every month.
    - Only 400 oocytes are released and rest undergo degeneration.
- **Development and Birth**
  - The zygote formed after fertilization in the oviduct, undergoes repeated mitotic divisions and embryo is formed.
  - Embryo is then implanted in uterus for further development.
  - Placenta is formed for supply of food material from mother to the body.
  - Embryonic development is completed approximately within nine months after the fertilization.

- **Menstrual cycle**
  - Female reproduction system undergoes some changes at puberty and those changes repeat at the interval of every 28 - 30 days. This repetitive changes are called as menstrual cycle.
  - It is controlled by four hormones : follicle stimulating hormone (FSH), luteinizing hormone [LH], estrogen and progesterone.
  - One of the follicles in the ovary starts to develop along with oocyte in presence of FSH.
  - This developing follicle secretes estrogen.
  - Endometrium of uterus starts to develops in presence of estrogen.
  - Developed follicle bursts in presence of LH and oocyte is released. This is called as ovulation.
  - Remaining tissue of follicle forms the corpus luteum.
  - Corpus luteum secrets Progesterone.
  - Endometrial glands secrete their secretion in presence of progesterone and such endometrium is ready for implantation.
  - If oocyte is not fertilized within 24 hours, corpus luteum becomes inactive and transforms into corpus albicans and secretion of estrogen and progesterone stops.
  - Endometrium degenerates in absence of these hormones.
  - Tissues of endometrium and unfertilized ovum are discarded through vagina accompanied with continuous bleeding. This is called menstruation and continues for five days.
  - Menstrual cycle is a natural process.
- **Reproduction and modern technology**
  - Many couples cannot have child due to various reasons.
  - But now with the help of advanced medical techniques like IVF, Surrogacy, Sperm bank, the childless couples can have a child.
  - In IVF, fertilization is brought about in a test tube and embryo formed is implanted in uterus of woman at appropriate time.
  - In surrogacy, oocyte is collected from woman having problem in implantation and sperms are collected from her husband and fertilized in the test tube.
  - The embryo thus formed is implanted in uterus of some other woman having normal uterus. Such a woman is called as a surrogate mother.
  - Just as women, men also face issue with sperm production.
  - A new concept of sperm bank has been introduced.
  - Semen is collected from desired men and stored in the sperm bank
- **Twins.**
  - When two embryos develop simultaneously in the same uterus and thus two offsprings are delivered simultaneously. Such offsprings are called as Twins.
  - They are of two types: monozygotic twins ana dizygotic twins.
  - Monozygotic twins are exactly similar to each other and their gender is also same.
  - Dizygotic twins are formed from two separate oocytes and sperms so they are genetically different and may be of same or different gender.
- **Reproductive Health**
  - A person's state of being physical, mental and social strength is called health.
  - Occurrence of menstrual cycle is related with reproductive and overall health of women.
  - Some problems regarding reproductive health may arise in men too.
  - Therefore, it is essential to maintain cleanliness of their genitals in order to protect themselves from various sexual diseases, syphilis and gonorrhea which are caused by bacteria.

MASTER KEY QUESTION SET - 3

Q.1. (A) 1. Fill in the blanks and rewrite the completed statement:

*(1) In humans, sperm production occurs in the organ .....

*(2) In humans, ... chromosome is responsible for maleness.

*(3) In male and female reproductive system of human,..... gland is same.

*(4) Implantation of embryo occurs in ..... .

*(5) ..... type of reproduction occurs without fusion of gametes.

*(6) Body breaks up into several fragments and each fragment starts to live as a new individual. This is ..... type of reproduction.

*(7) Pollen grains are formed by .....division in locules of anthers.

(8) Yeast cell produces two daughter nuclei by ..... division.

(9) The zygote divides by mitosis and ..... is formed.

(10) .....breaks open on arrival of favourable conditions and many amoebulae are released.

(11) ..... and digestive cavity of the budding *Hydra* are in continuity with those of parent *Hydra*.

(12) A ..... is formed in the process of fertilization by union of hyploid male and female gametes.

(13) ..... is male whorl and its members are called as stamens.

(14) Embryonic development is completed approximately within ..... after the fertilization.

(15) Encysted *Amoeba* or any other protist is called .....

(16) Reproduction in plants with the help of parts like root, stem, leaf and bud is called as ..... .

(17) *Planaria* reproduces by..... .

(18) Fungi like ..... have filamentous body.

(19) In ....., chromosome number is reduced to half.

(20) ..... is the structural unit of sexual reproduction in plants.

(21) ..... are called essential whorls.

(22) Many flowers have stalk for support called as ..... .

(23) Members of gynoecium are called as .....

(24) ..... is present at the tip of the style.

(25) Testes contain numerous ..... .

(26) ..... present in semiinferous tubules divide by meiosis to produce sperms.

(27) ..... is the stoppage of functioning of female reproduction system.

(28) The two main methods of reproduction are ..... and ..... .

(29) Cell organelles like ..... and ..... perform asexual reproduction by binary fission.

(30) A flower is called as ..... if both whorls i.e., androecium and gynoecium are present in the same flower.

(31) Formation of zygote by union of sperm and ovum is called as ..... .

(32) An organ called as ..... is formed for the supply of food material to the embryo in the uterus.

(33) Endometrium of the uterus starts to develop or regenerate under the effect of ..... .

(34) Corpus luteum secrets the hormone..... .

(35) In ..... technique, fertilization is brought about in test tube.

(36) Women who have problems in implantation of embryo in uterus can take the help of modern technique called..... .

(37) Twins formed from single embryo are called ..... twins.

(38) If embryonic cells are divided into two groups, 8 days after the zygote formation, there is high possibility of formation of ..... .

(39) A person's state of physical mental and social strongness is called as .....

(40) If oocyte is not fertilized within 24 hours, corpus luteum becomes inactive and transforms into ..... .

(41) In plants, second male gamete fuses with two polar nuclei to form ..... .

(42) Testes are present in the ..... outside the abdominal cavity.

(43) ..... is formed of sperms and the secretions of prostate glands, cowper's glands and seminal vesicles.

(44) The action of giving birth to young baby is called ..... .

(45) All the organs of male reproductive system are paired except urinogenital duct, penis and ..... .

Ans. *(1) testes (2) Y (3) Note: No glands are same is male and female reproductive system of human. (4) uterus (5) Asexual (6) fragmentation (7) meiosis (8) mitotic (9) embryo (10) Cyst (11) Dermal layers (12) diploid zygote (13) Androecium (14) nine months (15) cyst (16) vegetative propagation (17) regeneration (18) mucor (19) meiosis (20) Flower (21) Androecium and gynoecium (22) pedicel (23) carpels (24) Stigma (25) seminiferous tubules (26) Germinal epithelium (27) Menopause (28) asexual, sexual (29) mitochondria, chloroplasts (30) bisexual (31) fertilization (32) placenta (33) estrogen (34)progesterone (35) In Vitro Fertilization (IVF) (36)surrogacy (37) Monozygotic (38) conjoined twins (Siamese twins) (39) health (40) corpus albicans (41) Endosperm (42) Scrotum (43) Semen (44) Parturition (45) Scrotum*

Q.1. (A) 2. Select the odd man out:

(1) Stigma, style, anther, ovary.

Ans. Anther - others are female reproductive parts of a flower whereas anther is the male part.

(2) Vagina, uterus, testes, ovaries.

Ans. Testes - others are female reproductive organs whereas testes are male reproductive organs.

(3) *Bryophyllum*, carrot, raddish, *Spirogyra*.

Ans. *Spirogyra* - others reproduce by vegetative propagation whereas *Spirogyra* reproduces by fragmentation.

(4) Rete testes, urinogenital duct, oviduct, epididymis.

Ans. Oviduct - others are male reproductive organs whereas oviduct is a female reproductive organ.

Q.1. (A) 3. Complete the analogy:

(1) Prokaryote : Bacteria : : Protist : ..... .

Ans. *Amoeba* - Prokaryotes like bacteria and Protists like *Amoeba* perform asexual reproduction by binary fission.

(2) *Paramoecium* : ..... : : *Euglena* : longitudinal binary fission

Ans. Transverse binary fission - *Paramoecium* divides by transverse binary fission, whereas *Euglena* by longitudinal binary fission.

(3) *Hydra* : Budding : : *Bryophyllum* : : .....

Ans. Vegetative propagation - Reproduction in *Hydra* occurs via budding, whereas *Bryophyllum* reproduces through vegetative propagation.

(4) Androecium : ..... : : Gynoecium : Carpels

Ans. Stamen - Androecium is male whorl and its members are called as stamen whereas Gynoecium is female whorl and its members are called as carpels.

(5) XX - chromosomes : Female : : ..... : male

Ans. XY - chromosomes - One pair of sex chromosomes in males is XY, whereas in female it is XX.

(6) Calyx and corolla : Accessory whorls : : Androecium and Gynoecium : ..... .

Ans. Essential whorls - Androecium and gynoecium are called 'essential whorls' because they perform the function of reproduction, whereas calyx and corolla are called 'accessory whorls' because they are responsible for protection of inner whorls.

(7) Ovule : Seed : : Ovary : ..... .

Ans. Fruits - After fertilization, ovary develops into fruit, whereas ovules develop into seeds.

(8) Calyx : Sepals : : Corolla : ..... .

Ans. Petals - Members of calyx are called 'sepals' whereas, members of corolla are called 'petals'.

(9) Single embryo : Monozygotic twins : : Two embryos : ..... .

Ans. Dizygotic twins - Monozygotic twins are formed from single embryo whereas, dizygotic twins are formed from two separate oocytes and sperms.

(10) *Planaria* : Regeneration : : *Mucor* : ..... .

Ans. Spore formation - *Planaria* reproduces by fragmentation, whereas Mucor reproduces by spore formation.

(11) Root, stem, leaf : Vegetative propagation : : Flower : ..... .

Ans. Sexual reproduction - Root, stem and leaf reproduces by vegetative propagation of asexual reproduction, whereas flower reproduces by sexual reproduction.

(12) Length of epididymis : 6 meters : : Length of a sperm : ..... .

Ans. 60 micrometers - Length of each epididymis is about 6 meters, while the length of a sperm is about 60 micrometers.

Q.1. (A) 4. Match the columns:

(1)

Column 'A'	Column 'B'
(1) *Amoeba*	(a) Fragmentation
(2) Yeast	(b) Vegetative propagation
(3) *Bryophyllum*	(c) Binary fission
(4) *Mucor*	(d) Budding
	(e) Spore formation

Ans. *(1 – c); (2 – d); (3 – b); (4 – e)*

(2)

Column 'A'	Column 'B'
(1) FSH	(a) Regeneration of endometrium
(2) Luteinizing hormone	(b) Secretion of endometrial glands
(3) Progesterone	(c) Development of follicle
(4) Estrogen	(d) Ovulation

Ans. *(1 – c); (2 – d); (3 – b); (4 – a)*

(3)

Column 'A'	Column 'B'
(1) 44 + XY	(a) Female
(2) 44 + XX	(b) Identical twins
(3) Monozygotic twins	(c) Non-identical twins
(4) Dizygotic twins	(d) Male

Ans. *(1 – d); (2 – a); (3 – b); (4 – c)*

Q.1. (A) 5. State whether the following statements are true or false. Correct the false statements.

(1) Absence of genetic variation is an advantage of asexual reproduction.

(2) Binary fisson is usually performed by living organisms under favourable conditions.

(3) *Spirogyra* reproduces by regeneration.

(4) Diversity in living organisms occurs due to genetic variation.

(5) Calyx and corolla are called as essential whorls.

(6) Members of calyx are called as petals.

(7) Papaya is a bisexual flower.

(8) Y-chromosome is present in men and women.

(9) After fertilization, ovule develops into seed and ovary into fruit.

(10) The minimum age for marriage in India is 18 for girls and boys.

(11) Sperm and ovum are formed by mitosis.

(12) Fertilization in humans is internal.

(13) Approximately 2 - 4 million oocytes are released upto the age of menopause.

(14) When pollination involves two flowers borne on the same plant, it is called as cross-pollination.

(15) Flowers with stalk are called as sessile.

(16) Each embryo sac consists of two haploid egg cell and one haploid polar nuclei.

(17) The mother is responsible for a girl child.

(18) X-chromosome is present in men and women.

(19) *Paramoecium* divides by longitudinal binary fission.

Ans. *(1) False. Absence of genetic variation is a drawback of asexual reproduction. (2) True (3) False. Spirogyra reproduces by fragmentation. (4) True (5) False. Calyx and corolla are called as accessory whorls. (6) False. Members of calyx are called as sepals. (7) False. Papaya is an unisexual flower. (8) False. Y-chromosome is present only in men. (9) True (10) False. The minimum age for marriage in India is 18 for girls and 21 for boys. (11) False. Sperm and ovum are formed by meiosis. (12) True (13) False. Approximately 400 oocytes are released upto the age of menopause. (14) False. When pollination involves two flowers borne on the same plant, it is called self-pollination. (15) False. Flowers with stalk are called pedicellate. (16) False. Each embryo sac consists of a haploid egg cell and two haploid polar nuclei. (17) False. The father is responsible for a girl child. (18) True (19) False. Paramoecium divides by transverse binary fission.*

Q.1. (A) 6. Name the following:

*(1) Hormones related with male reproductive system

Ans. FSH (Follicle stimulating hormone), LH (Luteinizing hormone), testosterone.

*(2) Hormones secreted by ovary of female reproductive system.

Ans. Estrogen and progesterone

*(3) Types of twins

Ans. Monozygotic twins and dizygotic twins.

*(4) Any two sexual diseases.

Ans. Syphilis and gonorrhea

*(5) Methods of family planning

Ans. Intra uterine device, use of condoms

(6) Advanced medical techniques for reproduction

Ans. IVF, Surrogacy, Sperm bank.

(7) Hormones that control menstrual cycle

Ans. FSH (Follicle stimulating hormone), LH (Luteinizing hormone), estrogen and progesterone.

(8) Organs of female reproductive system in human.

Ans. Pair of ovaries, pair of oviducts, single uterus and a vagina.

(9) Organs of male reproductive system in human

Ans. Testes, rete testis, vas eferens, epididymis, vas deferens, ejaculatory duct, urinogenital duct, seminal vesicles, prostate gland, cowper's gland.

(10) Four floral whorls.

Ans. Calyx, corolla, androecium, gynoecium.

(11) Accessory whorls in a flower.

Ans. Calyx and corolla

(12) Essential whorls in a flower.

Ans. Androecium and gynoecium

Q.1. (A) 7. Answer the following in one sentence:

*(1) Which are the important life processes in living organisms? *(Can you recall; Textbook Page No. 22)*

Ans. Control and co-ordination, respiration, growth, excretion, reproduction, nutrition and excretion are some of the important life processes in living organisms.

*(2) Which life processes are essential for production of energy required by body?
(Can you recall; Textbook Page No. 22)

Ans. Nutrition and respiration are the processes essential for production of energy.

*(3) Whether the new organism is genetically exactly similar to earlier one that has product it?
(Can you tell; Textbook Page No. 22)

Ans. Offsprings are genetically similar to parents if they reproduce asexually and offsprings are genetically different if they reproduce sexually.

*(4) Who determines whether the two organisms of a species will be exactly similar or not?
(Can you tell; Textbook Page No. 22)

Ans. Method of reproduction will determine whether the two organisms of species will be exactly similar or not.

(5) What is gamete formation?

Ans. Formation of sperm and ovum by meiosis is called as gamete formation.

(6) When is a flower called bisexual?

Ans. A flower is called as bisexual if both essential whorls, i.e. androecium and gynoecium are present in the same flower, Eg. *Hibiscus.*

(7) When a flower is called unisexual?

Ans. A flower is called unisexual if any one of the two essential whorls are present in a flower. Eg. Papaya.

(8) What is pedicel?

Ans. The stalk present in a flower for its support is called as pedicel.

(9) What are sessile flowers?

Ans. Flowers with absence of stalk are called as sessile flowers.

*(10) Which hormone is released from pituitary of mother once the fetal development is completed? *(Can you tell;Textbook Page No. 31)*

Ans. Oxytocin is the hormone released from pituitary of the mother, once fetal development is completed.

*(11) Under the effect of that hormone, which organ of the female reproductive system starts to contract and thereby birth process (Parturition) is facilitated? *(Can you tell; Textbook Page No. 31)*

Ans. Uterus starts to contract under the effect of oxytocin hormone and facilitates parturition.

Q.1. (B) Choose and write the correct option:

(1) ..... divides by simple binary fission.

(a) *Paramoecium* (b) *Amoeba*
(c) *Euglena* (d) *Hydra*

(2) ..... reproduces by longitudinal binary fission.

(a) *Paramoecium* (b) *Amoeba*
(c) *Euglena* (d) *Hydra*

(3) *Hydra* reproduces by ..... .

(a) binary fission (b) budding
(c) fragmentation (d) multiple fission

(4) Which of the following is a mode of asexual reproduction?

(a) Multiple fission (b) Spore formation
(c) Budding (d) All of these

(5) For binary fission, *Amoeba* requires ..... parent cells.

(a) three (b) two (c) one (d) zero

(6) Yeast reproduces by .....
(a) budding (b) binary fission
(c) spore formation (d) multiple fission

(7) ..... reproduces from the buds on the leaf margin.
(a) Lotus (b) *Hibiscus*
(c) *Bryophyllum* (d) Papaya

(8) ..... is present at the tip of the style.
(a) Stigma (b) Anther (c) Ovary (d) Ovule

(9) ..... is formed in each ovule by meiosis.
(a) Pollen grains (b) Seeds
(c) Embryo sac (d) Fruit

(10) Zygote develops at the cost of the food stored in ..... .
(a) endosperm (b) pollen grain
(c) fruit (d) ovary

(11) Testes secrete the hormone .....
(a) progesterone (b) FSH
(c) estrogen (d) testosterone

(12) At the time of birth, there are ..... immature oocytes in the ovary of female foetus.
(a) 2 - 4 hundred (b) 5 - 6 hundred
(c) 2 - 4 million (d) 8 - 10 million

(13) Menopause occurs at the age of ..... years.
(a) 18 - 20 (b) 45 - 50
(c) 20 - 30 (d) 18

(14) Menstrual cycle occurs at an interval of every ..... days.
(a) 8 - 10 (b) 15 - 20
(c) 28 - 30 (d) 6 - 7

Ans. *(1) (b) Amoeba (2) (c) Euglena (3) (b) budding (4) (d) All of these (5) (c) one (6) (a) budding (7) (c) Bryophyllum (8) (a) Stigma (9) (c) Embryo sac (10) (a) endosperm (11) (d) testosterone (12) (c) 2 - 4 million (13)(b) 45 - 50 (14) (c) 28 - 30*

Q.2.1. Define or explain the following:

(1) Asexual reproduction

Ans. Process of formation of new organism by an organism of same species without involvement of gametes is called asexual reproduction.

(2) Sexual reproduction

Ans. Reproduction that occurs due to fertilization of gametes is called sexual reproduction.

(3) Reproduction

Ans. Formation of new organism of the same species by earlier existing organism is called as reproduction.

(4) Vegetative propogation

Ans. Reproduction in plants with the help of vegetative parts like root, stem, leaf and bud is called as vegetative propogation.

(5) Regeneration

Ans. Asexual reproduction in which body of parent organism breaks into many fragments from which each starts life independently.

(6) Pollination

Ans. Transfer of pollen grains from anther to stigma of a flower is called as pollination.

(7) Germination

Ans. The process of change of a seed to a new plantlet under favourable conditions of food moisture and air is called germination.

(8) Menopause

Ans. The natural cessation of menstruation that occurs between age 45-50 years is known as menopause.

(9) Pedicellate flowers

Ans. Flowers which have a stalk for support (pedicel) are called pedicellate flowers.

(10) Sessile flowers

Ans. Flowers which do not have a stalk for support are called sessile flowers.

(11) Fertilization

Ans. The process of formation of a diploid zygote by the union of haploid male and female gametes is called as fertilization.

(12) Ovulation

Ans. Bursting of mature ovarian follicle under the influence of hormones to release the oocyte is called ovulation.

(13) Parturition

Ans. The process of giving birth to a new born baby is called parturition.

(14) Twins

Ans. Two embryos develop simultaneously in the same uterus and thus two offsprings are delivered simultaneously. Such offsprings are called as twins.

Q.2.2. Write short notes:

(1) Multiple Fission

Ans.

(i) Asexual reproduction by multiple fission is performed by *Amoeba* and other similar protists.

(ii) *Amoeba* stops the formation of pseudopodia and thereby its movements whenever there is lack of food or any other adverse condition.

(iii) It becomes rounded and forms a protective covering around plasma membrane. Such encysted *Amoeba* or any other protist is called as cyst.

(iv) Many nuclei are formed by repeated nuclear division in the cyst, followed by cytoplasmic division and thus many amoebulae are formed.

(v) They remain encysted till there are adverse conditions.

(vi) Cyst breaks open on arrival of favourable conditions and many amoebulae are released.

(vii) This process is called Multiple fission.

(2) Fragmentation

Ans.

(i) This type of asexual reproduction occurs in multicellular organisms.

(ii) In this type of reproduction, the body of parent organism breaks up into many fragments and each fragment starts to live as an independent new organism.

(iii) It is seen in algae like *Spirogyra* and sponges like sycon.

(iv) When plenty of water and nutrients are available to *Spirogyra*, its filaments grow up very fast and break up into small fragments.

(v) Each fragment starts to live independently as a new *Spirogyra* fiber.

(vi) Similarly, if the body of *Sycon* breaks up accidentally into many fragments, each fragment develops into a new *Sycon*.

(3) Regeneration

Ans.

(i) Wall lizard breaks up and discards some part of its tail in emergency.

(ii) Discarded part is regenerated after a period. This is an example of limited regeneration.

(iii) However, under certain situation, an animal-*Planaria* breaks up its body into parts and thereafter each part regenerates remaining part of the body and thus new planaria are formed.

(iv) This is called regeneration.

(4) Pollination.

Ans.

(i) Transfer of pollen grains from the anther to the stigma is called as pollination.

(ii) Pollination occurs with the help of abiotic agents (wind, water) and biotic agents (insects and animals).

(iii) When pollination involves only one flower or two flowers of the same plant, it is called as self-pollination

(iv) If it is involves two flowers borne on two plants of the same species, it is called cross-pollination.

(5) Surrogacy

Ans.

(i) Some women have problems in implantation of embryo in uterus.

(ii) Such women can take the help of the modern remedial technique called as surrogacy.

(iii) In this technique, oocyte is collected from the ovary of the woman having problem in implantation in uterus.

(iv) That oocyte is fertilized in test-tube with the help of sperms collected from her husband.

(v) The embryo formed from such fertilization is implanted in the uterus of some other woman having normal uterus.

(vi) Such a woman, in whose uterus the embryo is implanted is called as surrogate mother.

(6) Sperm Bank/ Semen Bank

Ans.

(i) There are various problems in sperm production in case of many men like absence of sperms, slow movement of sperms, etc.

(ii) So as to have children in case of such couples, new concept of sperm bank has been introduced. This concept is similar to blood bank.

(iii) Semen ejaculated by the desired men is collected after their thorough physical and medical check-up and stored in the sperm bank.

(iv) As per the wish of the needful couple, oocyte of woman of the concerned couple is fertilized by IVF technique using the semen from the sperm bank.

(v) Resultant embryo is implanted in the uterus of the same woman.

(vi) Name of the semen donor is strictly kept secret as per the law.

(7) Population Explosion

Ans.

(i) Excessive growth of population within short duration is called as population explosion.

(ii) Due to population explosion we have to face problems like unemployment, decreasing per capita income and increasing loan, stress on natural resources etc.

(iii) There is only one solution for all such problems and it is population control.

(iv) Population control can be achieved by family planning.

(8) Vegetative propogation

Ans.

(i) Reproduction in plants with the help of vegetative parts like root, stem, leaf and bud is called as Vegetative reproduction propogation

(ii) Vegetative propogation in potatoes is performed with the help of 'eyes' present on tuber whereas in *Bryophyllum* it is performed with help of bud present on leaf margin.

(iii) In case of plants like sugarcane and grasses, vegetative propogation occurs with the help of buds present on leaf margin.

(iv) Plants like carrot and radish perform vegetative propogation with the help of roots.

Q.2.3. Distinguish between:

(1) Binary fission and Multiple fission

Ans.

Binary Fission	Multiple Fission
(i) In this process the parent cell divides to form two daughter cells.	(i) In this process, the parent cell divides within the cyst to form many daughter cells.
(ii) It occurs under favourable conditions.	(ii) It occurs under adverse conditions.
(iii) There is no cyst formation.	(iii) The organism forms a protective covering around itself called as cyst.
(iv) Nucleus divides into two halves	(iv) Nucleus divides into many nuclei.

(2) Human Male and female reproductive system

Ans.

Human Male reproductive system	Human Female reproductive system
(i) Testes are the essential organs.	(i) Ovaries are the essential organs.
(ii) Testes secrete testosterone	(ii) Ovaries produce estrogen and progesterone.
(iii) Millions of sperms are produced in one time.	(ii) Single oocyte is produced per month.
(iv) Male gametes are sperms.	(iv) Female gametes are oocytes.

Q.2.4. Answer the following:

***(1) Which are the main types of cell division? What are the differences?** *(Can you recall; Textbook Page No. 22)*

Ans.

(i) The two main types of cell division are 'mitosis' and 'meiosis'.

(ii) Mitosis occurs in somatic cells and stem cells of the body, whereas meiosis occurs in germ cells.

(iii) In mitosis, the chromosome number remains the same and two daughter cells are obtained from one cell.

(iv) In meiosis, chromosome number is reduced to half and four daughter cells are obtained from one cell.

***(2) What is the role of chromosomes in cell division?**
(Can you recall; Textbook Page No. 22)

Ans. As the genetic material passes from parents to child, the chromosomes are responsible for containing the instructions that make the offspring unique while still carrying traits from their parents.

***(3) What would have happened if the male and female gametes had been diploid?** *(Let's think; Textbook Page No. 26)*

Ans.

(i) If the gametes were diploid, the zygote would get 46 chromosomes from the father and 46 chromosomes from the mother, that would add up to 92.

(ii) This would lead to diseases or complications in the offspring.

***(4) What would have happened if any of the cells in nature had not been divided by meiosis?**
(Let's think; Textbook Page No. 26)

Ans.

(i) Meiosis is necessary for sexual reproduction and for increasing genetic diversity.

(ii) If meiosis were to disappear tomorrow, all sexually reproducing organisms would stop having offsprings.

(iii) This would lead to the extinction of the majority of the world's diploid species.

***(5) Why has the Government of India enacted the law to fix the minimum age of marriage as 18 in girls and 21 in boys?** *(Can you recall; Textbook Page No. 28)*

Ans.

(i) The Government of India has enacted the law to fix the minimum age of marriage as 18 in girls and 21 in boys because at this age girls and boys become adults.

(ii) They have developed the secondary sexual characteristics, and they are physically and mentally ready to reproduce.

***(6) What do we mean by maintenance of species?** *(Can you tell; Textbook Page No. 22)*

Ans. (i) The process of reproduction helps to increase the number of organisms of a species by which the species can prevent itself from being extinct. (ii) This is called as maintenance of species.

***(7) What is the relationship between the cell division and formation of new organism of the same species by earlier existing organism?** *(Can you tell; Textbook Page No. 22)*

Ans.

(i) In case of asexual reproduction, the parent cell divides to form two similar daughter cells. This occurs by the type of cell division called mitosis.

(ii) In case of sexual reproduction, gametes are formed by the type of cell division called meiosis. These gametes fuse to form a new organism

***(8) Which hormones are responsible for changes in human body during onset of sexual maturity?** *(Can you recall; Textbook Page No. 28)*

Ans. The hormones responsible for changes in human body during onset of sexual maturity are testosterone in males and estrogen and progesterone in females.

***(9) Does the parent cell exist after asexual reproduction fission?** *(Use your brain power; Textbook Page No. 24)*

Ans.

(i) In asexual reproduction - Fission, the mother cell divides into daughter cells as each daughter cell begins its life like a new individual.

(ii) The parent cell thus do not exist after asexual reproduction - fission.

***(10) Which different hormones control the functions of human reproductive system through chemical co-ordination?** *(Can you recall; Textbook Page No. 28)*

Ans. FSH (Follicle stimulating hormone) LH (Luteinizing hormone) male hormone - testosterone act female hormone - estrogen and progesterone are the different hormones that control the functions of human reproductive system through chemical co-ordination.

(11) Give an example of limited regeneration.

Ans. (i) Lizard breaks up and discards some part of its tail in emergency. (ii) This discarded part is regenerated after a period. (iii) This is limited regeneration.

(12) How does fertilization take place in humans?

Ans.

(i) Formation of zygote by union of sperm and ovum is called fertilization.

(ii) Fertilization is internal in humans.

(iii) Semen is ejaculated in vagina during copulation.

(iv) Few million sperms start their journey by the route of vagina-uterus-oviduct.

(v) One of those million sperms fertilize the only ovum present in the oviduct.

Q.2.5. Give scientific reasons:

(1) New organism has exact genetic similarity with the reproducing organism in asexual reproduction.

Ans.

(i) Process of formation of new organism by an organism of same species without involvement of gametes is called as asexual reproduction.

(ii) As this reproduction does not involve union of two different gametes, the new organism has exact genetic similarity with the reproducing organism.

(2) Sperm needs large amount of energy.

Ans.

(i) Length of each epididymis is about 6 meters whereas length of a sperm is about 60 micrometers.

(ii) Such a small sperm has to cross the distance of approximately 6.5 meters while passing out of male reproductive system to the oviduct .

(iii) Hence, sperms need large amount of energy.

(3) There is need of rest alongwith special personal hygiene during menstrual cycle.

Ans.

(i) Menstrual cycle is a natural process and women experience pains during this phase.

(ii) Severe weakness is felt due to heavy bleeding.

(iii) There is higher possibility of infection too during this phase.

(iv) Due to all such reasons, there is need of rest along with special personal hygiene.

Q.3.1. Explain the following:

***(1) Explain the concept of IVF.**

Ans.

(i) In the IVF technique, fertilization is brought about in the test tube and the embryo formed is implanted in uterus of a woman at appropriate time.

(ii) IVF technique is used for having the child in case of those childless couples who have problems like less sperm count, obstacles in oviduct etc.

***(2) Which precautions will you follow to maintain the reproductive health?**

Ans.

(i) A person's state of being physical, mental and social strength is called as health.

(ii) Bleeding occurs during menstrual cycle. Due to this, private organs need to be cleaned from time to time otherwise problem regarding reproduction health may arise.

(iii) It is essential to maintain the cleanliness of genitals of both males and females.

(iv) Also, one should avoid unsafe sexual contact.

Q.3.2. Draw a neat and labelled diagrams for the following.

***(1) Human male reproductive system**

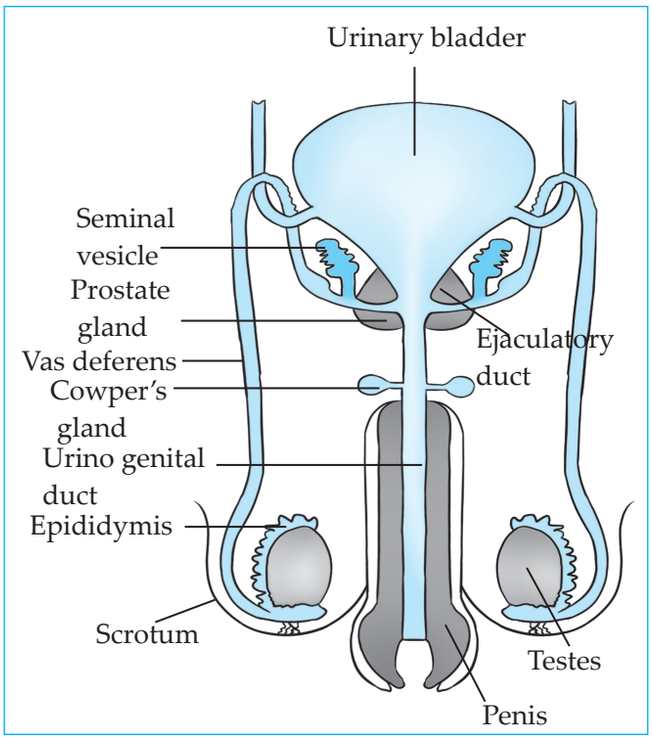


Fig. 3.1. Human male reproductive system

***(2) Human female reproductive system**

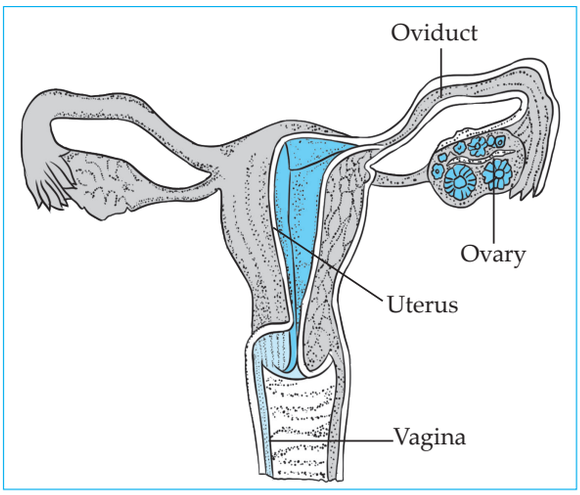


Fig. 3.2. Human female reproductive system

***(3) Flower with its sexual reproductive organs**

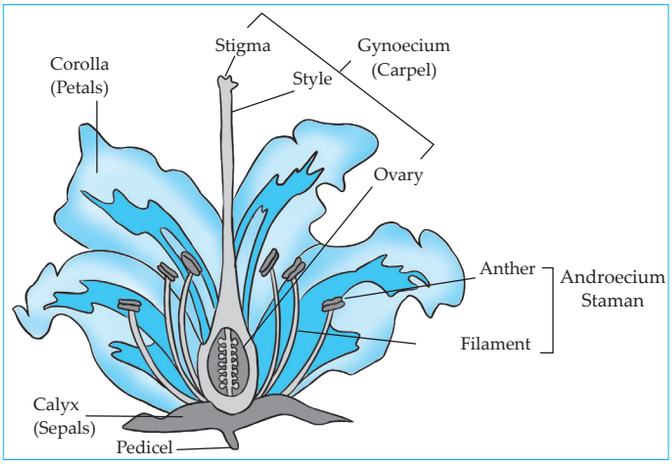


Fig. 3.3 Parts of flower

***(4) Menstrual cycle**

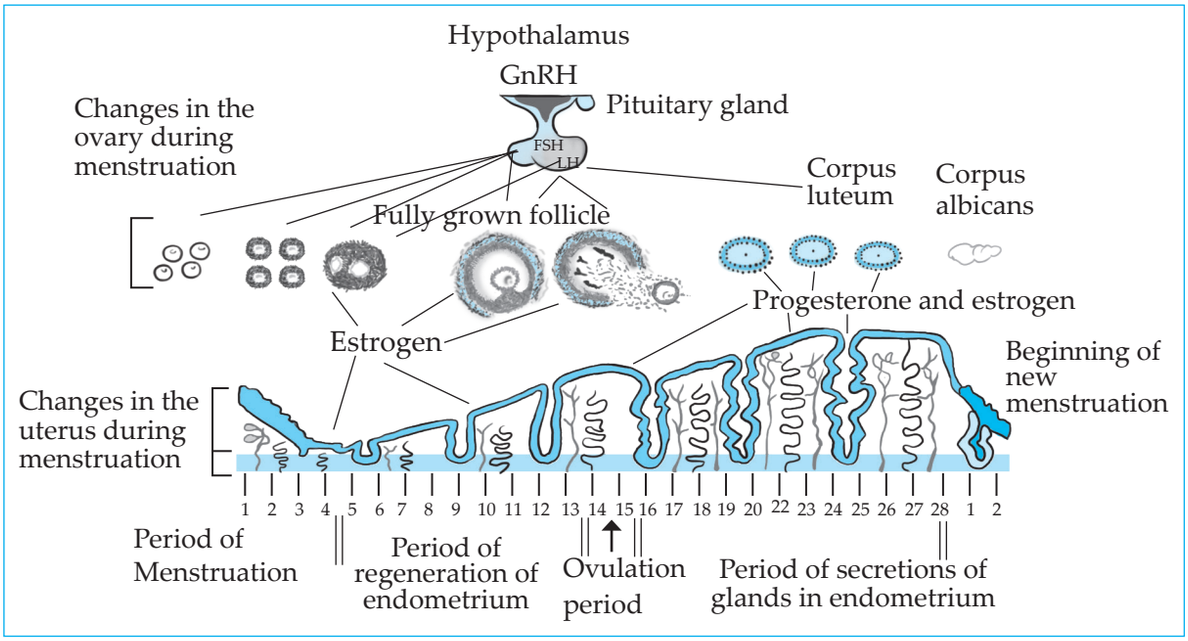


Fig. 3.4 Menstrual cycle

***Q.3.3.Observe the pictures and tell the life process which you identified.** *(Observe; Textbook Page No. 22)*

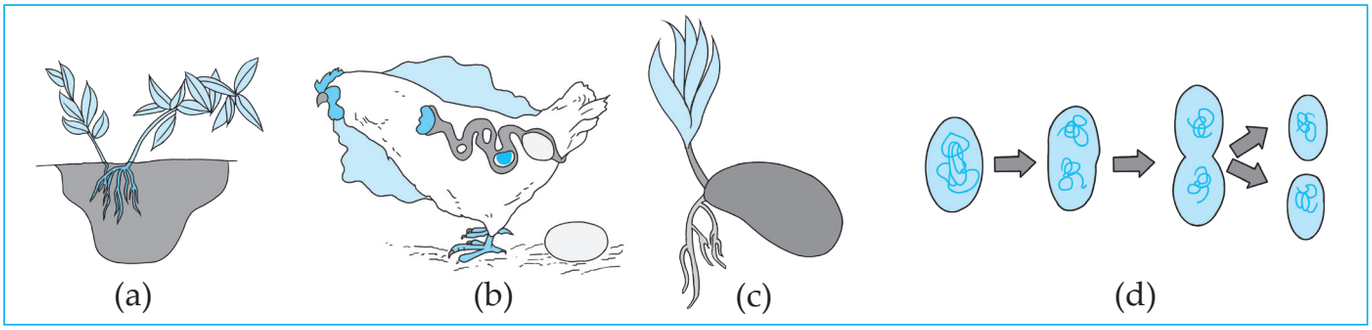


Fig. 3.5 Some life processes

Ans. The life process observed is reproduction.

***Q.3.4. Complete the paragraph with the help of words given in the bracket**

(Luteinizing hormone, endometrium of uterus, follicle stimulating hormone, estrogen, progesterone, corpus luteum)

Growth of follicles present in the ovary occurs under the effect of ..... This follicle secretes estrogen. ..... grows/ regenerates under the effect of estrogen. Under the effect of ..... fully grown up follicle bursts, ovulation occurs and ..... is formed from remaining part of follicle. It secretes ..... and ..... Under the effect of these hormones, glands of ..... are activated and it becomes ready for implantation.

Ans. *(1) follicle stimulating hormone (2) endometrium of uterus (3) luteinizing hormone (4) corpus luteum (5) progesterone (6) estrogen (7) endometrium*

Q.3.5. Complete the the following chart:

***(1)**

Ans.

Asexual reproduction	Sexual reproduction
(i) **Reproduction that occurs with the help of somatic cells is called as asexual reproduction.**	(i) Reproduction that occurs due to formation of gametes is called as sexual reproduction.
(ii) Male and female parents are not necessary for asexual reproduction.	(ii) **Male and female parent are necessary for sexual reproduction**
(iii) **This reproduction occurs with the help of mitosis only.**	(iii) This reproduction involves meiosis during gamate formation.
(iv) New individual formed by this method is genetically identical to the parent.	(iv) **New individual formed by this method is genetically different from parents.**
(v) **Asexual reproduction occurs in different individuals by various methods like binary fission, multiple fission, budding, fragmentation, regeneration, vegetation propagation, spore production etc.**	(v) Sexual reproduction occurs by two main processes - gamete formation and fertilization.

(2)

Ans.

Method of Asexual reproduction	Organisms / Example
(i) Binary fission	(i) *Amoeba, Paramoicium*
(ii) Multiple fission	(ii) *Amoeba*
(iii) Budding	(iii) Yeast cells, *Hydra*
(iv) Fragmentation	(iv) *Spirogyra*
(v) Regeneration	(v) *Planaria*
(vi) Spore formation	(vi) *Mucor*

Q.3.6. Observe the figure and answer the following questions:

(1)

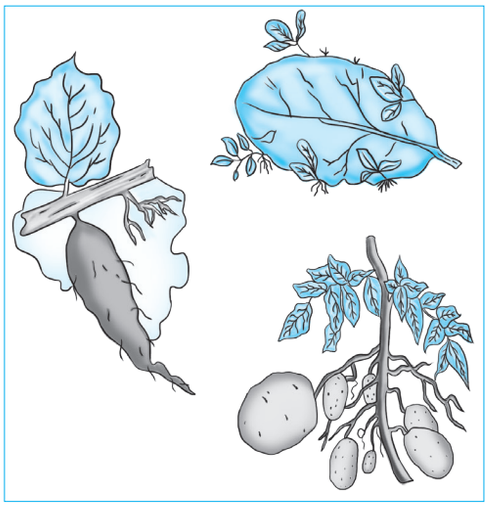


Fig. 3.6. Vegetative propogation

(a) Which method of reproduction is shown in the diagram?

Ans. Vegetative propagation

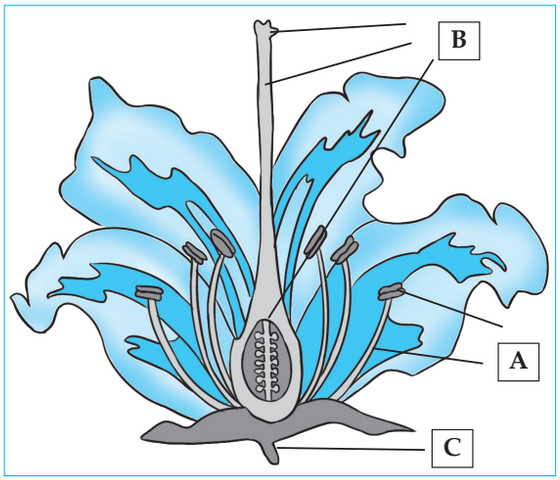
(b) Is it an asexual or sexual method of reproduction? Why?

Ans. It is an asexual method of reproduction because only the root, stem and leaf are participating in the reproduction.

(c) Give examples of plants undergoing this method of reproduction.

Ans. Raddish and carrot perform vegetative propogation through roots and sugarcane and grasses through buds.

(2)



(a) Label the parts (A), (B) and (C)

Ans. (A) It is the Androecium of Anther and filament, (B) It is the Gynoecium with the stigma, style and ovary (C) It is the pedicel

(b) Is the flower unisexual or bisexual? Why?

Ans. The flower is bisexual because both the male (Androecium) and female (Gynoecium reproductive organs are present in it.

(c) Where are the male and the female gametes present?

Ans. The male gametes are in the anther region inside the pollen grains whereas the female gametes are in the ovary called ovules.

(d) What is a flower without part (C) called?

Ans. It is called a sessile flower.

(3) For diagram refer Fig. 3.4

(a) Name the hormones involved in menstrual cycle.

Ans. hormones Estrogen and Progesterone are involved in menstrual cycle.

(b) What is the meaning of ovulation?

Ans. Ovulation is the release of oocyte on bursting of mature ovarian follice under the influence of hormones.

(c) Under what condition will corpus luteum get transformed into corpus albicans?

Ans. If oocyte is not fertilized, corpus luteum loses its function and becomes a degenerate body called as corpus albicans.

Q.4. Answer in detail.

***(1) What is Menstrual cycle? Describe it in brief.**

Ans. *[For diagram, refer fig. 3.4]*

(i) Female reproductive system undergoes some changes at puberty and those changes repeat at the interval of every 28 - 30 days. These repetitive changes are called as menstrual cycle.

(ii) Menstrual cycle in a natural process controlled by four hormones. Follicle stimulating hormone (FSH), Luteinizing hormone (LH), estrogen and progesterone.

(iii) One of the several follicles in the ovary starts to develop along with the oocyte present in it, under the effect of follicle stimulating hormone. This developing follicle secrets oestrogen.

(iv) Endometrium of the uterus starts to develop or regenerate under the effect of estrogen.

(v) Meanwhile developing follicle completes its development.

(vi) It bursts under the effect of lutenizing hormone and oocyte is released. This is called as ovulation.

(vii) Remaining tissues of the burst follicle forms the corpus luteum. Corpus luteum starts to secrete progesterone.

(viii) Endometrial glands secrete their secretion under the effect of progesterone. Such endometrium is ready for implantation of embryo.

(ix) If oocyte is not fertilized within 24 hours, corpus luteum becomes inactive and transforms into corpus albicans.

(x) Endometrium starts to degenerate in absence of estrogen and progesterone.

(xi) Tissues of degenerating endometrium and unfertilized ovum are discarded out through vagina, accompanied by bleeding.

(xii) Bleeding continues approximately for 5 days. This is called mensturation.

***(2) In case of sexual reproduction, newborn shows similarities about characters. Explain this statement with suitable example.**

Ans.

(i) Two parents i.e. male and female are involved in sexual type of reproduction.

(ii) In sexual reproduction fusion of male gamete and female gamete occurs.

(iii) Due to this, new individuals always has the recombined genes of both the parents.

(iv) Hence, the new individual show similarities with the parents for some characters and also has characters different from both parents.

***(3) Gender of child is determined by the male partner of couple. Explain with reasons whether this statement is true or false.**

Ans.

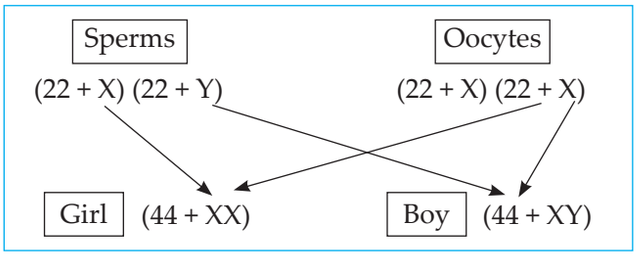
(i) During zygote formation, man contributes either X or Y chromosome to the next generation.

(ii) But, female transfers only X-chromosome to the next generation.

(iii) At the time of fertilization, if X-chromosome comes from male, the child will be a girl. And if Y-chromosome comes from the male then the child will be a boy.

(iv) Thus, gender of child is determined by the male partner of the couple.

(v) So, the above statement is true.



***(4) Explain asexual reproduction in plants.**

Ans.

(i) Reproduction in plants with the help of vegetative parts like root, stem, leaf and bud is called as vegetative reproduction.

(ii) Vegetative propagation in potatoes is performed with the help of eyes present on tuber whereas in *Bryophyllum*, it is performed with the help of buds present on leaf margin.

(iii) In case of plants like sugarcane and grasses, vegetative propagation occurs with the help of buds present on nodes.

(iv) Plants like carrot and raddish perform vegetative propagation with the help of roots.

(v) Plants like *Spirogyra* reproduces asexually by fragmentation.

(vi) When there is plenty of water and nutrients available to *Spirogyra*, its filaments grow up very fast and break up into many small fragments. Each fragment starts to live independently as a new spirogyra fibre.

(5) Explain budding in Yeast.

Ans.

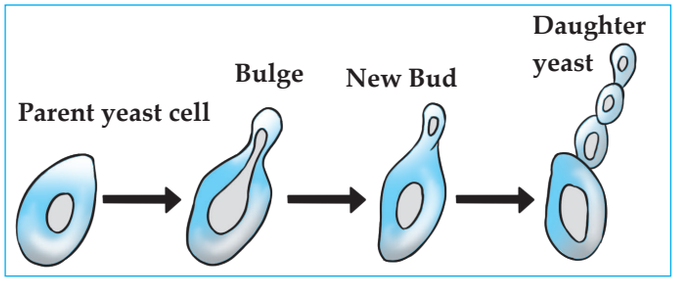


Fig. 3.7. Budding

(i) Budding is a method of asexual reproduction in a unicellular fungus-yeast.

(ii) Yeast cell produces two daughter nuclei by

mitotic division. This yeast cell is called as parent cell.

(iii) A small bulge appears on the surface of parent cell which is the bud.

(iv) One of the two daughter nuclei enters this bud.

(v) After sufficient growth, bud separates from the parent cell and starts to live independently, as a daughter yeast cell.

(6) Explain the process of spore formation.

Ans.

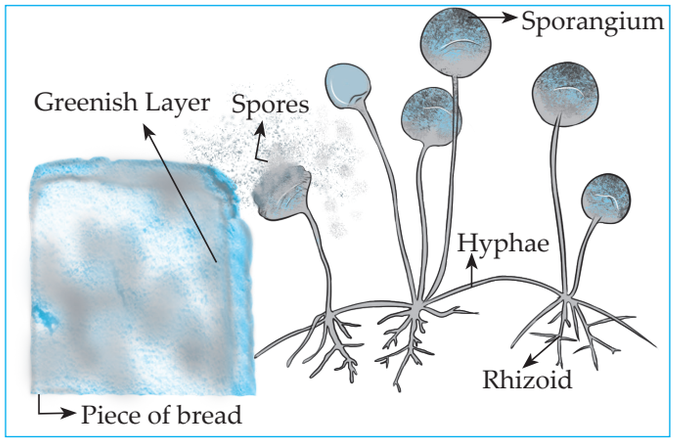


Fig. 3.8. Spore formation

(i) Spore formation is a method of asexual reproduction in fungi like mucor.

(ii) *Mucor* has filamentous body and sporangia which produce spores.

(iii) Once the spores are formes, sporangia burst and spores are released.

(iv) Spores germinate in moist and warm place and new fungal colony is formed.

(7) Describe the process of development and birth in humans.

Ans.

(i) The zygote formed after fertilization in the oviduct, undergoes repeated mitotic divisions and embryo is formed.

(ii) Meanwhile, it is pushed towards the uterus.

(iii) Once it reaches the uterus, it is implanted and further development occurs after implantation.

(iv) An organ called as placenta is formed for supply of food material during the growth of the embryo in the uterus.

(v) Embryonic development is completed approximately within nine months after fertilization following which birth takes place.

(8) Name two common sexual diseases. What are their symptoms?

Ans.

(i) Two common sexual diseases are syphilis and gonorrhea.

(ii) Both are caused by bacteria.

(iii) Symptoms of syphilis are chancre (patches) on various parts of the body including genitals, rash, fever, inflammation of joints, alopecia, etc.

(iv) Symptoms of gonorrhea are painful and burning sensation during urination, oozing of pus through penis and vagina, inflammation of urinary tract, anus, throat, eyes, etc.

(9) Describe the human male reproductive system with the help of a neat labelled diagram.

Ans. *(For diagram, refer Fig. 3.1)*

(i) Human male reproductive system consists of testes, various ducts and glands.

(ii) Testes are present in the scrotum, outside the abdominal cavity.

(iii) Testes contain numerous seminiferous tubules Germinal epithelium present in the tubules divide by meiosis to produce sperms.

(iv) Those sperms are sent forward through various tubules. Sequence of those tubules is as rete testes, vas eferens, epididymis, vas deferens, ejaculatory duct and urinogenital duct.

(v) As the sperms are pushed forward from one duct to next, they become mature and able to fertilize the ovum.

(vi) Seminal vesicles secrete their secretion in ejaculatory ducts whereas prostate glands and Cowper's glands secrete their secretions in urinogenital duct.

(vii) Semen is formed of sperms and secretions of all these glands.

(viii) Semen is ejaculated out through the penis.

(ix) All the organs of male reproductive system are paired except urethra prostate grands, penis and scrotum.

Note : In textbook urogenital duct is given instead of urethra. Urogenital duct is a term which is used to refer something with urinary and genital origin.

(10) Describe the human female reproductive system with the help of a neat labelled diagram.

Ans. *(For diagram, refer Fig. 3.2)*

(i) All organs of female reproductive system are in abdominal cavity.

(ii) It includes a pair of ovaries, a pair of oviduct, single uterus and a vagina.

(iii) A pair of Bartholin's gland is also present.

(iv) Generally every month an ovum is released in abdominal cavity alternately from each ovary.

(v) Free-end of the oviduct is funnel like. An opening is present at the centre of it.

(vi) Oocyte enters the oviduct through that opening.

(vii) Cilia are present on inner surface of oviduct. These cilia push the oocyte towards the uterus.

(11) What are twins? What are their types?

Ans.

(i) Two embryos develop simultaneously in the same uterus and thus two offsprings are delivered simultaneously. Such offsprings are called as twins.

(ii) There are two main types of twins-monozygotic twins and dizygotic twins.

(iii) Monozygotic twins are formed from single embryo. During early period of embryonic development (within 8 days of zygote formation), cells of that embryo divide into two groups.

(iv) Those two groups develop as two separate embryos and thus monozygotic twins are formed.

(v) Such twins are genetically exactly similar to each other. So they are similar in appearance and their gender is also same i.e., both will be either boys or girls.

(vi) In case of monozygotic twins, if the embryonic cells are divided into two groups 8 days after fertilization, there is high possibility of formation of conjoined twins (Siamese twins). Such twins are born with some parts of the body joined to each other. Some organs are common in such twins.

(vii) Occasionally, two oocytes are released from the ovary of the women and both are fertilized by two separate sperms and two zygotes are formed.

(viii) Two embryos are formed from those two zygotes and both are separately implanted in the uterus and thus dizygotic twins are delivered after complete development.

(ix) Such twins are genetically different and be same or different by gender.

***(12) Modern techniques like surrogate mother, sperm bank and IVF technique will help the human beings. Justify this statement.**

Ans.

(i) Modern techniques like surrogacy, IVF and sperm bank have been boon to the childless couples

(ii) In IVF technique, fertilization is brought about in a test-tube and the embryo thus, formed is implanted in the uterus of the women.

(iii) Surrogacy is a boon to women who face issues with their uterus. In this technique, oocyte is collected from the mother and sperms are collected from father.

(iv) They are fertilized in the test tube and the embryo is implanted in the uterus of some other woman having normal uterus. This process is called surrogacy and the woman bearing the child is called as surrogate mother.

(v) Sperm Bank or semen bank has been a boon for males who face issues with sperm count or motility.

(vi) Sperm banks are similar to blood bank where semen from physically and medically fit individuals are collected and stored.

(vii) Thus modern techniques like IVF, surrogacy and sperm bank help human beings.

***(13) Explain sexual reproduction in plants.**

Ans. *(For diagram of flower, refer Fig. 3.3)*

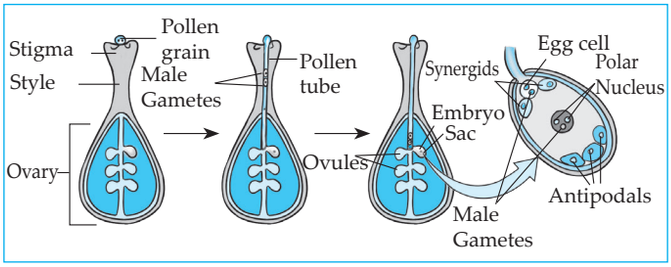


Fig. 3.9 - Double Fertilization in angiosperms

(i) A flower is the site of sexual reproduction in plants.

(ii) It consists of four floral whorls calyx, corolla androceium and gynoecium.

(iii) Androecium and gynoecium are called as essential whorls.

(iv) Calyx and corolla are called as accessory whorls.

(v) Androecium is male whorl and its members are called stamens, will be gynoecium is female whorl and its members are called as carpels.

(vi) Ovary present at the basal end of carpel contains one or many ovules. A hollow style comes up from the ovary.

(vii) Embryo sac is formed in each ovule by meiosis and each embryo sac consists of a haploid egg cell and two haploid polar nuclei.

(viii) Pollen grains are transferred from anther to the stigma. This is called as pollination.

(ix) When pollination occurs a long pollen tube carrying two male gametes is formed.

(x) Pollen tube reaches the embryo sac via style.

(xi) Pollen tube bursts and two male gametes are released in embryo sac. One male gamete unites with egg cell to form zygote. This process is called fertilization.

(xii) The second male gamete unites with two polar nuclei and endosperm is formed. This is called double fertilization.

(xiii) After fertilization ovule develops into seed and ovary into fruit.

(xiv) Seeds fall upon the ground when fruits break up and they germinate in the soil under favourable conditions.

(xv) Zygote develops at the cost of food stored in endosperm of seed and thus a new plantlet is formed. This is called as seed germination.

***(14) Explain with examples types of asexual reproduction in unicellular organisms.**

Ans.

(i) Process of formation of new organism by an organism of same species without involvement of gametes is called as asexual reproduction.

(ii) Types of asexual reproduction in unicellular organisms:

(a) Binary fission:

(i) In this process, the parent cell divides to form two similar daughter cells.

(ii) Binary fission occurs either by mitosis or amitosis. e.g. Prokaryotes (bacteria), Protists (*Amoeba*).

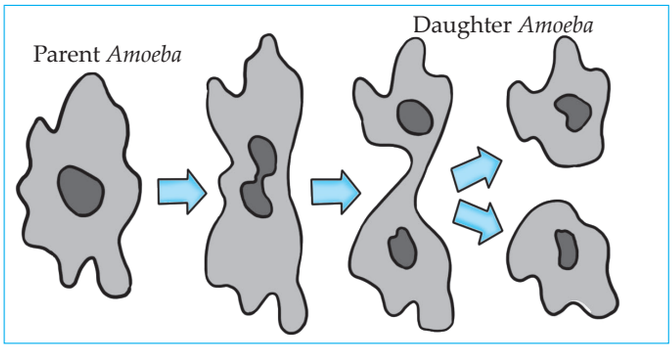


Fig. 3.10 - Binary fission

(b) Multiple fission:

(i) Asexual reproduction by multiple fission is performed by *Amoeba*.

(ii) *Amoeba* stops the formation of pseudopodia whenever there is lack of food.

(iii) It becomes rounded and forms protective covering around plasma membrane. Such encysted *Amoeba* is called as cyst.

(iv) Many nuclei are formed by repeated nuclear division in the cyst.

(v) It is followed by cytoplasmic division and thus many amoebulae are formed.

(vi) They remain encysted till there are adverse conditions. Cyst breaks open on arrival of favourable conditions and many amoebulae are released.

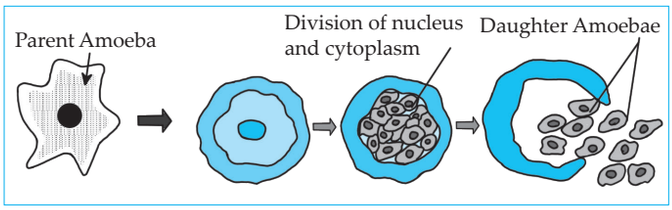


Fig. 3.11 - Multiple fission

(c) Budding:

(i) Sexual reproduction occurs by budding in yeast cells.

(ii) Yeast cells produces two daughter nuclei by mitotic division.

(iii) A small bulge appears on the surface of parent cell. This is called as bud.

(iv) One of the two daughter nuclei enters this bud.

(v) After sufficient growth, bud separates from the parent cell and starts to live independently as a daughter yeast cell.

(15) Explain budding in *Hydra*.

Ans.

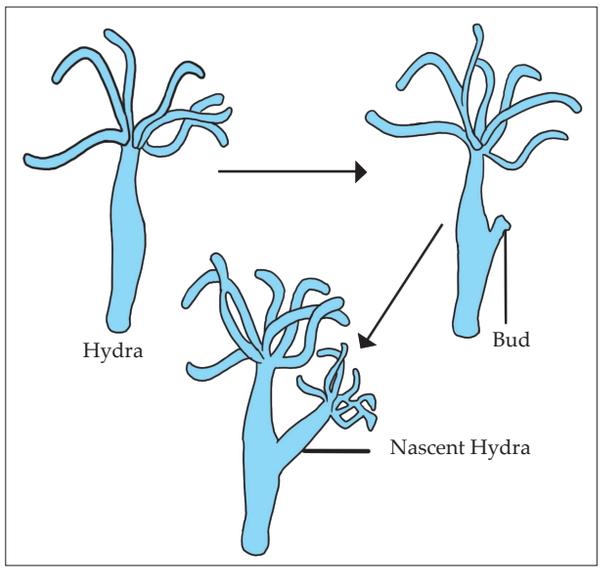


Fig. 3.12 - Budding

(i) In case of *Hydra*, under favourable condition, at specific part of its body, an outgrowth is formed by repeated divisions of regenerative cells of body wall. This outgrowth is called as bud.

(ii) Bud grows up progressively and finally forms a small *Hydra*.

(iii) Dermal layers and digestive cavity of the budding *Hydra* are in continuity with those of parent *hydra*.

(iv) Parent *Hydra* supplies nutrition to the budding *Hydra*.

(v) Budding *Hydra* separates from parent *Hydra* and starts to lead an independent life when it grows up and becomes able to lead an independent life.

❖ ❖ ❖

ASSIGNMENT - 3

Time : 1 hour **Marks : 20**

Q.1.(A) Answer the following. **(3)**

(1) Fill in the blanks.

Implantation of embryo occurs in ..... .

(2) Give name of: Types of twins.

(3) Select odd man out: Stigma, style, anther, ovary.

Q.1. (B) Choose and write the correct option. **(2)**

(1) Yeast reproduces by ..... .

(a) budding (b) binary fission (c) spore formation (d) multiple fission

(2) Testes secretes the hormone ..... .

(a) progesteron (b) FSH (c) estrogen (d) testosterone

Q.2. Answer the following (Any 2) **(4)**

(1) What is regeneration? Give an example of limited regeneration.

(2) Complete the following table

Female Reproductive System Hormone function

Hormone	Functions
(i) _____	(i) Endometrium develops or regenerates.
(ii) _____	(ii) Follicles in the ovary develop.

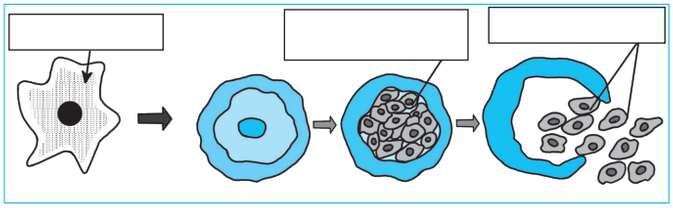
(iii) _____	(iii) Endometrial glands secrete their secretions.
(iv) _____	(iv) Ovulation where oocyte is released.

(3) Write short note on : IVF.

Q.3. Answer the following (Any 2) **(6)**

(1) Give 3 points of differentiation between Asexual and Sexual methods of reproduction.

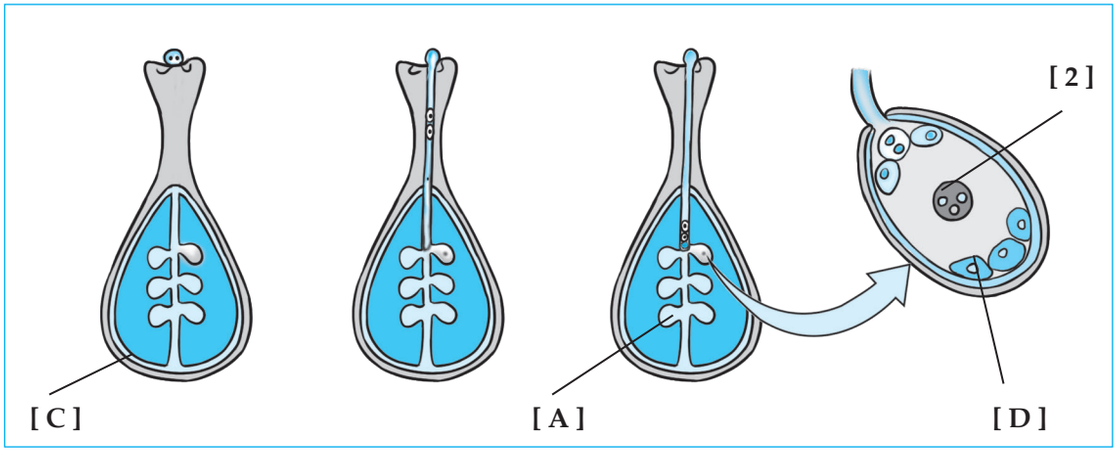
(2) Complete the given figure and explain the method of reproduction.



(3) A lady in a village was blamed to deliver a baby girl for the third time and was ill-treated by her family. Do you think that the blame was right? Explain with reason.

Q.4.Answer in detail (Any 1) **(5)**

(1) Observe the figure and answer the following questions.



(i) Label (A) to (D)

(ii) What process is shown in the diagram?

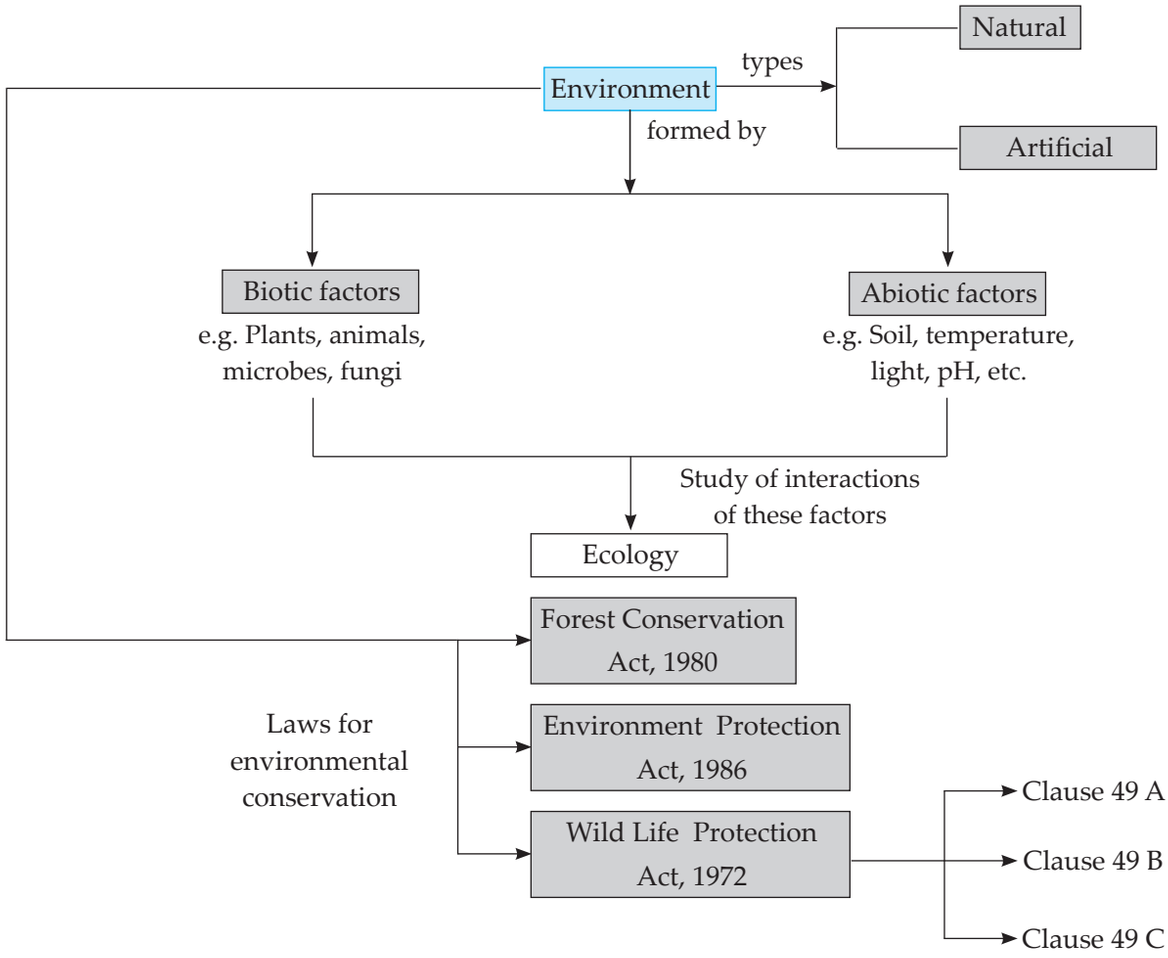
(iii) Explain the process

(2) Draw a labelled diagram of human male reproductive system and explain in detail.

❖ ❖ ❖

4 Environmental Management

CONCEPT MAP



Points to Remember:

- The Ecosystem is formed by the **biotic** and **abiotic** factors and their interactions with each other.
- Biotic factors: **Plants, animals, microbes**.
- Abiotic factors: **Air, water, soil, etc.**
- Physical, Chemical and Biological factors affecting living organisms in any possible way are collectively called as **'Environment'**. Environment is the condition in surrounding.
- There are two main types of environment. One is **natural environment** and the other is **artificial environment.**
- The science that deals with the study of interactions between biotic and abiotic factors of the environment is called as **'Ecology'**. Basic functional unit used to study the ecology is called **ecosystem**.
- A **small pond** is example of an ecosystem, and the **Earth** is the largest ecosystem.
- The environmental balance is maintained through continuous operation of various natural cycles like **water cycle, carbon cycle, gaseous cycles** like **nitrogen cycle, oxygen cycle,** etc.

- Environmental balance is also maintained due to various **food chains** of ecosystem.
- **Environmental conservation** has become the need of hour for mankind.
- Today, all **developed, developing** and **underdeveloped** countries have accepted the responsibility of environmental protection.
- Unnecessary and unacceptable change in the surrounding environment due to **natural events** or **human activities** is called as **environmental pollution.**
- Pollution is of various types namely, **air pollution, water pollution, sound pollution, soil pollution, thermal pollution,** etc.
- Ultimate adverse effect of all these pollutions is on the existence of all the living organisms and therefore, **environmental conservation** has become the need of the hour.
- Various reasons like **population explosion, rapid industrialization** and **indiscriminate use of natural resources, deforestation** and **unplanned urbanization** are responsible for environmental pollution.
- Radioactive pollution can occur due to **natural** and **artificial** reasons. **UV** and **IR radiations** are **natural radiations,** whereas **X-rays** and radiation from **atomic energy** plants are **artificial radiations.**
- **Chernobyl, Windscale and Three Miles Island** mishaps are the major mishaps of the world.
- Environmental conservation is our **social responsibility.**
- To create **awareness** about the conservation of environment, values like **positive attitude** and **affection** towards environment, knowledge about it, should be inculcated among children through **education.**
- In 1972, **United Nations Environment Program (UNEP)** has been established in a conference arranged on human and environment in which environmental problems were discussed.
- In India, a separate **environmental department** has been established after thorough discussion on environmental problems.
- **Ministry of Environment and Forests** is involved in planning, inducting and increasing awareness about environment and forests through various programs since **1985.**
- Since existence of the human race, there is **interrelationship** between environment and human. Human beings established dominance over the nature. They utilized all the natural resources as much as possible.
- **Human** has to play a crucial role in maintaining the **environmental balance**.
- Laws enacted about environmental conservation are: **(i) Forest Conservation Act, 1980. (ii) Environmental Conservation Act, 1986.**
- Biodiversity is the richness of living organisms in nature due to presence of **varieties of organisms, ecosystems** and **genetic variations within a species.**
- Biodiversity occurs at three different levels, viz. **Genetic Diversity, Species Diversity** and **Ecosystem Diversity.**
- There should be **positive attitude** of human beings towards the environment for welfare of entire living world.
- A person can perform a role of either a **conservator, organizer, guide** or a **plant-friend** etc.
- Biodiversity can be conserved by many ways. Many people in the society are voluntarily coming together to perform this **noble work of conservation of biodiversity.**
- The forest conserved in the name of God and considered to be sacred is called **'sacred grove'**.
- Sacred groves are in fact **'Sanctuaries'** conserved by the society and not by the government forest department.
- **Thirty four** highly sensitive biodiversity spots are reported all over the world. At present, **86%** of the sensitive areas are already destroyed.
- As far as India is concerned, out of **135 species of animals, 85 species** are found in the jungles of **eastern** region.

- The threatened species can be classified as **endangered species, rare species, vulnerable species** and **indeterminate species.**
- **International Union for Conservation of Nature (IUCN)** prepares the **'Red List'** that contains the names of the endangered species from different countries. **Pink** pages of this book contain the names of **endangered species,** while **green** pages contain the names of **previously endangered** but presently safe species.

MASTER KEY QUESTION SET - 4

Q.1. (A) 1. Fill in the blanks and rewrite the statements:

(1) The interactions between biotic and abiotic factors is called ..... .

(2) The science that deals with the study of interactions between biotic and abiotic factors of the environment is called ..... .

(3) Generally, ... of any material is called its pollution.

(4) Higher radiation of X-rays can cause ..... .

(5) Jivo ..... Jivanam.

(6) In human beings, sudden genetic changes are brought about by ..... pollution.

(7) The forest conserved in the name of God is called ..... .

(8) ..... and ..... used in agriculture, pollutes water.

(9) The richness of living organisms in nature due to presence of variety of organisms, ecosystems and genetic variations within a species is called ..... .

(10) More than ..... sacred groves have been reported in India.

(11) The World's largest organization engaged in environmental activities is ..... .

(12) Habitats of ..... and ..... are under threat in Assam in the Manas Sanctuary.

(13) The World Biodiversity Day is on ..... .

(14) The occurrence of diversity among the organisms of the same species is called ..... .

(15) ..... tribunal has been established in 2010 for effective implementation of environment related laws.

(16) ..... was responsible for creating forest cover in Kokilamukh jungle of Assam.

(17) In the western ghats, habitats of ..... and ..... of this region have been under threat.

(18) ..... of the Assam is under threat due to dams and indiscriminate use of water.

(19) ..... sanctuary of West Bengal is reserved for tigers.

(20) Giant squirrel is an example of .....speices.

(21) Out of the total plant species in the entire world 50,000 are ..... .

Ans. *(1) Ecosystem (2) Ecology (3) Contamination (4) cancerous ulcerations (5) Jivasya (6) radioactive (7) Sacred grove (8) insecticides, pesticides (9) Biodiversity (10) 13000 (11) Green peace (12) Tiger and Rhino (13) 22nd May (14) Genetic diversity (15) National green (16) Jadav Molai Payeng (17) Asiatic lion and Wild bison (18) Manas Sanctuary (19) Sunderban Sanctuary. (20) Intermediate (21) Endemic.*

Q.1. (A) 2. Find the odd one out:

(1) Air, water, animals, minerals.

Ans. Animals - others are abiotic factors

(2) Proteins, carbohydrates, fats, water.

Ans. Water - others are organic compounds

(3) Deer, tiger, frog, lion.

Ans. Deer - others are carnivores

(4) Water cycle, nitrogen cycle, oxygen cycle, carbon cycle.

Ans. Water cycle - others are gaseous cycles

(5) Adverse effects of vision, genetic change, cancerous ulceration, tuberculosis.

Ans. Tuberculosis - others are effects of radiation

(6) CO_2, SO_3 , O_3, ketone.

Ans. CO_2 - others are secondary pollutants

(7) Deer, elephant, zebra, wolf.

Ans. Wolf - others are herbivores

(8) CO_2 , dust, ash, asbestos.

Ans. CO_2 - others are solid components of air pollution

(9) IPCC, IUCN, BNHS, UNEP.

Ans. BNHS - others are international organisations

(10) Asiatic cheetah, himalayan wolf, giant squirrel, pink headed duck.

Ans. Giant squirrel - others are extinct birds and animals

Q.1. (A) 3. Complete the analogy:

(1) Manas Sanctuary : Rhino : : Sunderban Sanctuary : .....

Ans. Tiger

(2) Red panda : Rare species : : Lion tailed monkey : .....

Ans. Endangered species

(3) Rare species : Musk deer : : Indeterminate species : .....

Ans. Giant squirrel (shekhru)

(4) Endangered species : Lion tailed monkey : : Vulnerable species : .....

Ans. Lion

(5) Clause 49 B : Use of articles with animal parts banned : : Clause 49 C : .....

Ans. Disclosure of the stock of artifacts made from rare wild animals is compulsory

(6) Sound pollution Rule : 2000 : : E-waste Rule :.....

Ans. 2011

(7) 1980 : Forest Conservation Act : : 1986 : .....

Ans. Environmental Conservation Act.

(8) IUCN : International Union for Conservation of Nature : : IPCC : .....

Ans. Intergovernmental Panel on Climate Change

(9) IPCC : Geneva : : IUCN : .....

Ans. Switzerland

(10) Names of endangered species : Pink pages : : Names of presently safe species : .....

Ans. Green pages.

Q.1. (A) 4. Match the columns:

(1)

Column 'A'	Column 'B'
(1) Endangered species	(a) Musk deer
(2) Rare species	(b) Gir Lion
(3) Vulnerable species	(c) Lion-tailed monkey
(4) Indeterminate species	(d) Giant squirrel

Ans. *(1 - c); (2 - a); (3 - b); (4 - d)*

(2)

Column 'A'	Column 'B'
(1) Clause 49 B	(a) Ban on trading of rare animals
(2) Clause 49 C	(b) Ban on the articles made from skin or organs of wild animals
(3) Clause 49 A	(c) Disclosure of the stock of artifacts made from rare wild animals.

Ans. *(1 - b); (2 - c); (3 - a)*

(3)

Column 'A'	Column 'B'
(1) Herbivore	(a) Man
(2) Omnivore	(b) Tiger
(3) Carnivore	(c) Frog
(4) Insectivore	(d) Deer

Ans. *(1 - d); (2 - a); (3 - b); (4 - c)*

(4)

Column 'A'	Column 'B'
(1) Producers	(a) Bacteria
(2) Consumers	(b) Green plants
(3) Decomposers	(c) Herbivores

Ans. *(1 - b); (2 - c); (3 - a)*

(5)

Column 'A'	Column 'B'
(1) Primary consumers	(a) Omnivore
(2) Top level consumers	(b) Autotrophs
(3) Secondary consumers	(c) Herbivore
(4) Producers	(d) Carnivore

Ans. *(1 - c); (2 - a); (3 - d); (4 - b)*

(6)

Column 'A'	Column 'B'
(1) 1998	(a) Environmental Conservation Act
(2) 1980	(b) E-waste rule
(3) 2011	(c) Forest Conservation Act
(4) 1986	(d) Biomedical Waste Rule

Ans. *(1 - d); (2 - c); (3 - b); (4 - a)*

(7)

Column 'A'	Column 'B'
(1) Red panda	(a) Vulnerable species
(2) Shekhru	(b) Rare species
(3) Lion-tailed monkey	(c) Indeterminate species
	(d) Endangered species

Ans. *(1 - b); (2 - c); (3 - d)*

(8)

Column 'A'	Column 'B'
(1) WWF	(a) United Nations Environment Program
(2) IUCN	(b) World Wildlife fund
(3) UNEP	(c) Intergovernmental Panel on Climate Change
(4) IPCC	(d) International Union for Conservation of Nature

Ans. *(1 - b); (2 - d); (3 - a); (4 - c)*

Q.1. (A) 5. State whether the following statements are true or false. Correct the false statement:

(1) Wild animals like lion, tiger etc are not important for ecosystem.

(2) The place where frogs are more, obviously snakes are less in that area.

(3) The paddy fields are frequently attacked by grasshoppers.

(4) Human existence is totally impossible without existence of nature.

(5) Radioactive pollution can cause tuberculosis.

(6) Wildlife Protection Act has been established in 1972.

(7) Basic functional unit used to study the ecology is called ecosystem.

(8) Earthquakes are man-made factors affecting environment.

(9) UV and IR radiation are natural radiations.

(10) Cancerous ulcerations occur due to higher radiations of X-rays.

(11) Environment is made up of one type of ecosystem.

(12) The Earth is sufficient to satisfy everyone's need but not the greed.

(13) Sound pollution Control and Prevention Rule was established in 2011.

(14) A species can be possibly wiped out if there is a decrease in the diversity within the species that reproduce sexually.

(15) Bacteria are generally good decomposers.

(16) All over the world 76 spots are reported as highly sensitive biodiversity spots.

Ans. *(1) False. Every component of ecosystem is important. (2) False. If frogs are more, snakes are also more to feed upon the frogs. (3) True (4) True (5) False. Radioactive pollution can cause cancerous ulceration. (6) True (7) True (8) False. They are natural factors affecting environment. (9) True (10) True (11) False. Environment is made up of various ecosystems. (12) True (13) False. Sound pollution Control and Prevention Rule was established in the year 2000 (14) True (15) True (16) False. All over the world 34 spots are reported as highly biodiversity spots.*

Q.1. (A) 6. Complete the following food chain by arranging in a proper sequence.

(1) Cow, Tiger, Grass

Ans. Grass ⟶ Cow ⟶Tiger

(2) Frog, Insect, Grass, Hawk, Snake

Ans. Grass ⟶ Insect ⟶Frog ⟶Snake ⟶Hawk

(3) Tiger, Rabbit, Wolf, Grass

Ans. Grass ⟶ Rabbit ⟶ Wolf ⟶Tiger

(4) Algae, Snake, Insect, Frog, Mongoose

Ans. Algae ⟶ Insect ⟶Frog ⟶Snake ⟶Mongoose

(5) Insect, Tree, Fowl, Man

Ans. Tree ⟶ Insect ⟶Fowl ⟶Man

(6) Goat, Man, Grass

Ans. Grass ⟶ Goat ⟶ Man

(7) Grasshopper, Snake, Frog, Grass, Eagle

Ans. Grass ⟶ Grasshopper ⟶ Frog ⟶ Snake ⟶ Eagle

(8) Lion, Deer, Grass

Ans. Grass ⟶ Deer ⟶Lion

(9) Insect, Green Plant, Frog, Eagle, Snake

Ans. Green Plant ⟶ Insect ⟶Frog ⟶ Snake ⟶ Eagle

Q.1. (A) 7. Name the following:

(1) Secondary Consumers

Ans. Frog, Tiger

(2) Primary Consumers

Ans. Deer, Elephant

(3) Omnivores

Ans. Man, Bear

(4) Carnivores

Ans. Lion, Tiger

(5) Saprophyte

Ans. Fungi

(6) Abiotic factors

Ans. Air, Water

(7) Autotrophs

Ans. Algae, Fern

(8) Heterotrophs

Ans. Rabbit, Lion

(9) Biotic factors

Ans. Plants, Animals

(10) Air pollutants

Ans. CO_2, CO

(11) Endangered species

Ans. Lion tailed monkey

(12) Largest ecosystem

Ans. The Earth

(13) Rare Species

Ans. Red panda, Musk deer

(14) Decomposers

Ans. Bacteria, Fungi

(15) International environmental organization.

Ans. International Union for Conservation of Nature (IUCN)

(16) Forest conserved in the name of God

Ans. Sacred groves

(17) Voluntary Organizations engaged in environmental activities is India.

Ans. Bombay Natural History Society, Mumbai. (BNHS)

(18) World's largest organization engaged in environmental activities.

Ans. Green Peace

(19) Diseases caused by radiations

Ans. Cancerous ulcerations

(20) Water pollutants

Ans. Domestic wastes, Industrial effluents

(21) Clause for ban on trading rare animals

Ans. 49A

Q.1. (A) 8. Make a list of the following:

(1) Animals and plants from jungle ecosystem.

Ans. **Animals :** Tiger, lion, leopard, moth, mongoose, deer, bison, crow, stag, shekhru.

Plants : Teak, berry, jamun, acacia, banyan.

(2) Animals and plants from grassland ecosystem?

Ans. **Animals :** Wolf, rabbit, honeybee, insect, rat, butterfly, snake, frog, mongoose, fox, deer, stag.

Plants : Grass, shrubs

(3) Animals and plants from pond ecosystem.

Ans. **Animals** : Fish, tortoise, duck, kingfisher, heron, frog, snake, crocodile.

Plants : Algae, aquatic plants.

Q.1. (B) Choose and write the correct options:

(1) How many biodiversity spots are reported all over the World?

(a) 30 (b) 34 (c) 35 (d) 40

(2) Which of the following belongs to rare species?

(a) Tiger (b) Lion

(c) Red panda (d) Lion tailed monkey

(3) World Biodiversity day is celebrated on ..... .

(a) 22nd May (b) 5th June

(c) 21st March (d) 22nd April

(4) The Forest Conservation Act was enacted in ..... .

(a) 1980 (b) 1986 (c) 1972 (d) 1963

(5) ..... has been established in 2010 for effective implementation of environment related laws.

(a) Forest Conservation Act

(b) Wild life protection Act

(c) Environmental conservation Act

(d) Indian Forest Act

(6) The Chipko centre is a voluntary environmental organization located in ..... .

(a) Mumbai (b) Tehri Garhwal

(c) Pune (d) Trivandrum

(7) The 'Red list' which contains the names of endangered specis is prepared by ..... .

(a) WWF (b) IUCN (c) IPCC (d) UNEP

(8) Presently, only .....% of the Earth's area has been left over with sensitive biodiversity.

(a) 3.2 (b) 2.3 (c) 6.8 (d) 15.7

(9) ..... is the largest ecosystem.

(a) Ocean (b) Earth (c) Pond (d) Lake

(10) The Molai Jungle is located in Kokilamukh of Jorhat district of ..... .

(a) Assam (b) Trivandrum

(c) Tehri (d) Ahmedabad

Ans. *(1) (b) 34 (2) (c) Red Panda (3) (a) 22nd May (4) (a) 1980 (5) (c) Environmental conservation Act (6) (b) Tehri Garhwal (7) (b) IUCN (8) (b) 2.3 (9) (b) Earth (10) (a) Assam.*

Q.2.1. Classify the following.

(1) Classify the following into biotic and abiotic factors:

Stone, fungus, soil, green plants, air, fish, water, sunlight, rat, snake, humidity, frog.

Ans.

Biotic Factors	Abiotic Factors
Fungus, green plants fish, rat, snake, frog	Stone, soil, air, water, sunlight, humidity

(2) Classify the following into Primary Consumers and Secondary Consumers:

Grasshopper, elephant, frog, deer, fruit eating bats, fox, tiger, giraffe

Ans.

Primary Consumer	Secondary Consumers
Grasshopper, elephant, deer, fruit eating bats, giraffe	Frog, fox, tiger

(3) Classify the following into Air Pollutants and Water Pollutants

Industrial waste, hydrogen sulphide, carbon dioxide, domestic wastes, sewage, carbon monoxide, dust, asbestos, pesticides used in agriculture

Ans.

Air Pollutants	Water Pollutants
Hydrogen sulphide, carbon dioxide, carbon monoxide, dust, asbestos	Industrial waste, domestic wastes, sewage, pesticides used in agriculture.

(4) Classify the following into Voluntary Organizations and International Environmental Organization:

Chipko Centre, Gandhi Peace Foundation, World

Wildlife Fund, Bird Life International Centre for Environment Education, Bombay Natural History Society, Green Climate Fund, Kerala Science Literature Council, Intergovernment Panel on Climate Change

Ans.

Voluntary Organization	International Environmental Organization
Chipko Centre, Gandhi Peace foundation, Centre for Environmental Education, Bombay Natural History Society, Kerala Science Literature Council	World Wildlife Fund, Bird, Life International, Green Climate Fund, Intergovernmental Panel on Climate Change

(5) Classify the following into Producers and Consumers:

Grasshopper, Grass, Frog, Green plants, algae, Tulsi, Tiger

Ans.

Producers	Consumers
Grass, green plants, algae, tulsi	Grasshopper, frog, tiger

Q.2.2. Define the following:

(1) Ecology

Ans. The science that deals with the study of interactions between biotic and abiotic factors of the environment is called as 'ecology'.

(2) Bio - diversity

Ans. Biodiversity is the richness of living organisms in nature due to presence of varieties of organisms, ecosystems and genetic variations within a species.

(3) Ecosystem

Ans. The biotic and abiotic factors and their interactions with each other form an ecosystem.

(4) Autotrophs

Ans. The organisms which produce their own food are called autotrophs.

(5) Producers

Ans. The organisms which can prepare their own food and make it available for other organisms are called producers.

(6) Consumers

Ans. The animals which depend on producers or other organisms for food are called consumers.

(7) Primary consumers

Ans. The animals which feed exclusively on producers only are called primary consumers.

(8) Secondary consumers

Ans. The animals which derive their food from primary consumers are called secondary consumers.

(9) Habitat

Ans. The place where organisms live and prosper is called as habitat. It is a dwelling place of an organism.

(10) Decomposers

Ans. The organisms which decompose the dead organisms to derive their food are called decomposers.

(11) Environment

Ans. Physical, chemical and biological factors affecting the living organisms in any possible way is collectively called as environment.

(12) Rare species

Ans. The organisms whose number is considerably declined and may become extinct very fast are called rare species.

(13) Vulnerable species

Ans. The organisms which are extremely less in number and continue to decline are called vulnerable species.

(14) Endangered species

Ans. The organisms whose number is declined or their habitat is shrunk to such an extent that they can be extinct in near future if conservative measures are not implemented are called endangered species.

(15) Genetic diversity

Ans. Occurrence of diversity among the organisms of same species is called genetic diversity.

(16) Species Diversity

Ans. Innumerable species of organisms occuring in nature is called species diversity.

(17) Sacred groves

Ans. The forest conserved in the name of God and considered to be sacred is called sacred groves.

(18) Environmental pollution

Ans. Direct or indirect changes in physical, chemical and biological properties of air, water and soil which will be harmful to humans and other living beings is called environmental pollution.

(19) Food Chain

Ans. Food chain is the sequence of transfer of energy in the form of one organism to another.

(20) Food Web

Ans. An ecosystem consisting of many food chains interconnected at various levels is called food web.

Q.2.3. Answer the following

***(1) What is ecosystem? What are its different components?** *(Can you recall; Textbook Page No. 36)*

Ans. (i) The biotic and abiotic factors at a particular place and their interactions is called an ecosystem. (ii) Biotic factors: Plants, animals, microbes Abiotic Factors: Water, air, soil, etc.

***(2) What are the types of consumers? What are the criteria for their classification?** *(Can you recall; Textbook Page No. 36)*

Ans. (i) Consumers are classified as primary consumers, secondary consumers and top level consumers, etc. (ii) These types depend on the food they eat or prey they feed on.

***(3) Write the relationship between lake and birds on tree?** *(Can you recall; Textbook Page No. 36)*

Ans. (i) Tree near lake comes under lake ecosystem. (ii) Birds reside on the trees and may trap prey from pond.

***(4) What is the difference between food chain and food web?** *(Can you recall; Textbook Page No. 36)*

Ans.

	Food Chain	Food Web
(i)	Interactions between producers, consumers and decomposers in a definite sequence is called as a food chain.	The interconnection among different food chains in an ecosystem at various levels is called as a food web.
(ii)	It consists of only one straight chain.	It consists of many interconnected food chains.

***(5) A bird building nest on a tree feeds upon the fishes in nearby pond. Whether this bird is part of both i.e. tree as well as pond ecosystem?** *(Let's Think; Textbook Page no. 37)*

Ans.

(i) Yes, bird is a part of both tree as well as pond ecosystem.

(ii) It feeds upon the fish in the pond and also resides on the tree

(iii) It might feed on fruits of the tree as well as insects dwelling there.

***(6) What will be the effect on paddy crop if frog population declines all of a sudden?**
(Let's Think; Textbook Page no. 37)

Ans. Paddy crop production will go down as the population of grasshoppers will increase and they will damage the paddy crop.

***(7) Number of which consumers will decline and which will increase?**
(Let's Think; Textbook Page no. 37)

Ans. Primary consumers (Grasshopper) will increase and tertiary consumers (snake) will decline.

***(8) What will be the overall effect on the ecosystem?**
(Lets Think; Textbook Page no. 37)

Ans. The natural balance of the ecosystem will be disturbed.

***(9) What is environment?**
(Can you tell; Textbook Page no. 37)

Ans. (i) Physical, chemical and biological factors affecting the living organisms in any possible way is collectively called as environment. (ii) In short, environment is the condition in surrounding.

***(10) What is included in environment?**
(Can you tell; Textbook Page no. 37)

Ans. Environment includes many biotic, abiotic, natural and artificial factors.

***(11) Which factors have an effect on the environment?**
(Can you tell; Textbook Page no. 38)

Ans.

(i) Environment is affected by natural factors and artificial factors.

(ii) Natural factors: Earthquakes, floods, fires, droughts etc.

(iii) Artificial factors**:** Deforestation, industrialization, use of excessive pesticides and fertilizers, unorganized garbage disposal, etc.

(iv) These factors cause pollution, create imbalance and ultimately affect the existence of biotic factors.

***(12) What will happen if number of consumers in environment goes on increasing gradually?**
(Can you tell; Textbook Page no. 38)

Ans. If number of consumers go on increasing, it will affect the population of producers and

other consumers disturbing the balance of the ecosystem.

***(13) What will be the effect of industry established on river bank on the river ecosystem?** *(Can you tell; Textbook Page no. 38)*

Ans.

(i) The river water will be affected by the chemicals released as effluents from the industry.

(ii) The animals and plants in the river may die.

(iii) The animals and human beings dependent on the river water also are seriously affected by the polluted water and it will make the soil around the polluted water infertile.

***(14) Which are the the types of pollution?** *(Can you recall; Textbook Page no. 39)*

Ans. The types of pollution are : Air pollution, water pollution, soil pollution, radioactive pollution, thermal pollution, light pollution, noise pollution

***(15) What do you mean by natural and artificial pollution?** *(Can you recall; Textbook Page no. 39)*

Ans.

(i) Unnecessary and unacceptable change in the surrounding environment due to natural events is called natural pollution. e.g. Forest fires, volcanoes, tsunami, etc.

(ii) Unnecessary and unacceptable change in the surrounding environment due to human activities is known as artificial pollution. eg. Industrialization, deforestation, unplanned urbanization, etc.

***(16) Collect the names of extinct birds and animals of India.** *(Recall a little; Textbook Page no. 45)*

Ans. Indian Cheetah, Indian Aurochs, Two-horned Rhinoceros, Pink headed Duck, Sivatherium (the tallest and fastest monster) are extinct birds and animals of India.

***(17) Which cycles are operated in environment? What is their importance?** *(Can you recall; Textbook Page no. 38)*

Ans.

(i) Various cycles operated in the environment are nitrogen cycle, oxygen cycle, carbon cycle, water cycle, etc.

(ii) Environmental balance is maintained through continuous operation of various cycles.

***(18) Which are the different trophic levels in the food chain?** *(Can you Recall; Textbook Page No. 36)*

Ans. Producers, primary consumers, secondary consumers, tertiary consumers, top level (apex) consumers and decomposers.

(19) What is Smog? State its affects.

Ans. (i) Smoke and fog together are called smog. (ii) It affects visibility and causes road accidents.

***(20) What do we learn from the story of Jadav Molai Peyang?**

Ans. We can learn from the story of Jadav Molai Peyang that positive attitude towards environment, hard work with patience and a single person, with determination can establish a new forest.

Q.2.4. Write short notes:

(1) Food chain

Ans.

(i) Food chain is a linkage of organisms within an ecosystem, in which each link feeds on the one before it and is fed on by the one after it.

(ii) Only the first link in the chain is a producer and all the rest are consumers.

(iii) In the ecosystem, the energy is transferred from one organism to another with food, in a definite sequence.

(iv) Initially, solar energy is absorbed by producers and with the help of photosynthesis the food is synthesized.

(v) Energy gets transferred from producers to consumers of different levels.

(vi) Decomposers derive energy from dead organisms by decomposition from all levels.

(viii) The flow of energy is unidirectional.

e.g. Grass → Grasshopper → Frog → Snake → Hawk

(2) Food Web

Ans.

(i) An ecosystem consists of many food chains that are interconnected at various levels. This is called food web.

(ii) An organism may be the prey for many other organisms.

(iii) For example, an insect feeds upon leaves of various plants but the same insect is the prey for different animals like wall lizards, birds, etc.

(iv) This forms an intricate web instead of a linear food chain. Such an intricate network is called as food web.

(v) Generally, food webs are formed everywhere in nature.

***(3) Sacred Groves**

Ans.

(i) The forest conserved in the name of God and considered to be sacred is called as sacred grove.

(ii) Sacred groves are in fact 'Sanctuaries' conserved by the society and not by the government forest department.

(iii) As they have been conserved in the name of god, they have special protection.

(iv) These clusters of thick forests are present not only in Western Ghats of India but in the entire country.

(v) More than 13000 sacred groves have been reported in India.

(vi) They are called *'Deorai'* in local language and because of God, people do not cut the trees. This helps in their conservation.

***(4) Environmental Conservation**

Ans.

(i) All the developed, developing and underdeveloped countries have accepted the responsibility of environment protection.

(ii) It will be possible to answer the environmental problems only if environmental protection-conservation becomes an effective public movement.

(iii) For this purpose, values like positive attitude and affection towards environment, knowledge about it, etc. should be inculcated among the children since their childhood.

(iv) Human establishments dominate over the nature. In an attempt to live satisfactory life, human kept on snatching from the nature as much as possible and this leads to increase in problems.

(v) Environmental conservation is our social responsibility.

(vi) Various laws are enacted about environmental conservation. Human has a crucial role in environmental conservation.

(vii) These laws are to be implemented strictly and whoever is a culprit, should be severely punished.

***(5) Disaster and its management**

Ans.

(i) Various dangerous events occur many times in the environment. These are called disasters.

(ii) These are 'all of a sudden' troubles to the mankind. Such events cause sudden changes in the environment and thereby, cause damage to it.

(iii) Disaster is a sudden event that leads to huge loss of life and property.

(iv) Disaster management is either prevention of disasters or making arrangements to face them or at least achieve the abilities to face them.

(v) Disasters are never planned but losses due to them can be prevented in a planned manner.

(vi) Disast er management is achieving or time to time improving the ability to face the disaster through scientific and careful observations and analysis of data.

(vii) For example, preparing the action plan through study of various aspects like preventive measures, rehabilitation and reconstruction and executing that plan is management of disaster.

(viii) Increasing awareness about disaster management among the general public through training programs, mass media etc. will enable them to be always prepared for disaster rescue.

***(6) Chipko Movement of Bishnoi**

Ans.

(i) In the 1970s, an opposition to the destruction of forests spread throughout India and came to be known as the Chipko movement.

(ii) The name of the movement comes from the word 'embrace' as the villagers hugged the trees and prevented the contractors from felling them.

(iii) Many communities in India have helped save nature. One such is the Bishnoi community of Rajasthan.

(iv) The original chipko movement was started around 260 years back in Rajasthan by this community. A large group of villagers led by a lady called Amrita Devi laid down their lives in an effort to protect the trees from being felled on the orders of the Maharaja of Jodhpur.

(v) After this incident the Maharaja gave a strong royal decree preventing the cutting of trees is all Bishnoi villages.

(vi) The success achieved by this protest led to similar protests in other parts of the country.

***(7) Biodiversity**

(i) Biodiversity is the richness of living organisms in

nature due to presence of varieties of organisms, ecosystems and genetic variations within a species. Biodiversity occurs at three different levels.

(a) Genetic Diversity : Occurrence of diversity among the organisms of same species is genetic diversity. For example, each human being is different from the other.

(b) Species Diversity : Innumerable species of organisms occur in nature. This is called as species diversity. Species diversity includes various types of plants, animals and microbes.

(c) Ecosystem Diversity : Many ecosystems are present in each region. Ecosystem is formed through the interaction between plants, animals, their habitat and changes in the environment. Each ecosystem has its own characteristic animals, plants, microbes and abiotic factors. Ecosystems are also of two types, natural and artificial.

(8) Why are green plants called producers?

Ans. (i) The food which is produced by green plants can be utilized by others. (ii) They produce food for the whole ecosystem, hence they are called as producers.

(9) What is the purpose of Environmental Conservation Act, 1986?

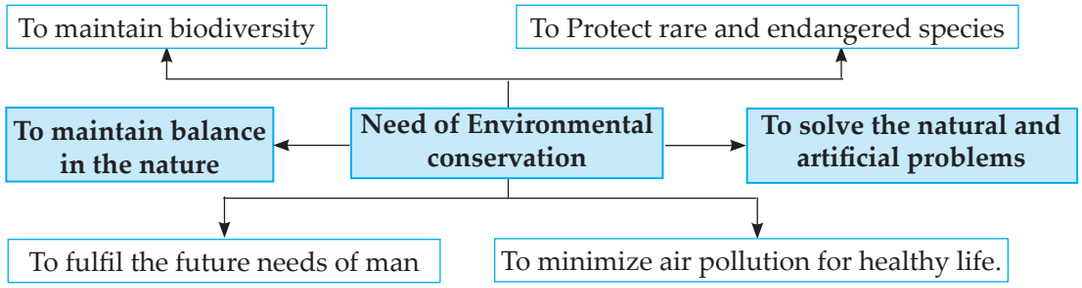
Ans. Purpose of the Environmental Conservation Act, 1986 is to control the pollution and punish the persons or institutes harming the environment.

(10) What is the role of Ministry of Environment and Forests?

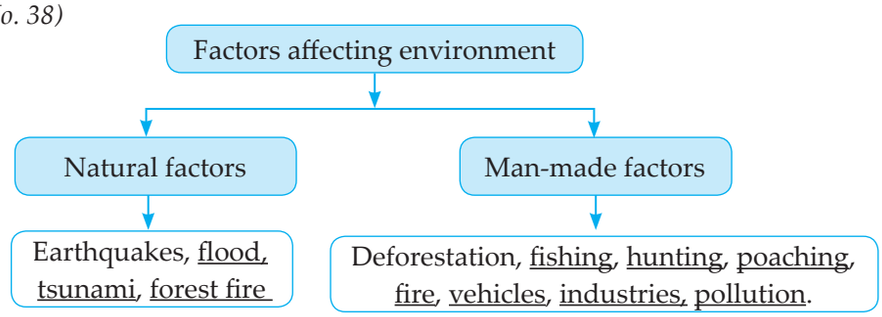
Ans. Ministry of Environment and Forests is involved in planning, inducting and increasing awareness about environment and forests through various programs since 1985.

Q.2.5. Complete the following chart table: *(Complete the chart; Textbook Page No. 40)*

***(1) Now a day, we are observing the environmental degradation everywhere. Complete the flow chart given besides with the help of environment.**



***(2) Observe the environment around you. Complete the following flow chart.** *(Observe and fill the information; Textbook Page No. 38)*



Q.2.6. Give scientific reasons:

(1) Domestic animals like cockroaches, lizards are ecologically important.

Ans.

(i) Our house is a small ecosystem in which interactions between biotic and abiotic factors take place.

(ii) Wall lizard feeds on mosquitoes, spider, etc. which help in maintaining cleanliness.

(iii) Cockroach feeds on material from drainage and helps in cleaning the drainage passage.

(iv) Every component of the ecosystem is important for the ecosystem, as they form an important link in the food chain.

(2) We should take care of the environmental components of our surroundings.

Ans. Both biotic and abiotic factors are important in maintaining ecological balance.

(i) Our surroundings represent an ecosystem.
(ii) In recent years, due to certain harmful human activities, pollution has increased.
(iii) Due to this rise in levels of pollution, our health has deteriorated.
(iv) The existence of humans is entirely dependent on the existence of biotic and abiotic components, hence, we must conserve nature.

(3) The Earth is the largest ecosystem.

Ans.

(i) Ecosystem is an interaction between the biotic and abiotic factors in the definite geographic area.
(ii) On the Earth, there are different geographic locations like oceans, mountains, deserts, grasslands, polar region, etc.
(iii) All areas are the separate and individual ecosystems.
(iv) Since the Earth is made of all such ecosystems, it is a huge or the largest ecosystem.

(4) Environmental problems are increasing in the recent times.

Ans.

(i) Man is the most intelligent animal on this planet.
(ii) On the Earth, human being has proved his superiority as compared to other animals with the help of characters like intelligence, memory, imaginary ability, etc.
(iii) Humans established their domination over the nature.
(iv) Man utilized all the natural resources as much as possible.
(v) In an attempt to live a satisfactory life, human being kept on snatching from the environment as much as possible and this leads to disturbance of environmental balance.
(vi) Hence, environmental pollution is increasing day by day.
(vii) Industrialization, urbanization, deforestation, construction of bridges and dams even housing lead to create and increase environmental problems.

(5) Green plants are called autotrophs.

Ans.

(i) Green plants absorb solar energy.
(ii) In the sunlight, they perform photosynthesis in which the food in the form of glucose is synthesized.
(iii) Thus, these organisms can manufacture and utilize the food they make.
(iv) The food they prepare is not only used by them but can be made available to the entire biological world, hence are called producers.
(v) Green plants do not depend on others for food and hence, they are called autotrophs.

(6) Grasshopper is a primary consumer.

(i) The organisms which feed exclusively on producers are called primary consumers.
(ii) Grasshopper can not produce its own food.
(iii) It feeds on grass and other green plants only.
(iv) Hence, grasshopper is a primary consumer.

(7) The protection and conservation of wildlife is necessary.

Ans.

(i) The existence of ecosystem is concerned with the proper interactions between the various components of the ecosystem.
(ii) The biotic factors in the forest are linked to each other to derive benefits from mutual dependence.
(iii) The decrease or increase in the wildlife affects the entire ecosystem adversely. Food chain and food webs get disturbed as prey-predator relationship is broken.
(iv) Due to this, the entire ecosystem suffers. Hence, we must protect wildlife.
(v) Most harmful effects of the environmental pollution affect all living organisms including wild animals..
(vi) Biodiversity is the richness of living organisms in nature.
(vii) Possibility of wiping out the species arises if there is decrease in the wildlife diversity.
(viii) Hence, conservation, protection, and cultivation of wildlife is essential.

(8) The flow of energy in the ecosystem is unidirectional.

(i) The ultimate source of energy is any ecosystem is the sun.
(ii) Part of the energy received by an ecosystem from the Sun is stored in food molecules by plants.
(iii) When this energy is transferred from one trophic level to another trophic level, some part of energy is released in the form of heat and some part is utilized for metabolism.

(iv) No energy in the ecosystem goes back to the Sun.

(v) Thus, the flow of energy in the ecosystem is unidirectional.

(9) Decomposers are crucial biotic factors in an ecosystem.

Ans.

(i) Most decomposers are fungi and bacteria.

(ii) In the process of feeding, they use the energy left in dead and decaying matter.

(iii) If decomposers were not the part of ecosystem, then the nutrients that entered food chain would remain locked up forever in the wastes thrown out by the bodies of the organisms, and after death, in their bodies.

(iv) Less and less nutrients would remain available to plants, and through them, to other creatures.

(v) The waste would go on building up around us till all life on earth would be overwhelmed by its own wastes, if the decomposes were not there.

(vi) Thus, decomposers are crucial biotic factors of ecosystems.

(10) In the ecosystem wild animals like lions, tigers, are important.

Ans.

(i) In the forests, the green plants play the role of producers. They perform photosynthesis and produce food which is available for herbivores.

(ii) Herbivores feed on green plants and satisfy their energy requirement and they become food for carnivores.

(iii) Lion, tigers are secondary or top level consumers which feed on herbivores.

(iv) In order to maintain ecological balance, every organism is necessary. If there are no wild animals, then the number of herbivores will increase beyond certain limit which may affect the green plants.

(v) Hence, predators like lion and tiger are important to prevent the overpopulation of herbivores.

Q.3.1. Explain the following questions.

(1) Explain various causes of environmental pollution?

Ans.

(i) Contamination of any material is called as pollution.

(ii) Any unacceptable and unnecessary change in the surrounding is called environmental pollution.

(iii) Contamination of abiotic components leads to environmental pollution.

(iv) Air, water and soil are contaminated by various human activities which lead to pollution.

(v) Population explosion, industrialization, urbanization, deforestation, overuse of natural resources are some of the major causes of environmental pollution.

(2) Enlist incidences of radioactive pollution? Write their effects.

Ans.

(i) Radioactive pollution can occur due to two reasons such as natural and artificial.

(ii) UV and IR are natural radiations, whereas X-rays and radiations from atomic energy plants are artificial.

(iii) Chernobyl, Windscale and Three Miles Island incidences are the major mishaps of the present world.

(iv) Effects of radiations:

(a) Cancerous ulceration occur due to higher radiations of X-rays.

(b) Tissues in the body are destroyed.

(c) Genetic changes occur.

(d) Vision is adversely affected.

***(3) Write the types and examples of biodiversity.**

Ans.

(i) Biodiversity is the richness of living organisms in nature due to presence of varieties of organisms, ecosystems and genetic variations within species.

(ii) Biodiversity occurs at three different levels.

(a) Genetic Diversity: Occurrence of diversity among organisms of same species whose members involve in sexual reproduction is genetic diversity.

(b) Species Diversity: Innumerable species of organisms occur in the nature. This is called species diversity. Species diversity includes various types of plants, animals and microbes.

(c) Ecosystem Diversity: Many ecosystems are present in each region. Ecosystem is formed through the interactions between plants, animals, microorganisms, and abiotic factors.

(4) How are threatened species classified? OR What are the different types of threatened species?

Ans. Classification of threatened species:

(i) Endangered species: Either number of these organisms is declined or their habitat is shrunk to such an extent that they can be extinct in near future if conservative measures are not implemented.

Example: Lion tailed monkey, lesser florican

(ii) Rare Species: Number of these organisms is considerably declined. Organisms of these species being endemic may become extinct very fast.

Example: Red panda, musk deer.

(iii) Indeterminate species: These organisms appear to be endangered but due to some of their behavioural habits (like shyness) there is no definite and substantial information.

Example: Giant squirrel (Shekhru)

(5) What are abiotic factors? Write examples.

Ans. All inanimate and non-living things are together termed as abiotic factors.

Abiotic factors are divided further into physical and chemical factors.

(a) Physical components: Sunlight, Temperature, Heat, pressure, humidity.

(b) Chemical components: Air, water, soil, minerals, gases, chemical compounds.

(6) Enlist the effects of excessive use of natural resources.

Ans. Excessive use of natural resources have following adverse effects:

(i) The life of animal and plant is threatened.

(ii) Many species got extinct from the Earth and some species became endangered.

(iii) Due to deforestation, many varieties of medicinal plants are lost.

(7) Suggest some measures at individual level, a person can follow to protect the environment

Ans. On an individual level, a person can take certain measures:

(i) Use eco-friendly materials at home instead of synthetic materials.

(ii) Rain water harvesting at domestic level should be undertaken.

(iii) Electrical appliances can be switched off when not in use. Switch off fans, A.C's, while leaving the room.

(iv) Dry and wet garbage should be kept and disposed off separately.

(v) Use eco-friendly fuel and renewable energy sources.

***(8) How can bio-diversity be conserved?**

Ans. Biodiversity can be conserved in the following ways:

(i) Protecting rare species of organisms.

(ii) Establishing national parks and sanctuaries.

(iii) Declaring some regions as 'bioreserves'.

(iv) Projects for conservation of special species.

(v) Conserving all plants and animals.

(vi) Maintaining records of the traditional knowledge.

(vii) Obeying the rules.

(9) How do the interactions take place in the biotic and abiotic factors of ecosystem?

Ans.

(i) Biotic factors of the ecosystem use abiotic components for the manifestation of their life processes.

(ii) Similarly, biotic factors release some materials as excretory products from their bodies to the environment and also release materials after their death.

(iii) Due to these continuous reactions, the abiotic components of the ecosystem keep on fluctuating.

(iv) In any ecosystem, the existence of biotic components is entirely dependent on the abiotic components.

(v) In this way, there are continuous interactions between biotic and abiotic factors of the environment.

(10) Explain the role of producers in the food chain?

Ans.

(i) Every component of the food chain needs energy.

(ii) Food is a source of energy.

(iii) Green plants trap solar energy and carry out photosynthesis to form glucose.

(iv) As green plants prepare their own food and do not depend on others for food, they are called autotrophs.

(v) The food which they prepare is not simply utilized by them but utilized directly or indirectly by

other living organisms. Hence, the green plants are called producers.

(vi) In the process of photosynthesis, oxygen gas is released in the atmosphere which is available to other organisms for respiration.

***(11) What is energy pyramid?**

Ans.

(i) Energy pyramid is a graphical model which represents the flow of energy in a community.

(ii) It consists of different levels which represent different group of organisms composing a food chain.

(iii) The energy pyramid shows the process of energy travelling up a food chain.

(12) What happens if there are no decomposers on the Earth?

Ans.

(i) Every component of the ecosystem plays a significant role in it.

(ii) Decomposers have a role of returning the material from the dead organism to the nature by the process called decomposition.

(iii) If decomposers are absent, this process will not take place and the Earth will see dead bodies everywhere, thus increasing garbage.

(iv) If materials are not returned to the surroundings, then they are not made available for recycling.

(v) Ultimately ecosystems would be buried under a heap of garbage.

(13) Pollution depletes the quality of air. Explain with suitable example.

Ans.

(i) The air pollution definitely depletes or reduces quality of air.

(ii) In metropolitan cities, due to heavy traffic and industrialization various gases add to the surrounding air.

(iii) Indiscriminate disposal of such gases increase CO_2 level of air.

(iv) As any particular component of air gets increased beyond certain limit, the air gets affected.

(v) Industries add 50% more CO_2 than what exists naturally, this is known as quality disintegration or a quality decay.

***(14) How do butterflies contribute to environmental balance?** *(Search; Textbook Page no. 41)*

Ans.

(i) Butterflies pollinate different types of flowering plants, thus helping in the reproduction of plants.

(ii) Butterflies play an important role in food chain as prey for birds, bats and other insectivorous animals.

(iii) By feeding on leaves, butterflies can help to control some of the unwanted plants found in the garden.

(iv) Butterflies have been widely used by ecologists as model organisms to study the impact of climate change.

(v) By watching how butterflies react and adjust to environmental changes, scientists can determine the effects of various actions on the environment as a whole.

***(15) Recognize the following food chain - Describe the ecosystem to which it belongs.**

Grasshopper ⟶ snake ⟶ Paddy field ⟶ Eagle ⟶ Frog.

Ans.

(i) Paddy field ⟶ Grasshopper ⟶ Frog ⟶ Snake ⟶ Eagle

(ii) This food chain belongs to Paddy field ecosystem. It is a man-made ecosystem.

(iii) Paddy is cultivated on large scale in various states of South India.

(iv) Paddy fields are frequently attacked by grasshoppers.

(v) Similarly frogs are also present in large numbers in the mud of paddy fields to feed upon grasshoppers and snakes are also present therein to feed upon their favorite food. i.e frogs.

(vi) Eagles feed on snakes which keeps a check on the number of snakes, in the ecosystem.

***(16) What is the meaning of "Jivo Jivasya Jivanam"?**

Ans.

(i) Jivo Jivasya Jivanam means that living things are interconnected to each other.

(ii) One life on earth is food for anothers.

(iii) Producers produce food which is used by primary consumers

(iv) They are food for secondary consumers and so on.

(v) If any link in the food chain is disturbed, the entire food chain is affected.

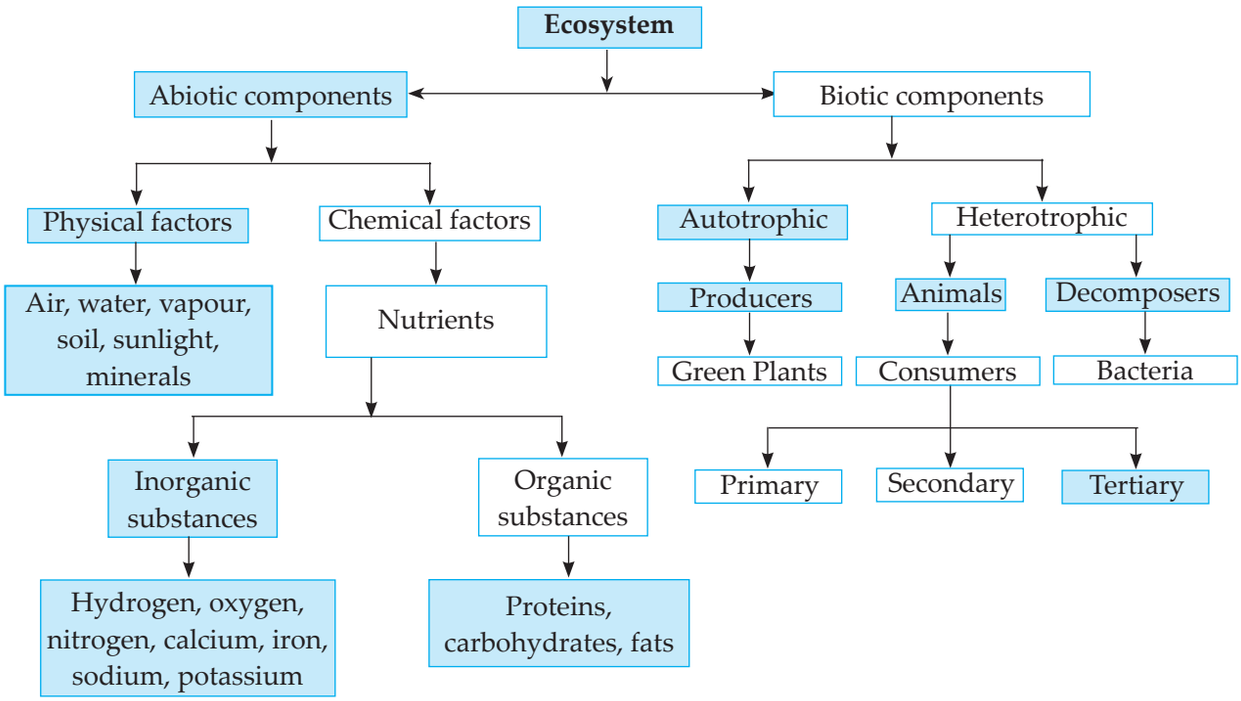
Q.3.2. Complete the chart / table:

***(1) Based on the air pollution, water pollution and soil pollution, complete the following chart.** *(Complete the chart; Textbook Page No. 39)*

	Air Pollution	Water Pollution	Soil Pollution
Components	**Gases: CO_2, CO, hydrocarbon, sulphur, NO_2, hydrogen sulphides, etc** **Solid : Dust, ash, carbon, lead, asbestos, etc.**	NH_3, free Cl_2, H_2S, O_3, phosphene (PH_3) hot water, colour, soap, wax, mercury, etc.	Leftover food, paper scraps, old clothes, bottles, tins, plastic articles, tar construction work waste, ash, biomedical waste
Source	Vehicles, chemical industries, industries, use of pesticides in agriculture, CFC from refrigerator, road mix material	**Industrial wastes, domestic waste, sewage, chemicals discharged from industries, pesticides used in agriculture.**	Mines, metallurgy, thermal power station, domestic waste, hospitals. E-wastes plastic wastes from industries.
Effect	Irritiation of eyes due to SO_2, CO, CO_2, inflammation of respiratory tract, respiratory disorder, depletion of capacity to hold O_2 in blood, cancer, tuberculosis, acid rain.	Inflammation in the abdomen, loss of brain power death of aquatic animals, water borne diseases in humans.	**Soil erosion, retarded growth of plants/crops, nutritional deficiency etc.**
Control Measure	(i) Use well tuned machinery. (ii) Prevent incomplete oxidation. (iii) Minimize the use of pesticides in agricultural practices (iv) Construct tall chimneys (v) Encourage tree plantation and cultivation.	(i) Do not waste water (ii) Do not release hot water in water bodies. (iii) Industrial effluents should be treated. (iv) Not to use pesticides or insecticides in the agricultural.	(i) Restrict the use of plastics. (ii) Wet garbage should be given treatment to make manure from it. (iii) Do not litter public places. (iv) Plantation and cultivation of trees. (v) Recycling

***(2) Fill up the blank boxes and display the completed chart.** *(Complete the chart; Textbook Page No. 37)*

Ans.



Q.4.1. Answer in detail:

***(1) Explain the statement- 'We have got this Earth planet on lease from our future generations and not as ancestral property from our ancestors'.**

Ans.

(i) Existence of man is entirely dependent on the existence of ecosystem.

(ii) Man derives his benefits by using various components of the ecosystem.

(iii) We can get these materials easily from the nature as our ancestors protected and conserved them for us.

(iv) Today man has proved his superiority as compared to other animals. He is indiscriminately using the natural resources for personal greed.

(v) Due to this, future generations may not benefit from the nature. They will suffer from pollution, drought, unseasonal rains, green house effect etc.

(vi) Thus, it is our responsibility to preserve, conserve and protect nature so that next generations will get conducive climate and their life may not be in trouble.

(vii) Thus it is rightly said that, we got the planet earth on lease from our future generations and not ancestral property.

(viii) Nature is not our ancestral property but we have to take care of it so that it can be handed over to next generations without any further damage to it.

***(2) How will you justify that overcoming the pollution is a powerful way of environmental management?**

OR

***Why is it said that pollution control is important?**

(Use your brain power; Textbook page No. 40)

Ans.

(i) Natural environment consists of air, atmosphere, water, land, living, organisms, etc.

(ii) Continuous interactions occur between biotic and abiotic factors. Their interactions are very important.

(iii) Environmental balance is maintained through continuous operation of various natural cycles like biogeochemical cycles.

(iv) When some natural factors of environment and some artificial polluted factors harm the environment, it creates imbalance between various factors of the environment and ultimately affects the existence of biotic factors.

(v) The main threat to the ecosystem is the pollution of materials present in it. Sometimes it may damage the ecosystem completely in the course of time.

(vi) In environment management, we take the task of protecting, conserving and preserving the natural components of the ecosystem.

(vii) If we control the pollution, then the environmental management activities will succeed and the purpose will be served.

(viii) If there is minimum pollution, then the nature cycles will continue without any disturbance and biodiversity can be enriched.

***(3) Which projects will you run in relation to environmental conservation? How?**

Ans.

(i) Project (1): Tree plantation and cultivation: This program is necessary as only if people come to know the importance of a tree, plantations will increase and 'cutting the trees' will never take place.

(ii) Project (2): Save water: In this project, people and students will be made aware of the importance of water. At the same time, various methods of water conservation will be taught.

(iii) Project (3): Wildlife conservation: Various places like sanctuaries, national parks can be visited to know more about the wild animals and we can make efforts to protect them.

(iv) Project (4): Minimise or avoid use of plastic**:** With this activity, we can create awareness about the hazards of plastic and various programs can be conducted to create awareness about minimizing use of plastic and conserving the environment.

***(4) What would be your role in environment management?** *(Think and answer; Textbook Page No. 44)*

Ans.

(i) Attempts at various levels are performed for conserving environment.

(ii) Some levels are as follows:

(a) Conservation: Conserving the available resources.

(b) Control: Preventing the harm, stopping harmful activities, changing the mindset.

(c) Production: Attempting innovation, revival of harmed factors of environment.

(d) Prevention: Preventing possible harms, factors harmful to environment and designing new plans.

(e) Preservation: Preserving whatever has been leftover, remedies to prevent further loss, preserving unknown regions.

(f) Awareness: Education, Guidance, Awareness, Imitation, Organization, Participation.

***(5) Write the names of biodiversity hot spots?**

Ans.

(i) There are 34 highly sensitive biodiversity spots which are reported all over the world. Such areas had once occupied 15.7% area of the Earth.

(ii) At present, 86% of the sensitive areas are already destroyed

(iii) Some animals from the Western Ghats spread over the states of Gujarat, Maharashtra, Goa, Tamilnadu and Kerala have been endangered due to mining industry and search for natural gas.

(iv) Habitats of Asiatic Lion and Wild Bison of this region have been under threat.

(v) Manas Sanctuary of Assam is under threat due to dams and indiscriminate use of water. Tiger and Rhino of that region, are under threat.

(vi) Sunderban Sanctuary of West Bengal is reserved for tigers. However, the tiger population and overall local environment is seriously challenged by dams, deforestation, excessive fishing, trenches dug for the same, etc.

***(6) Which are the reasons for endangering the species of plants and animals? How can we save those?**

Ans. Numerous species of animals and plants have become endangered due to activities of human beings.

(i) Animals and plants are the sources of income for some people. Hence, poaching takes place which becomes a big threat to the existence of animal and plant life.

(ii) Animal skin, flesh and bones are used for various purposes and thus they are killed.

(iii) Wood, medicinal plants, gums, resins are the plant products which are useful, hence plants are brutally cut.

(iv) Animals and plants have demand abroad for research and for medicines. Due to this, hunting takes place which resulted in making certain varieties endangered.

(v) Because of all these reasons, certain animals and plants became endangered.

(vi) We can save the remaining animal and plant life through environmental education, awareness programs, strict rules and regulations, implementing various environmental acts, and prohibiting poaching can prevent the loss of varieties of plants and animals.

***(7) Why does human being have an important place in the environment?**

Ans.

(i) Since the existence of human, there is inter relationship between human and environment.

(ii) Humans evolved on the Earth long after formation of the Earth.

(iii) Human beings proved their superiority as compared to other animals with the help of characteristic like intelligence, memory, imagination etc. Humans established domination over the nature.

(iv) They utilized all the natural resources as much as possible and this lead to increase in problems.

(v) From this entire scenario, we can understand that the human being has crucial role in maintaining the environmental balance.

(vi) If he has disturbed the environmental balance, then he himself only can conserve and improve the quality of nature.

(8) Mahatma Gandhi said, ' The Earth is sufficient to satisfy everyone's need but not the greed' Explain.

Ans.

(i) There are different types of biotic and abiotic factors on the earth.

(ii) There are different types of ecosystems found with lot of variety in them as per their abiotic components.

(iii) Diversity in biotic factors depends on availability of abiotic factors.

(iv) Various bio-geochemical cycles naturally going on in nature which maintain the natural balance of the ecosystems.

(v) If use of any such factors is indiscriminately increased, there can be imbalance which leads to pollution.

(vi) Man uses the nature the most to satisfy his needs. In the course of time, he has become greedy.

(vii) Human activities like deforestation, road construction, industrialization, unplanned urbanisation lead to loss of biodiversity as well as environmental pollution.

(viii) Mahatmaji's vision was that human should use nature only for basic needs and not for the development at the cost of nature.

(ix) There should be sustainable development without harming the environment.

Q.4.2. Observe and explain the diagram.

***(1) What are the meanings of following symbols? Write your role accordingly?**

***(a)**

Fig. 4.1

Ans. This sign is used for indicating that 'this object can be reused and recycled'.
We can collect and give it to rag pickers.

***(b)**

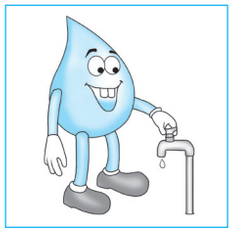


Fig. 4.2

Ans. This sign is used to indicate 'Save Water'.
We must close the taps which are left open, not to waste water.

***(c)**

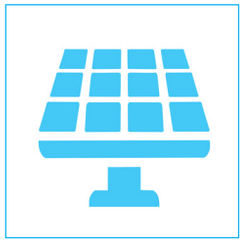


Fig. 4.3

Ans. This sign indicates 'Solar Panel'.
We can save energy by using solar energy.

***(2) Some symbols are given below. Find the meaning of those symbols in relation to environment conservation. Make a list of other such symbols.**
(Enlist and Discuss; Textbook Page No. 43)

(a)

Fig. 4.4

Ans. This sign indicates 'Waste Management'.

(b)

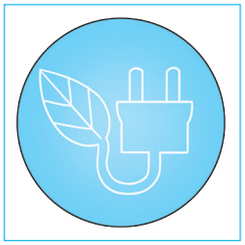


Fig. 4.5

Ans. This sign indicates 'Save Energy'.

(c)

Fig. 4.6

Ans. This sign indicates 'Save fuel'.

(d)

Fig. 4.7

Ans. This sign indicates 'Save water'.

(e)

Fig. 4.8

Ans. This sign indicates 'Ban Plastic'.

***(3) Observe the and answer the following questions.**

Ans.

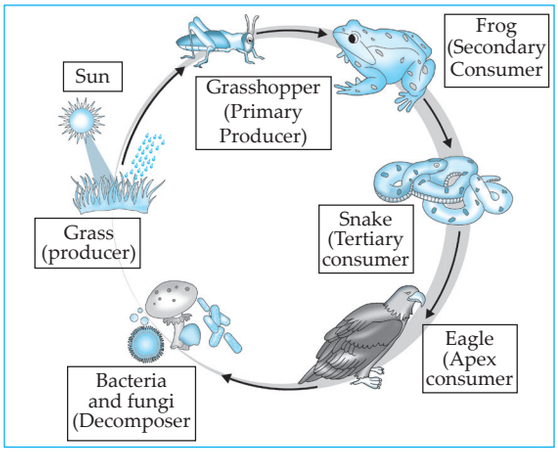


Fig. 4.9 Food chain

(a) Write the name and category of each of the component shown in picture. *(Think and answer; Textbook Page No. 36)*

Ans. Grass (producer), Grasshopper (primary consumer), Frog (Secondary consumer), Snake (Tertiary consumer), Eagle (Apex consumer), Microbes (Decomposers).

(b) What is necessary to convert this food chain into food web? *(Think and answer; Textbook Page No. 36)*

Ans.

(i) Include more primary consumers like squirrel, deer, goat etc.

(ii) Include more secondary consumers like wolf, fox etc.

(iii) Include more tertiary and apex consumers like lion, tiger etc.

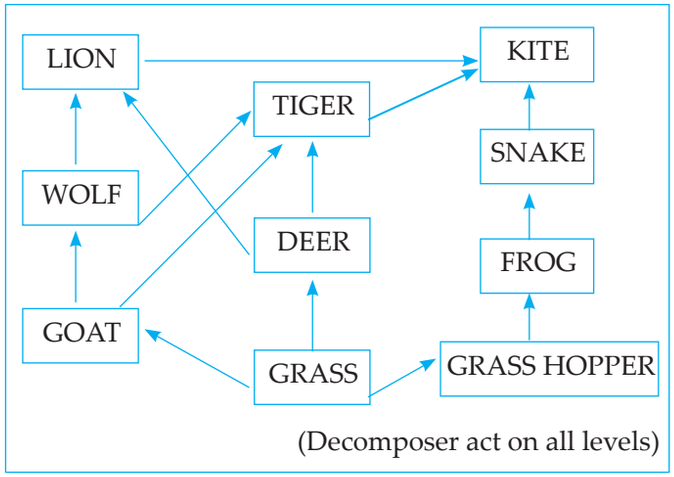
(iv) Show interrelationship of these animals to convert the food chains into a food web.

***(4) Prepare a food web of atleast 3 food chains.**

Ans. Grass → grass hopper → frog → snake → kite

Grass → dear → tiger

Grass → goat → wolf → lion



(5)

Fig. 4.10. Jadav Molai Payeng

(a) Who is this Man in the above picture?

Ans. The man in the picture is Jadav Molai Payeng.

(b) What was his contribution for?

Ans.

(i) The 1979, the local social forestry Department in Assam began a social aforestation project in 200 hectares of land.

(ii) Even after completion of the project, Molai single handedly continued to plant the trees.

(iii) At present, the barren area is covered with trees to about 1360 acres.

(iv) We learn that even if many people come together to destroy a forest, a single person if determined can make a difference and create a new forest.

(v) In any environmental projects do not think what can you do ? Think if you do, then others around you will follow you.

❖ ❖ ❖

ASSIGNMENT - 4

Time : 1 hour **Marks : 20**

Q.1. (A) Answer the following. **(3)**

(1) Fill in the blanks: The World Biodiversity Day is ..... .

(2) Find the odd man out: Deer, tiger, frog, lion.

(3) Complete the analogy:

Rare species : Musk deer : : Indeterminate species : .....

Q.1.(B) Choose and write the correct options: **(2)**

(1) How many biodiversity spots are reported all over the World?

(a) 30 (b) 34 (c) 35 (d) 40

(2) ..... has been established in 2010 for effective implementation of environment related laws.

(a) Forest Conservation Act (b) Wild life protection Act

(c) Environmental conservation Act (d) Indian Forest Act

Q.2.Answer the following (Any 2) **(4)**

(1) Define: (i) Biodiversity (ii) Secondary consumers

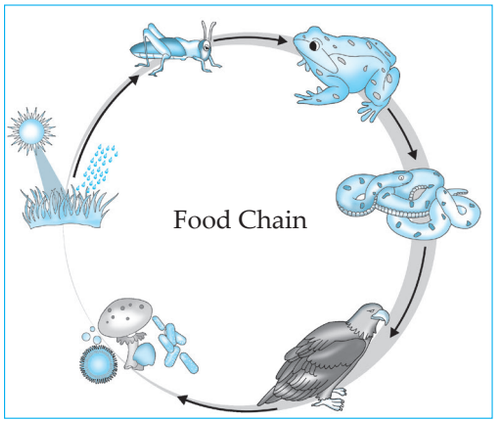
(2) Write the differences between food chain and food web.

(3) Green plants are called autotrophs - Give scientific reasons.

Q.3.Answer the following (Any 2) **(6)**

(1) Enlist incidences of radioactive pollution. Write their effects.

(2) Label the figure.



(3) How would you conserve environment?

Q.4.Answer in detail (Any 1) **(5)**

(1) How are the threatened species classified?

(2) 'We have got this Earth planet on lease from our future generations and not as ancestral property from our ancestors.' - Explain this statement.

❖ ❖ ❖

5 Towards Green Energy

Points to Remember:

- **'Energy is a stored ability or capacity of a body to do work.'** Hence, in order to carry out work, we need energy.
- The energy required to perform mechanical work, is called **mechanical energy**. It is of two types; namely, **potential energy** and **kinetic energy**.
- Energy can be **converted** from one form to another. The total energy in the universe always remain **constant**.
- Most of the electric power plants are based on the principle of electromagnetic induction invented by **Michael Faraday**. According to him, whenever magnetic field around a conductor changes, a potential difference is generated across the conductor.
- The magnetic field around a conductor can be changed in two ways. If a **conductor** is **stationary** and **magnet** is **rotating**, the field around conductor changes or if a **magnet** is **stationary** but the **conductor is moving** then also the field around the conductor will change. Thus in both the cases, a **potential difference** is produced across the conductor.
- The electric power generating machine based on this principle is called **'electric generator'**.
- The electric generator converts **mechanical energy** into electrical energy.
- In the thermal power stations, coal is burnt and **heat** energy is then converted to **electrical** energy. Here, chemical energy of coal is first converted into heat and then into **kinetic energy** of steam and ultimately to electrical energy.
- Thermal power plant has boiler, turbine, generator, condenser, etc.
- Due to thermal power plants **CO_2, SO_2, NO_2,** carbon particles are added to air resulting in **air pollution**.
- In the nuclear power plant, steam turbine is used to rotate the generator. However here, the energy released by fusion of nuclei of atoms like **Uranium** or **Plutonium** is used to generate the steam of very **high temperature** and **high pressure**.
- In the nuclear power plant, the **nuclear** energy is first converted into **thermal** energy, then **thermal** energy is converted into **kinetic** energy of steam, then **kinetic** energy of **steam** is converted into **kinetic** energy of **turbine** and finally **kinetic** energy of turbine is converted into **electrical** energy.
- When a slow moving neutron is bombarded on uranium nucleus, the splitting of uranium nucleus takes place, **Barium** and **Krypton** nuclei are formed with release of three neutrons, with release of tremendous amount of energy, this process is called **'nuclear fission'**.
- The products after fission of nuclear fuel are also **radioactive** and emit harmful radiations.
- In the power generation **plant** based on **natural gas**, the turbine is run by a gas at very **high temperature** and **pressure** generated by combustion of a natural gas.
- In this plant, pressurised air is introduced into the combustion chamber using a **compressor**, Natural gas is burnt in the chamber at very high temperature and pressure generated in this chamber runs the turbines. The turbine then drives the generator to produce **electricity**.

- The efficiency of power plant based on **natural gas** is more than **thermal power plant**. Even the air pollution is greatly reduced.
- In Hydroelectric power plant, the **potential** energy in water stored in dam is converted into **kinetic** energy of water. This **kinetic** energy **drives** the **turbines**. The turbines drive the generator to produce **electricity**.
- Since no fuel is burnt in hydro-electric power generation, there is **no pollution**, but obstruction of water affects living world in the river.
- **Wind** energy can also be used to obtain electrical energy.
- The machine that converts the kinetic energy of wind into electrical energy is called **wind-turbine**.
- Wind energy is a **clean source of energy**.
- The electrical energy can also be generated by using solar energy. This can be done by two ways, **solar photo-voltaic cells** and **Solar thermal power plant**.
- In solar photovoltaic cells, the electricity is generated without using generator and without using **principle of electro-magnetic induction**. Photovoltaic cells convert the solar radiation energy directly into electrical energy.
- In the second method, the energy of **solar radiations** is converted into **thermal** energy first. Then the turbine-generator system is driven using that thermal energy to **generate electricity**.
- Solar energy is the most **eco-friendly energy**.

MASTER KEY QUESTION SET - 5

Q. 1. (A) 1. Fill in the blanks and rewrite the statement:

(1) The principle of ..... was invented by Michael Faraday.

(2) To rotate the magnet in the generator, we need a device called .....

(3) The water in a cooling tower in thermal power plant is circulated through the .....

(4) In thermal power plants, the ..... energy in the coal is converted into electrical energy through several steps.

(5) In nuclear fission, the energy released by fission of nuclei of atoms like ..... and ..... is used.

(6) Natural gas does not contain element ....., so burning of natural gas results in less pollution.

(7) In Hydroelectric plants, the ..... energy of the flowing water drives the turbine

(8) ..... is a factor necessary for wind - energy generation, but is not available everywhere.

(9) A silicon solar cell of dimension 1 cm^2 generates current of about ..... mA.

(10) Solar cells are made of a special type of material called ..... such as silicon.

(11) Many solar panels connected in series form a solar strings and many solar strings connected in parallel form a solar .....

(12) If 36 solar cells, each of size 100 cm^2 are connected in series in a solar panel, it will give potential difference of ..... V and current of ..... A.

(13) A transformer transforms the ..... and current levels of the generated power.

(14) Incomplete combustion of fossil fuels leads to formation of ..... gas which adversely affects our health.

(15) An electronic device that convents D.C. Solar power into AC power is called .....

(16) ..... and ..... fuels are obtained from Natural gas.

Ans. *(1) electro magnetic induction (2) turbine (3) condenser (4) chemical (5) Uranium and Plutonium (6) Sulphur (7) kinetic (8) Wind velocity (9) 30 (10) Semi conductor (11) array (12) 18, 3 (13) voltage (14) carbon monoxide (15) inverter (16) LPG, CNG*

Q. 1. (A) 2. Find the odd one out:

(1) Boiler, turbine, generator, solar cell.

Ans. Solar cell: It is part of Solar power station while, others are parts of thermal power station.

(2) Thermal energy, atomic energy, wind energy, natural gas power.

Ans. Wind energy: It is clean source of energy while others create air pollution.

(3) Uranium, plutonium, coal, thorium.

Ans. Coal - It is a fuel used is thermal power plant while others are used as fuels in nuclear power plant

(4) Flowing water, water stored in dam, moving fan, running train.

Ans. Water stored in dam: It is an example of potential energy, while others are examples of kinetic energy.

(5) LPG, CNG, coal, methane.

Ans. Coal: It is solid fuel while others are gaseous fuels.

(6) Edible oil, LPG, CNG, crude oil.

Ans. Edible oil: It is used in food products, while others are used as fossil fuels.

(7) Solar energy, nuclear energy, tidal energy, wind energy.

Ans. Nuclear Energy: It creates nuclear pollution while others are clean sources of energy.

(8) Carbon dioxide, oxygen, sulpur dioxide, nitrogen dioxide.

Ans. Oxygen: It is a pure gas while others are harmful gases released by burning of coal.

Q. 1. (A) 3. Find out the correlation:

(1) Thermal power plant : Coal : : Nuclear power plant : .....

Ans. Uranium - Coal is used as a fuel to generate energy in a thermal power plant whereas uranium is used as a fuel to generate energy in Nuclear power plant.

(2) Series arrangement of modules : Strings : : parallel arrangement of string : .....

Ans. Solar array - Many modules are connected in series to form solar strings while many solar strings are connected in parallel to form a solar array.

(3) Coal consumption of world : 41% : : coal consumption in India : .....

Ans. 60% - The coal consumption of the world is 41% whereas coal consumption of India is 60%.

(4) Natural gas : CNG and LPG : : Nuclear power : .....

Ans. Uranium and plutonium - CNG and LPG are used as fuels in Natural gas power plant whereas uranium and plutonium are used as fuels in a nuclear power plant.

(5) Silicon solar cell of 1 cm^2 : 30 mA : : 100 cm^2 : ..... .

Ans. 3A - A silicon solar cell of dimension 1 cm^2 generates current of about 30 mA while silicon solar cell of dimension 100cm^2 generates current of about 3A.

(6) Water stored in dam : Potential energy : : Flowing water : ..... .

Ans. Kinetic energy - Water stored in dam is an example of potential energy and flowing water is an example of Kinetic energy.

(7) Atomic power plant : Steam turbine : : Natural power plant : ..... .

Ans. Gas turbine - The turbine used in atomic power plant is rotated using steam and the turbine used in thermal power plant is rotated using gas.

(8) Inverter : DC to AC : : Photovoltaic cell : ..... .

Ans. Solar energy to Electrical energy - Inverter converts the DC current to AC current while photovoltaic cell converts solar energy to electrical energy.

Q. 1. (A) 4. Match the columns and complete the table:

*(1)

Column 'A'	Column 'B'	Column 'C'
(1) Coal	(a) Potential energy	(A) Wind electricity plant
(2) Uranium	(b) Kinetic energy	(B) Hydro electric plant
(3) Water reservoir	(c) Nuclear energy	(C) Thermal plant
(4) Wind	(d) Thermal energy	(D) Nuclear power station

Ans. *(1 - d - C) ; (2 - c - D) ; (3 - a - B) ; (4 - b - A)*

(2)

(2) Column 'A'	Column 'B'	Column 'C'
(1) Electromagnetic induction	(a) Silicon	(A) Uncontrolled chain
(2) Nuclear plant	(b) Heat from coal	(B) DC
(3) Photovoltaic cell	(c) Faraday	(C) Chemical energy
(4) Thermal power plant	(d) U - 235	(D) Changing magnetic field

Ans. *(1 - c - D) ; (2 - d - A) ; (3 - a - B) ; (4 - b - C)*

(3)

Column 'A'	Column 'B'
(1) Thermal power	(a) Only avalible in day time
(2) Wind power	(b) Air pollution
(3) Solar power	(c) Atomic radiation
(4) Atomic power	(d) Wind velocity

Ans. *(1 - b); (2 - d); (3 - a); (4 - c)*

(4)

Column 'A'	Column 'B'
(1) Series of solar cells	(a) Solar cell
(2) Series of solar panels	(b) Solar String
(3) Solar strings in parallel	(c) Solar panel
(4) semiconductor silicon	(d) Solar array

Ans. *(1 - c); (2 - b); (3 - d); (4 - a)*

(5)

Column 'A'	Column 'B'
(1) Thermal power station.	(a) CNG
(2) Nuclear power station	(b) Coal
(3) Solar cell	(c) Uranium
(4) Natural gas power	(d) Silicon

Ans. *(1 - b); (2 - c); (3 - d); (4 - a)*

Q. 1. (A) 5. State whether the following statements are true or false and correct the false statement:

(1) There is heat energy stored in coal.

(2) In thermal power plant water is boiled using cooling tower.

(3) In thermal power plant, turbine rotates because of steam.

(4) In the nuclear reactor, aluminium is used as a fuel.

(5) The reaction in the atomic reactor is a type of uncontrolled chain reaction.

(6) If U-235 is bombarded with a neutron, it gets converted into U-237.

(7) Atomic energy is a very good energy source.

(8) The efficiency of natural gas plant is less than that of thermal power station working on coal.

(9) Energy released during fission is measured in joules.

(10) The product after fission of nuclear fuels are harmless.

(11) Carbon dioxide generated due to buring of fuels like coal, diesel leads to problems like acid rain.

(12) In wind turbine the function of the gearbox is to increase rotations per unit time

(13) Wind turbine of specific capacity is selected depending on altitude.

(14) In Nuclear fission, Uranium 236 releases two neutrons and converts into Barium and krypton.

(15) Solar cells are made up of Silicon.

Ans. *(1) False. Coal has chemical energy. (2) False. Water is boiled using boiler. (3) True. (4) False. Uranium is the fuel used in nuclear reactor. (5) False. The atomic reaction carried out in the nuclear reactor is a type of controlled chain reaction. (6) False. It gets converted into U-236. (7) True. It is a clean source as there is no combustion. (8) False. The efficiency of natural gas plant is more than that of thermal power plant that works on coal. (9) False. The energy released during fission is measured in MeV. (10) False. The product after fission of nuclear fuel are radioactive and emit harmful radiation. (11) False. Acid rains are caused by Nitrogen dioxide (12) True. (13) False. It depends on wind velocity. (14) False. 3 neutrons and Barium and Krypton. (15) True.*

Q. 1. (A) 6. Answer the following in one sentence.

*(1) What is Energy?

(Can you recall Text book pg no. 47)

Ans. Energy is the capacity or stored ability of a body to do work.

(2) Write the types of mechanical energy?

Ans. Mechanical energy is of two types potential energy and kinetic energy.

(3) Where can we install wind turbines?

Ans. The wind velocity is usually high near the sea shore. Therefore, we can install wind turbines there.

(4) Can electrical energy be generated without using the principle of electromagnetic induction?

Ans. Yes, Solar radiation using solar cells.

(5) What is meant by Green energy? Give examples of green energy?

Ans. Green energy is the eco-friendly form of energy which does not cause environmental pollution.

Examples: Solar energy, wind energy, Hydroelectricity etc.

*(6) Which electricity generation process is eco-friendly and which is not?

(Lets think Text book pg no. 52)

Ans. Wind mill, solar thermal plant are eco-friendly while thermal and nuclear power generation are not eco-friendly.

Q. 1. (B) Choose and write the correct option:

(1) Electromagnetic induction was discovered by ..... .

(a) Edison (b) Newton

(c) Michael Faraday (d) Archimedes

(2) In combustion of coal.....gas is not released.
(a) SO_2 (b) NO_2 (c) NH_3 (d) CO_2

(3) Each nuclear fission of uranium nucleus releases ..... neutrons.
(a) one (b) two (c) three (d) four

(4) Water stored in the dam possess .....energy.
(a) chemical (b) potential
(c) kinetic (d) electric

(5) The electric energy obtained from solar photovoltaic cell is of ..... type.
(a) DC (b) AC
(c) static (d) magnetic

(6) Solar cell can work during ..... only.
(a) night (b) morning
(c) day time (d) evening

(7) Each nuclear fission of uranium nucleus release ..... energy.
(a) 20 MeV (b) 236 MeV
(c) 237 MeV (d) 200 MeV

(8) Wind turbines with capacity right from less than ..... to about ..... are commercially available.
(a) 1 kW, 7000 kW (b) 10 kW, 700 kW
(c) 1 MW, 700MW (d) 1 kW, 10kW

(9) A good solar cell can have an efficiency of around .....
(a) 50% (b) 10% (c) 15% (d) 51%

(10) The natural gas based power plant in Maharashtra is at.....
(a) Koyana (b) Chandrapur
(c) Anjanvel (d) Tarapur

(11) It took millions of years for the formation of ..... fuels.
(a) chemical (b) solid
(c) gaseous (d) fossil

(12) The photovoltaic cells convert ..... energy into electrical energy.
(a) mechanical (b) solar
(c) chemical (d) sound

(13) ..... is not a component of nuclear power plant.
(a) control rods (b) gas turbine
(c) steam turbine (d) condenser

Ans. *(1) (c) Michael Faraday (2) (b) NH_3 (3) (c) three (4) (b) potential (5) (a) DC (6) (c) daytime (7) (d) 200 MeV (8) (a) 1kW, 7000kW (9) (c) 15% (10) (c) Anjanvel (11) (d) fossil (12) (b) solar (13) (b)* gas turbine.

Q.2.1. Define the following:

(1) Electric generator

Ans. The device that converts mechanical energy to electrical energy is called an Electric Generator.

(2) Thermal power plant

Ans. The plant in which thermal energy is used to generate electrical energy is called thermal power plant.

(3) Nuclear power plant

Ans. The plant in which the nuclear energy is used to generate electrical energy is called nuclear power plant.

(4) Green energy

Ans. The energy generated by using wind, water, sunlight which is environment friendly is called green energy.

(5) Solar photovoltaic effect

Ans. Solar photovoltaic cell converts the solar radiation energy directly into electrical energy. This effect is called solar photovoltaic effect.

(6) Solar panel

Ans. Many solar cells come together to form a solar panel.

(7) Solar string

Ans. Many solar panels connected in series form a solar string.

(8) Hydro-electric power plant

Ans. The plant in which the potential energy of the water stored in dam is converted into kinetic energy and this kinetic energy drives the turbine to generate electrical energy is called hydro-electric power plant.

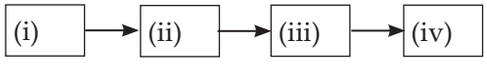
(9) Energy

Ans. The capacity or stored ability of a body to do work is called energy.

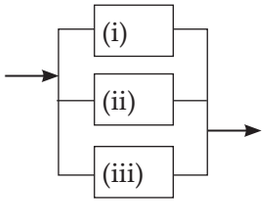
Q.2.2. Solve the numerical problems:

***(1) In the diagrams below, silicon solar cells with dimensions 1 cm^2 are connected. Find the potential difference and electric current?**

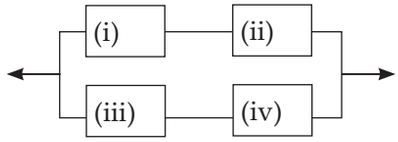
(i)



(ii)



(iii)



Ans.

(i) A silicon solar cell of dimension 1 cm^2 can yield 30 mA electric current and the potential difference of 0.5 V. In the diagram, four cells are connected in series.

∴ Total potential difference = Sum of the individual potential difference

∴ $V = V_1 + V_2 + V_3 + V_4$

∴ $V = 0.5 + 0.5 + 0.5 + 0.5$

∴ $V = 2V$

There is no change in the electric current as cells are in series

∴ $I = 30$ mA

(ii) From the silicon solar cell with dimension 1cm^2 , we get electric current of 30 mA and a potential difference of 0.5 V

Since the cells are connected in parallel, there is no change in potential difference.

∴ $V = 0.5$ V

Total current = Sum of individual currents.

$I = I_1 + I_2 + I_3$

∴ $I = 30 + 30 + 30$

∴ $I = 90$ mA

∴ The potential difference is 0.5 V and current of 90 mA is produced.

(iii) 30 mA electric current and 0.5 V potential difference can be obtained from 1 cm^2 silicon solar cell.

Since cells (i), (ii) are in series,

Potential difference = Sum of the individual Potential differences.

$V_a = V_1 + V_2$

∴ $= 0.5 + 0.5$

∴ $V_a = 1V$

Electric current will be the same $I_a = 30$ mA

Since iii and iv are in series,

$V_b = V_3 + V_4$

$= 0.5 + 0.5$

∴ $V_b = 1$ V

Since (i) and (ii), (iii) and (iv) are in parallel,

∴ Potential difference will remain the same.

$V = V_a = V_b = 1$ V

∴ Total electric current (I) = $I_a + I_b$

$= 30 + 30$

$= 60$ mA

∴ Potential difference is 1V and electric current of 60 mA can be obtained

***(2) How much potential difference and electric current we can get from 100 cm^2 dimension of silicon solar cell?**

Ans. The electric current is proportional to the area but the potential difference is independent of the area.

Area of 1 cm^2 can yield 30 mA current

∴ The current obtained from 100 cm^2 area

$= 100 \times 30$

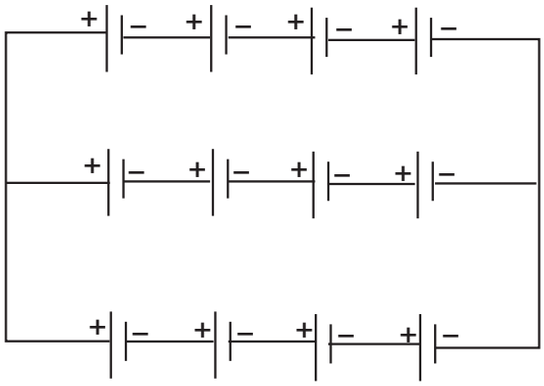
$= 3000$ mA $= 3$ A

The potential difference will remain 0.5 V.

Potential difference is 0.5 V and electric current of 3 A is produced.

***(3) One solar panel produces a potential difference of 18 V and current of 3 A. Describe how you can obtain a potential difference of 72 volts and current of 9 A with a solar array using solar panels. You can use sign of a battery for a solar panel.**

Ans.



Q.2.3. Answer the following questions:

***(1) What are the different forms of energy?**

(Can you recall Text book pg no. 47)

Ans. Following are the forms of energy : (i) Mechanical energy (ii) Heat energy (iii) Light energy (iv) Sound energy (v) Electrical energy (vi) Magnetic energy (vii) Chemical energy (viii) Nuclear energy

***(2) How is Electric energy produced?**

(Can you tell Text book pg no. 47)

Ans.

(i) Most of the electric power plants are based on the principle of electro - magnetic induction invented by Michael Faraday.

(ii) According to this, whenever magnetic field around a conductor changes a potential difference is generated across the conductor and electrical energy is produced.

***(3) Why the energy in the coal is called as chemical energy?**

(Lets Think Text book pg no. 49)

Ans.

(i) Coal contains carbon and hydrocarbons which produce heat on combustion.

(ii) Hence energy in coal is called chemical energy.

***(4) How does nuclear fission take place?**

(Can you tell Text book pg no. 50)

Ans.

(i) When a slow moving neutron is bombarded on Uranium - 235 nucleus, it absorbs the neutron and gets converted into its isotope Uranium - 236.

(ii) Uranium - 236 being extremely unstable, converts into atoms of Barium and Krypton through a process of fission releasing three neutrons and 200 MeV energy.

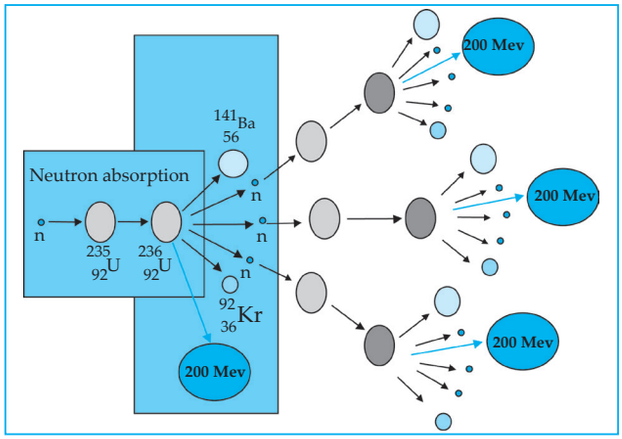


Fig. 5.1 : Nuclear fission (chain reaction)

(5) What are the problems associated with hydroelectric power plant?

Ans.

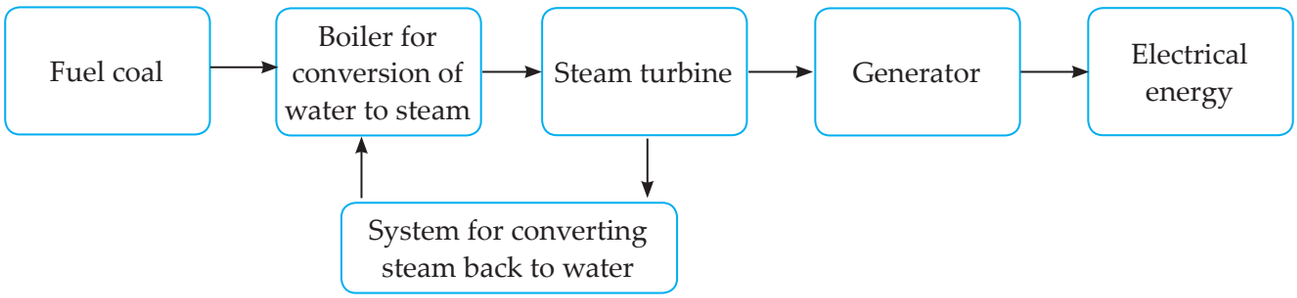
(i) The back water due to storage of water in dam may submerge villages or towns in that area as well as forests and fertile lands.

(ii) This leads to the problems of rehabilitation of the displaced population.

(iii) The obstruction of the flow of river water may have adverse effects on the aquatic world in the river.

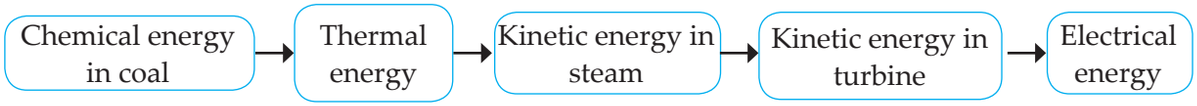
Q. 2.4 Complete the following flowchart:

(1) Stages in the generation of Electrical Energy from thermal energy.



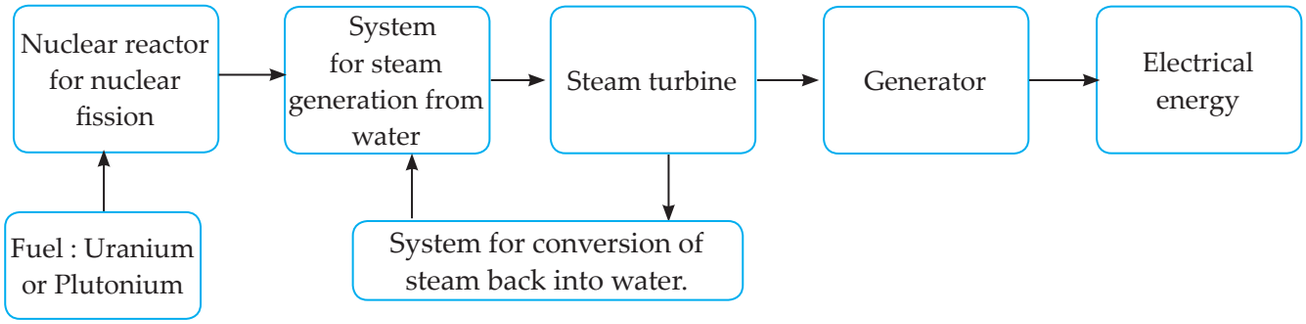
***(2) Step by step Energy Conversion in thermal power plant.**

Ans.



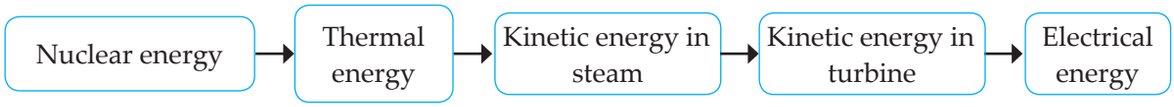
(3) Stages in generation of Electrical energy from nuclear energy.

Ans.



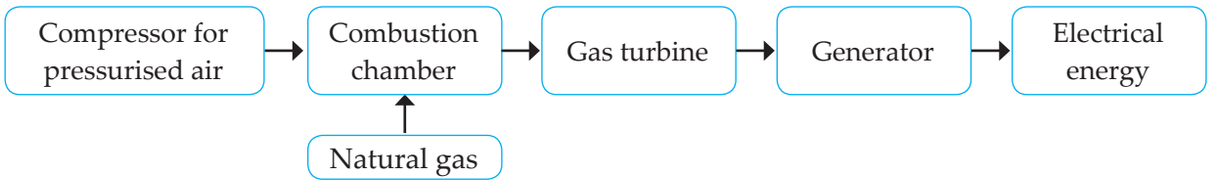
***(4) Step by step Energy conversion in nuclear power plant.**

Ans.



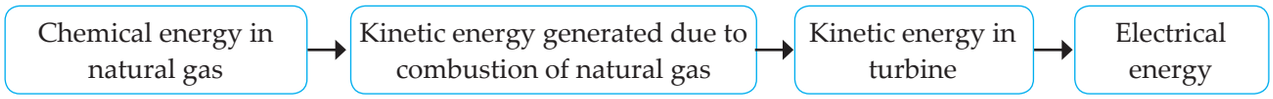
(5) Stages in generation of electrical energy from natural gas.

Ans.

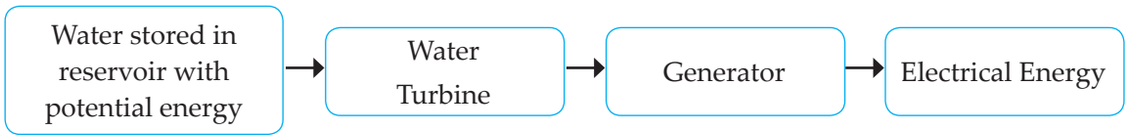


(6) Step by step energy conversion in power plant of natural gas.

Ans.

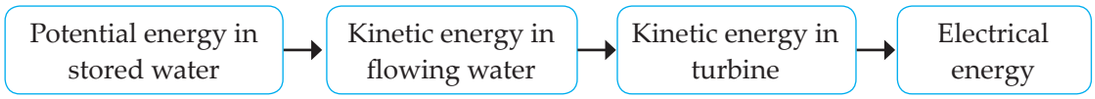


(7) Stages of generation of Electrical energy from hydroelectric power station.



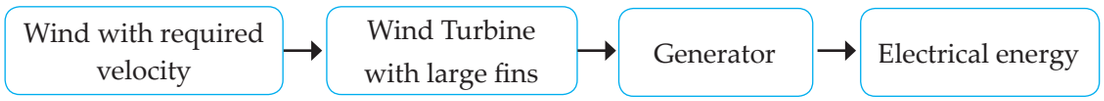
***(8) Step by step energy conversion in hydroelectric power plant.**

Ans.



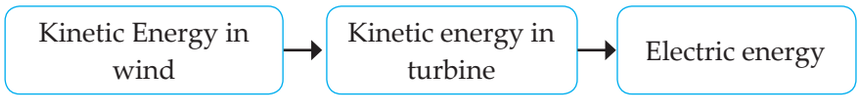
(9) Stages in generation of Electrical energy from wind energy.

Ans.



(10) Step by step energy conversion using wind energy.

Ans.

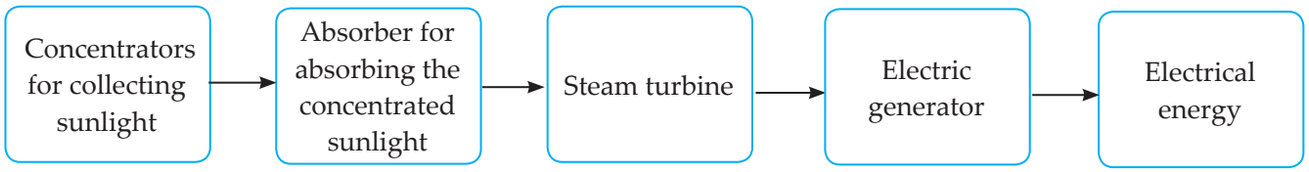


(11) Conversion of energy generated by solar cells to AC formed using inverter.

Ans.

(12) Different stages of generation of electrical energy is solar thermal power plant. OR
Step by Step energy conversion in solar thermal power plant.

Ans.



Q.2.5 Distinguish between:

(1) Bio-fuels and Fossil fuels

Bio-fuels	Fossil fuels
(1) The fuels obtained from the decomposition of excretory products of animal and plants are called bio-fuels.	(1) Fuels obtained from the burials of plants and animal from the Earth's crust are called fossil fuels.
(2) These fuels are eco-friendly and cause comparatively less pollution.	(2) These fuels are not eco-friendly as their combustion causes pollution.
(3) These fuels are inexhaustible.	(3) These fuels are exhaustible.
(4) Examples: Gobar gas, ethanol, bio-disel, etc.	(4) Examples: Coal, natural gas, crude oil, etc.

*** (2) Conventional energy sources and Non-conventional energy sources.**

Conventional energy sources	Non-conventional energy sources.
(1) Conventional energy sources are exhaustible.	(1) Non-conventional sources of energy are inexhaustible
(2) Conventional sources of energy cause pollution.	(2) Non - conventional sources of energy are pollution free.
(3) Conventional sources are used extensively by us.	(3) Non-conventional sources of energy are not used as extensively as conventional sources.
(4) These sources require thousands of years to form.	(4) They are abundantly available in nature.
(5) Examples: Coal, Crude oil, Natural gas, etc.	(5) Examples: Solar energy, wind energy, bio-gas etc.

***(3) Thermal electricity generation and Solar thermal electricity generation**

Thermal electricity generation	Solar thermal electricity generation
(1) In thermal power plant coal, natural gas, etc are used as sources (fuels).	(1) In solar power plant, solar radiations are used as the source.
(2) Working of thermal power plant can cause air pollution.	(2) Solar power plant does not causes air pollution.
(3) The rate of electric power generation is very high.	(3) The rate of electric power generation is very low.
(4) This energy source is not eco-friendly.	(4) This energy source is absolutely eco-friendly.

(4) Solar Cells and Solar thermal plant

Solar Cells	Solar thermal plant
(1) Solar or photovoltaic cells convert solar energy into electrical energy directly.	(1) Solar thermal plant converts solar energy into heat energy then into kinetic energy and then into electrical energy.
(2) Solar photovoltaic cells make use of a semiconductor like silicon.	(2) It uses reflectors to concentrate sunlight on absorbers.
(3) Its design is simple and easy to use.	(3) Its design is complex like a thermal power plant.

Q.2.6 Give scientific reasons:

(1) Atomic energy is an extensive source of energy.

Ans.

(i) Atomic energy involves two reactions, viz. Nuclear fission and Nuclear fusion.

(ii) Both these reactions result in the release of tremendous amount of energy.

(iii) Nuclear fission reaction is used in Nuclear power plants to produce electrical energy.

(iv) Nuclear fusion reaction takes place in the sun giving us solar energy.

(v) Therefore, atomic energy is an extensive source of energy.

***(2) The construction of turbine is different for different types of power plants.**

Ans.

(i) Every power plant uses a different kind of source to rotate the turbine.

(ii) In thermal and nuclear power plants, steam produced rotates the turbine.

(iii) In hydroelectric power plant, flowing water is used to rotate turbines and wind is the medium in windmills.

(iv) Also the power output of every power plant is different.

(v) Hence, there should be turbines of different designs for different power plants.

***(3) It is absolutely necessary to control the fission reaction in nuclear power plants.**

Ans.

(i) Nuclear power plants work on the principle of controlled chain reaction.

(ii) When slow moving neutrons strike the uranium nucleus, it splits into Barium and Krypton with release of three neutrons and tremendous amount of energy (200 MeV).

(iii) Three neutrons strike on three more uranium nucleus and fission continues creating tremendous energy which is harmful.

(iv) Reaction is controlled by using neutron absorbent material like boron steel and cadmium rods which absorb excess neutrons and heat generated can be used for welfare of mankind.

(v) Hence, it is absolutely necessary to control the fission reaction in nuclear power plants.

***(4) Hydroelectric energy, Solar energy and Wind energy are called renewable energies.**

Ans.

(i) Hydroelectric energy, solar energy and wind energy are all obtained without burning of a fuel.

(ii) They do not cause air pollution and are thus, eco-friendly.

(iii) Sunrise, rainfall, wind are natural phenomena.

(iv) These phenomena are constantly and continuously happening on earth.

(v) By setting up hydroelectric power plant, solar panel and wind mills we can obtain these energies continuously, uninterrupted and at low cost. Hence, these sources are called renewable energy sources.

***(5) It is possible to produce energy from mW to MW using solar photovoltaic cells OR**
How can we get the required amount of energy by connecting solar photovoltaic cells?

Ans.

(i) A silicon solar cell of dimension 1 cm^2 generates a current of about 30 mA and potential difference of about 0.5 V. Thus a silicon solar cell of dimension 100 cm^2 will generate about 3 A (30 mA / cm^2 × 100 cm^2 = 3000 mA) current and 0.5 V.

(ii) If solar cells are connected in series the potential difference gets added but current remains the same. If solar cells are connected in parallel the potential difference remains the same but the current generated is the summation of current from individual cells.

(iii) By using this principle we can obtain power of desired quantity.

(iv) We can decide the number of solar panels to be used and what type of combination we can have to get required amount of electric power.

(v) Hence, solar photovoltaic cells can be used to obtain mW to MW power.

(6) In all types of thermal power plants, steam is used to rotate turbines.

Ans.

(i) In order to obtain electricity from a power plant, it is necessary to rotate the turbines.

(ii) Water is easily available and when water is heated steam can be formed. When pressure is applied on steam and allowed to pass through a small opening we can easily obtain kinetic energy.

(iii) Kinetic energy of the steam helps to rotate turbines easily and can be reused

(iv) Hence, in all types of thermal power plants steam is used to rotate turbines.

(7) Boilers of the thermal power plants have tall chimneys.

Ans.

(i) The thermal power plants mainly use coal and natural gas as a fuel which have chemical energy.

(ii) The combustion of coal or natural gas result in the formation of various gases like carbon dioxide and sulphur dioxide, nitrogen oxide gas which are very dangerous and cause air pollution.

(iii) These gases and the produced soot can be hazardous if released at the normal height.

(iv) Tall chimney release them at a height in such a way that they disperse easily and do not sediment

(v) Therefore, the chimneys of boilers are much taller.

(8) Though nuclear energy is an extensive source but the amount of electric power generation from nuclear power plants is much less.

Ans.

(i) The technology of nuclear power plant is highly expensive.

(ii) Similarly, the fuel Uranium required to run these plants is not available in all countries.

(iii) The fission products sometimes are radioactive and can cause environmental pollution.

(iv) Disposal of radioactive wastes from the nuclear power plant is much more difficult as it can cause health hazards.

(v) Therefore, these plants are used on a limited scale thus energy production is also less.

Q. 3. 1. Explain the following statements:

***(1) 'Save energy' is the need of the hour.**

Ans.

(i) Energy is necessary to perform work.

(ii) Day by day the use of energy for various purposes is rising.

(iii) If we do not harness new sources of energy, the reserves of fossil fuels would get exhausted faster.

(iv) It is estimated that the current reserves would get over in nearly 200 years.

(v) If we save energy today, we may use it for longer period of time.

(vi) Thus it is important to take every possible measure to save energy.

(2) Energy obtained from fossil fuels is not green energy.

Ans.

(i) Fossil fuels cause pollution during combustion.

(ii) Burning of coal results in emission of gases like carbon dioxide which is harmful to health.

(iii) Coal and oil release sulphur dioxide and soot, which causes problems related to respiration and acid rain.

(iv) As fossil fuels harm the environment they cannot be considered as green energy.

Q.3.2.Explain with diagram step-by-step energy conversion in.

***(1) Thermal power plant:**

Ans. *Refer Q.2.4 (2) for flow chart*

(i) Coal has stored chemical energy and it is used as a fuel.

(ii) Coal is burnt to obtain heat energy. This is used to boil water to obtain steam.

(iii) Steam of very high temperature and pressure is generated.

(iv) The kinetic energy of the steam drives the turbines thus the generator connected to the turbines rotates and electricity is generated.

***(2) The Nuclear power plant**

Ans. *Refer Q.2.4 (4) for flow chart*

(i) When fuel U-235 is bombarded with a neutron it becomes unstable and splits into Barium, Krypton and 3 neutrons with a lot of energy (200 MeV)

(ii) By using this energy, water is boiled to form steam.

(iii) By using kinetic energy of steam the turbine is rotated.

(iv) Then the kinetic energy of the turbine is used to rotate the generator and electricity is produced.

(3) Hydro-electric power plant

Ans. *Refer Q.2.4 (8) for flow chart*

(i) Water stored in a dam's reservoir has potential energy.

(ii) When this water flows, the potential energy gets converted into Kinetic energy.

(iii) With the help of this Kinetic energy, the turbines are rotated.

(iv) The turbine in turn drives the generator to generate electricity.

(4) Solar thermal power plant:

Refer Q.2.4 (12)

Ans.

(i) Solar energy is initially converted into heat by concentrating it.

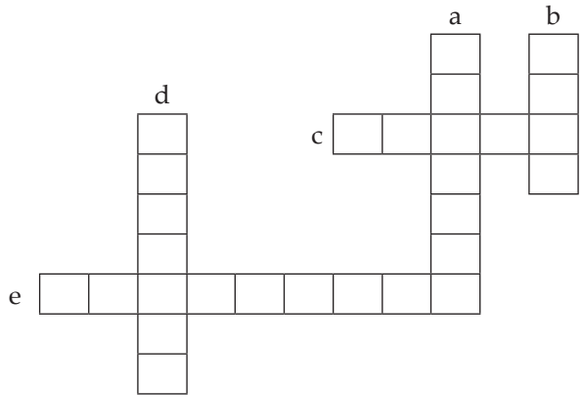
(ii) The absorbed sunlight is utilized to boil water and steam is obtained.

(iii) Kinetic energy of steam is used to drive turbines.

(iv) The kinetic energy of turbine is used to drive generators which produce electricity.

Q. 3.3 Solve the following crossword puzzle:

***(1)**



(a) Maximum energy generation in India is done using ..... energy.

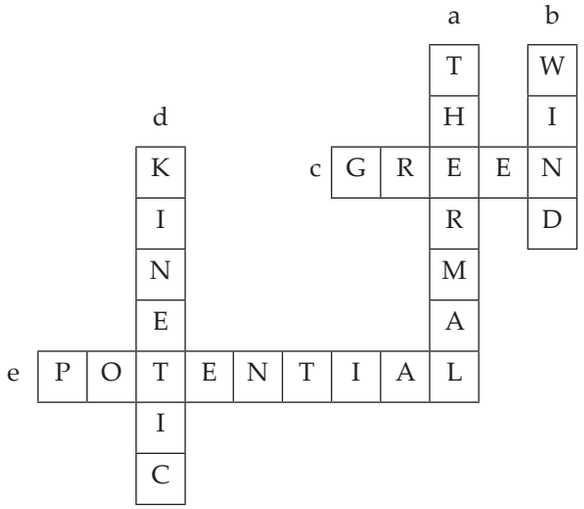
(b) ..... energy is a renewable source of energy.

(c) Solar energy can be called ..... energy.

(d) ..... energy of wind is used in wind mills.

(e) ..... energy of water in dams is used for generation of electricity.

Ans. (a) Thermal (b) Wind (c) Green (d) Kinetic (e) Potential



Q.3.4. Answer following questions based on figures.

***(1)** **Compare: Observe the schematic of thermal power plant and the nuclear power plant. Discuss what are the similarities and differences between the two?**

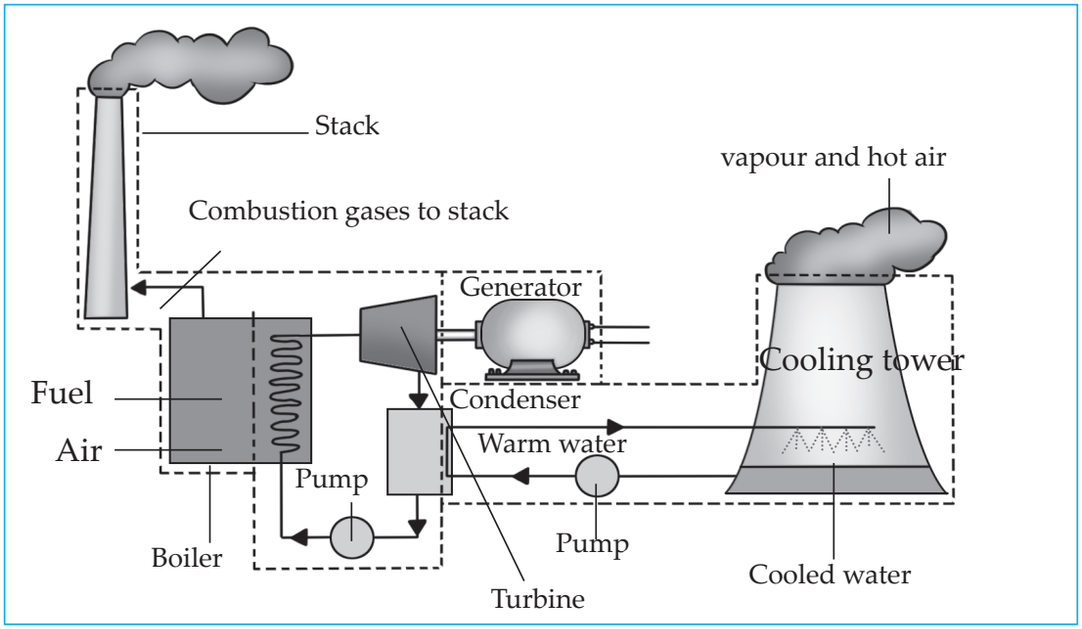


Fig. 5.2 Thermal Power Plant

Ans. **Similarity:** In both the power plants water is boiled to form steam and kinetic energy of the steam rotates the turbine.

Differences : In the thermal power plant coal is a main fuel that is burnt.
In the nuclear power plant Uranium - 235 is the fuel which undergoes nuclear fission.

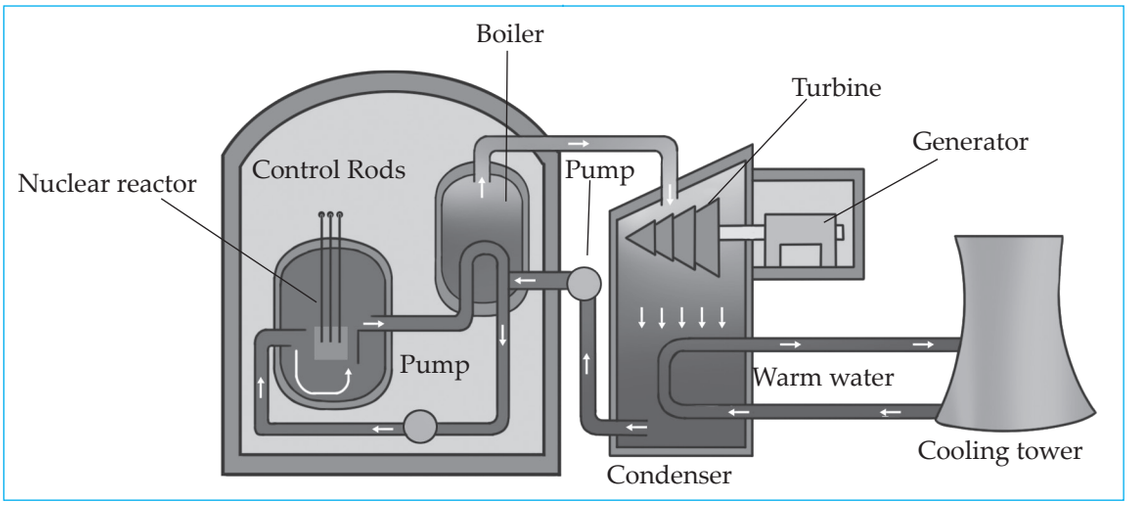


Fig 5.3 : Nuclear Power Plant

(2) ***Use your brain Power Text book Pg. No. 54)***

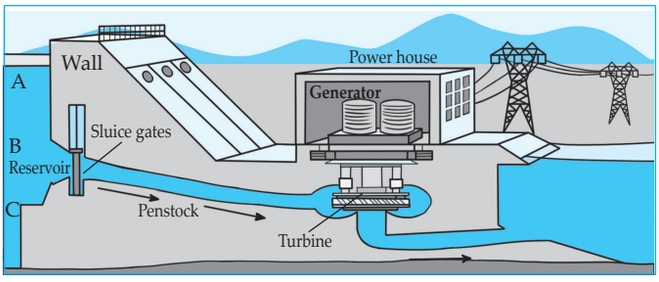


Fig 5.4. hydroelectric plant

(a) With reference to point B, potential energy of how much water reservoir in the dam will be converted into kinetic energy?

Ans. The potential energy of water stored in the region A to B, will be converted into kinetic energy.

(b) What will be the effect on electricity generation; if the channel taking water to turbines starts at point A?

Ans. The energy generation will increase as the water at A It will have higher potential energy that can generate higher kinetic energy as it flows.

(c) What will be the effect on electricity generation, if the channel taking water to turbine starts at point C.

Ans. The energy generation will decrease as the water at C will have lower potential energy that will generate lower kinetic energy as it flows.

(3)

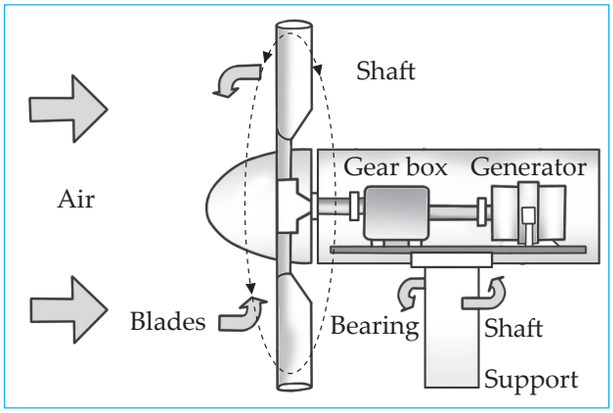


Fig 5.5 : wind mill

(a) What is the process shown in the diagram?

Ans. The process is the conversion of wind energy into electrical energy using a wind mill.

(b) Give the conversion of energy of the process.

Ans.

Kinetic Energy in wind → Kinetic energy in turbine → Electrical energy

(c) Is this process environment friendly? Explain.

Ans. Yes, this process is environmentally friendly as it does not involve the burning of fuels which produce harmful gases as by products.

(d) What are the disadvantages of this process?

Ans. The disadvantage of this process is that the minimum wind velocity necessary for wind energy generation is not available every where.

(4)

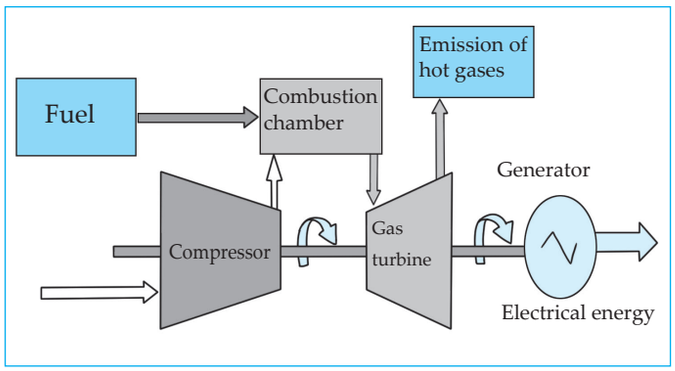


Fig. 5.6

(a) Which energy is produced?

Ans. Electrical energy.

(b) What is this power plant based on?

Ans. Generation of electricity from natural gas

(c) Is this energy generation eco-friendly? Why?

Ans.

(i) No, this energy generation is not eco-friendly as it leads to emission of certain gases and soot particles which leads to air pollution.

(ii) Also it takes millions of years for formation of natural gases and their reserves are limited.

(5)

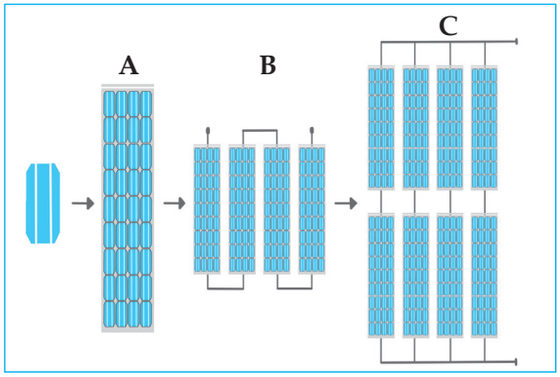


Fig. 5.7

(a) Label A, B and C in the diagram

Ans. A : Module, B : String, C : Array

(b) What is considered as a basic unit of a solar electric plant?

Ans. A Solar cell is the basic unit of a solar electric plant.

(c) What are the modules connected in series called?

Ans. The modules connected in series are called as string.

(d) What is the type of current obtained from a solar cell?

Ans. DC current.

(6)

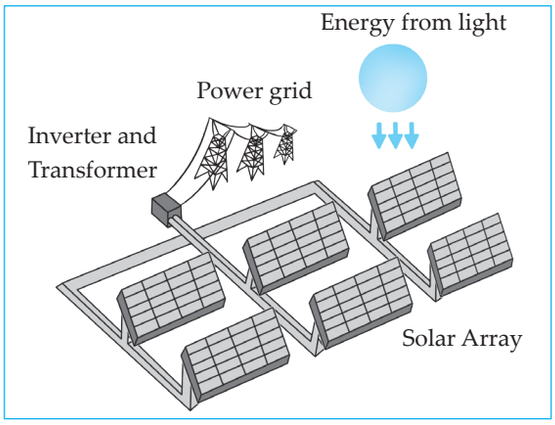


Fig. 5.8

(a) What is the diagram about?

Ans. It is a schematic diagram of a solar photovoltaic station.

(b) What is the device used to convert DC solar power to AC solar power called?

Ans. An Inverter is used to convert DC solar power to AC solar power.

(c) What is the use of transformer?

Ans. A transformer transforms the voltage and current levels of generated power which is then fed into electricity distribution network.

(7)

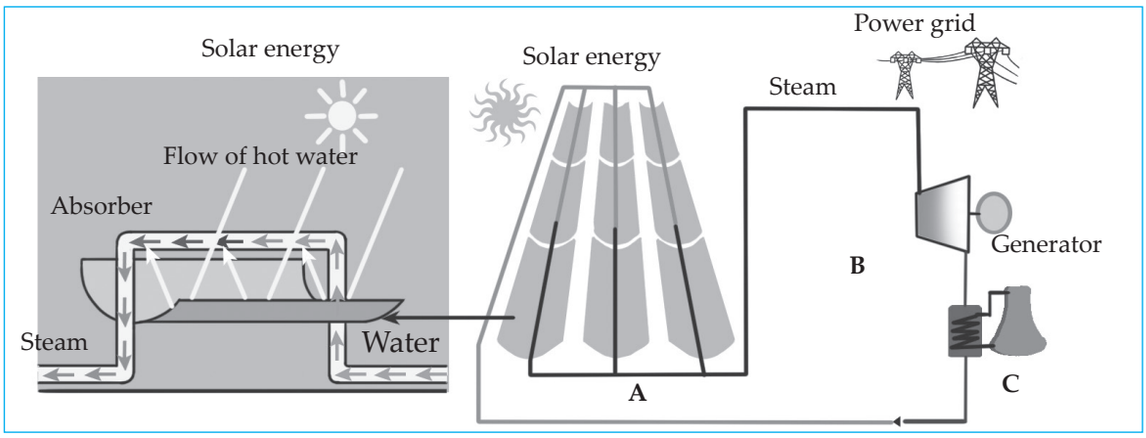


Fig. 5.9

(a) Name the power plant shown in the diagram

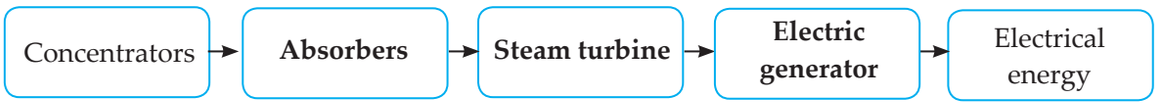
Ans. Solar Thermal Power Plant.

(b) Label A, B and C in the diagram.

Ans. A - Solar Panel, B - Condenser, C - Cooling Tower.

(c) Complete the flow chart for stages of energy generation in the above power plant.

Ans.



(8)

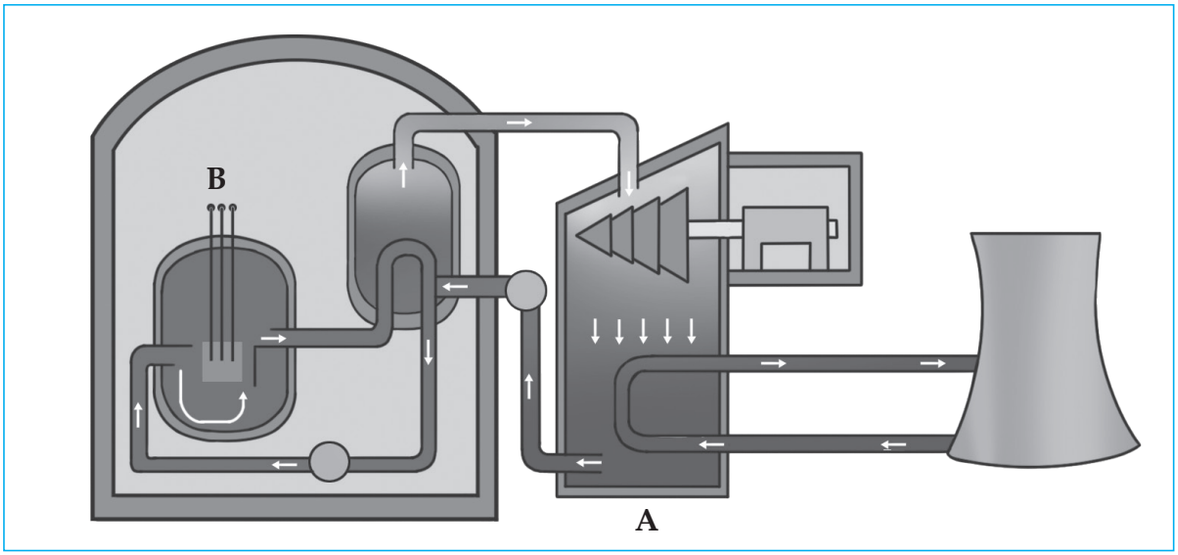


Fig. 5.10

(a) Label A and B in the diagram

Ans. A - Condenser,

B - Control rods.

(b) Define nuclear fission.

Ans. The splitting of heavy nucleus of Uranium into Barium, Krypton and three neutron, with release of energy is called nuclear fission.

(c) State the drawbacks of a nuclear power plant.

Ans.

(i) Products of nuclear fission called nuclear waste are all radioactive. The disposal of nuclear waste is a big challenge.

(ii) Sometimes accident can occur which can leak harmful radiations.

(iii) Radiation pollution can be most dangerous.

Q.3.5. Draw neat and labelled diagrams for the following

(1) Electromagnetic Induction

Ans.

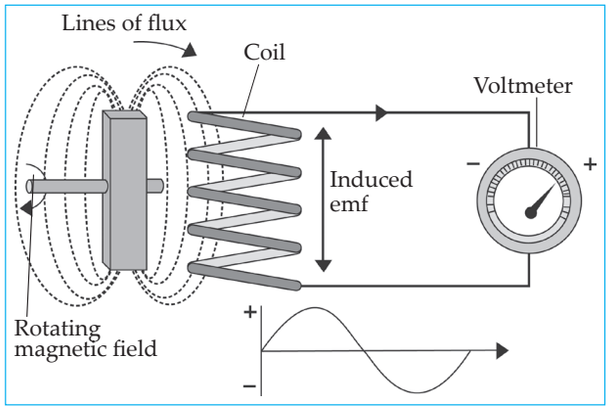


Fig. 5.11. Electromagnetic Induction

(2) Schematic of electric generator

Ans.

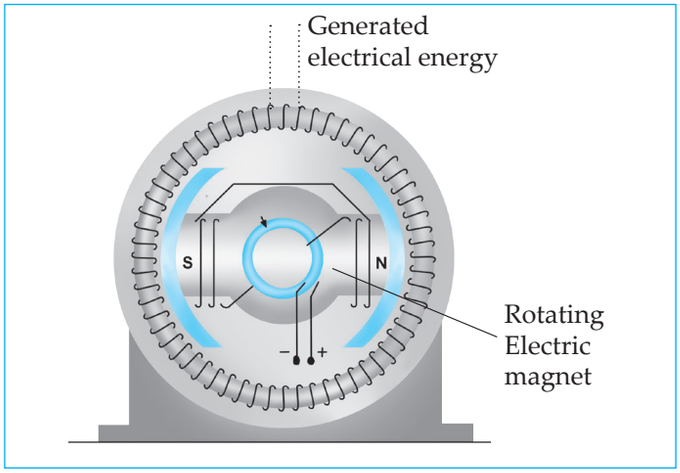


Fig. 5.12. Electric generator

(3) Series combination of solar cell.

Ans.

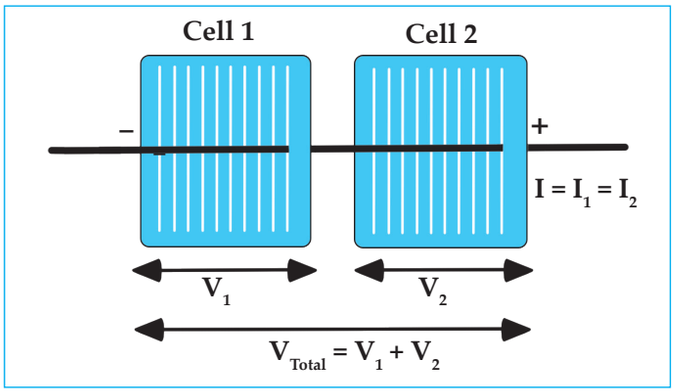


Fig 5.13. Solar cells in series

(4) Solar cells in parallel

Ans.

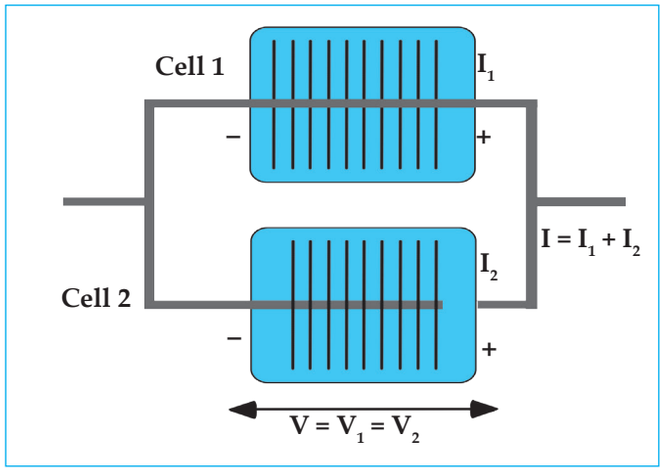


Fig 5.14. Solar cells is parallel

(5) A solar panel made from 36 solar cells.

Ans.

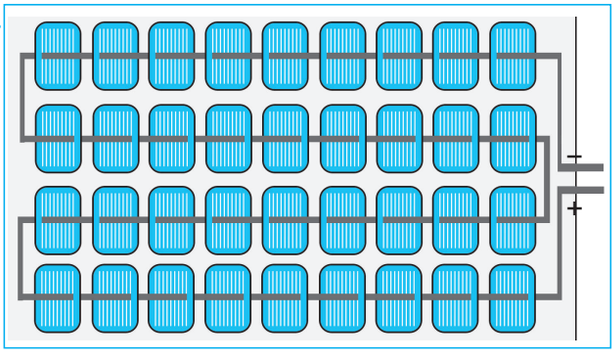


Fig 5.15. Solar panel made from 36 solar cells

Q.4. Answer the following questions in brief:

***(1) Which fuel is used in thermal power plant? What are the problems associated with this type of power generation?**

Ans. In the thermal power plant coal is used as a fuel.

Problems created by thermal power plant:

(i) The combustion of coal results in emission of gases like CO_2, NO_2, SO_2, which causes air pollution.

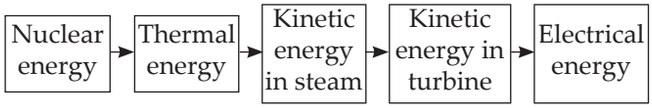
(ii) During combustion of coal, soot is formed thus carbon particles added to air can cause respiratory problems.

(iii) Large amount of coal is required for this plant which may deplete the coal reserves rapidly. In the shortage or lack of coal the thermal power plant could be shut down.

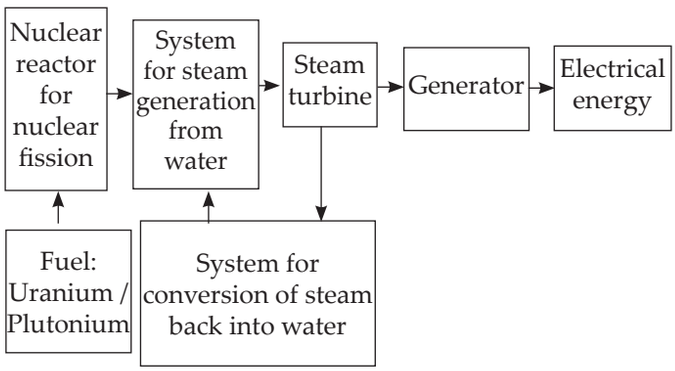
***(2) Which types of power generation involve maximum number of steps of energy conversion? In which type of power generation is the number minimum?**

Ans.

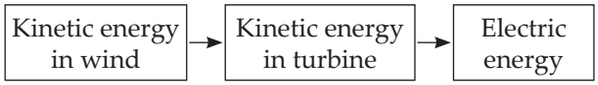
(i) The nuclear power plant has maximum steps for the generation of electricity.



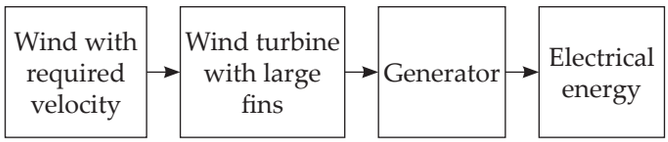
(ii) The flow chart of nuclear power plant



(iii) The transformation of energy in an electric generator using wind energy has miniumum number of steps:



(vi) Stages in electric energy generation using wind energy.



***(3) Other than thermal power plant, which power plants use thermal energy for power generation? In what different ways is the thermal energy obtained?**

Ans.

(i) Thermal energy is used in power plants using coal, Uranium, Natural gas, (LPG and CNG) as fuels.

(ii) Generally, thermal power plant uses coal to produce heat and chemical energy of coal is converted into heat during the combustion.

(iii) Apart from coal, natural gas, LPG and CNG are also used as fuel for the thermal power plant.

(iv) Nuclear power plant uses uranium as the source of energy.

(v) In the nuclear power plant the nuclear fission of uranium results in the production of heat which is utilized for the production of steam.

(vi) In the solar thermal plant, the heat is obtained by concentrating solar radiations and then steam is produced.

(4) What is green energy? Which energy sources can be called as green energy source and why? Give examples.

Ans.

(i) The eco-friendly energy is called green energy.

(ii) The energy production which does not cause any damage to environment is actually a green energy.

(iii) Solar energy, wind energy, hydro electric energy do not harm the environment as there is no combustion involved and there is no air pollution caused.

(iv) Thus, energy obtained from these sources are called as green energy.

(5) How does the nuclear fission process takes place in the nuclear power plant?

Ans. *(For diagram refer Fig. 5.1)*

(i) The nuclear power plant works on the principle of converting nuclear energy to electrical energy.

(ii) The Uranium nucleus U-235 is bombarded with a slow moving neutron. The uranium nucleus absorbs it and is converted into its isotope U-236 which is extremely unstable splits into Barium and Krypton with release of three neutrons and tremendous amount of energy.

(iv) The released neutrons carry out fission of three more uranium nuclei and the process continues. This sets the chain reaction which is uncontrolled and may result in an explosion. But it is controlled in the process by using neutron absorbing material.

(v) Boron steel and cadmium rods are used to absorb neutrons

(vi) Thus the reaction gets controlled and the energy released can be used for generating electricity.

(vii) Hence the basis of nuclear power plant is controlled chain reaction.

***(6) How can you obtain the required amount of energy by connecting solar panels?**

Ans.

(i) Solar cells contain the semiconductor Silicon

(ii) A Silicon solar cells of area 1 cm^2, can generate 30 mA of electricity and 0.5V potential difference is obtained.

(iii) If two solar cells are connected in series the potential difference get added to 1V but electric current remains the same.

(iv) It two solar cells are connected in parallel, the current becomes 60 mA but potential difference remains the same. In this manner we can get the required potential difference and electric current.

***(7) What are the advantages and limitations of solar energy?**

Ans. Advantages of solar energy:

(i) Solar energy is a clean source of energy.

(ii) It is a sure source of energy.

(iii) It is eco-friendly source of energy.

(iv) Since there is no combustion of fuel there is no pollution of air.

(v) This energy source is in-exhaustible.

(vi) Solar energy can be easily converted into electricity for use.

Limitations of using solar energy:-

(i) Solar radiations are available only in day time.

(ii) Storage equipment are costly and initial installation cost is very high.

(iii) Radiation intensity is not constant throughout the day, hence it is not an even or uniform source.

(iv) Solar panels occupy lot of space, hence there is an issue of space for installation.

(v) It is not concentrated source as solar energy is scattered.

(vi) Sunlight of power 100 W/cm^2 can produce only 15W power. i.e. the efficiency of equipments is 15% which is low.

(8) Write the advantages and limitation of Nuclear energy:

Ans. Advantages of Nuclear energy:

(i) Use of nuclear energy does not emit gases which lead to air pollution.

(ii) Storage of fuel and transport issues do not arise.

(iii) Nuclear energy is an extensive and good source of energy .

Limitation of nuclear energy.

(i) Products of nuclear fission called nuclear waste are all radioactive. The disposal of nuclear waste is a big challenge.

(ii) Sometimes accident can occur which can leak harmful radiations.

(iii) Radiation pollution can be most dangerous.

***(9) Give your opinion about whether hydroelectric plants are environment friendly or not?**

Ans.

(i) In the hydroelectric power plant, kinetic energy of water get converted into electricity.

(ii) The water stored in the dam possess potential energy. As this water is allowed to flow, this energy gets converted into kinetic energy.

(iii) The kinetic energy of water is used to rotate the turbines and electricity is generated.

(iv) In this, since no fuel is burnt, there is no air pollution and thus it is eco-friendly

(v) Water mass does not get polluted as there are no effluents. This water can be used for agricultural purposes.

(vi) Compared to thermal and nuclear power plants the hydroelectric power plant, is definitely eco-friendly.

(vii) Rehabilitation of people is necessary for people whose land is used for construction of dam.

(10) Write the advantages and limitation of wind power?

Ans. Advantages of wind power.

(i) Wind possess kinetic energy which rotates turbines and electricity is generated.

(ii) In the entire process there is no combustion of any fuel, hence no air pollution.

(iii) Thus wind energy is really a clean and eco-friendly source of energy.

(iv) Since no fuel is required, there is no fear of getting raw material exhausted.

(v) The area under the wind mill can be used for agriculture.

Limitations of wind power :

(i) Slower wind produces 9 kW power while if there is lot of wind then around 7 MW power can be generated. If there is not enough speed of wind, generation of power will be less.

***(11) Write short notes on: Electrical energy generation and environment**

Ans.

(i) The environment impact of electricity generation is significant because modern society needs large amount of electrical power.

(ii) The power is normally generated at power plants that converts some other kind of energy into electrical power.

(iii) Each system has some advantages and disadvantages, but many of them pose environmental concerns.

(iv) Thermal power plants give out CO_2, NO_2, SO_2 which causes air pollution.

(v) Nuclear power plant pose the threat of disposal of nuclear waste and radiation leakage.

(vi) Wind mills and solar power plants are eco-friendly but installation cost is high hence is used less frequently.

(vii) Hydroelectric power plants are Eco-friendly and generate sufficient electricity but rehabilitation of people is necessary, whose land is used for construction of dam.

❖ ❖ ❖

ASSIGNMENT - 5

Time : 1 Hr. **Marks : 20**

Q.1. Answer the following: **(3)**

(1) Fill in the blank: A transformer transforms the ..... and current levels of the generated power.

(2) Name the following: The principle invented by Michael Faraday.

(3) State whether True or False: Water is boiled using boiler.

Q.1. (B) Choose and write the correct option: **(2)**

(1) Each nuclear fission of uranium nucleus releases ..... energy.

(a) 20 MeV (b) 236MeV (c) 237 MeV (d) 200 MeV

(2) Water stored in dams possess ..... energy.

(a) chemical (b) potential (c) kinetic (d) electric

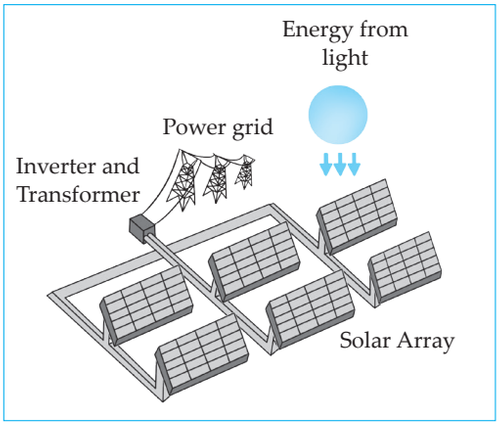
Q.2. Answer the following (Any 2) **(4)**

(1) Distinguish between: Biofuels and Fossil fuels.

(2) Give Scientific reason: Energy obtained from fossil fuels is not green energy.

(3) How much potential difference and electric current can we get from 100 cm^2 dimension of silicon solar cells?

Q.3. Answer the following (Any 2) **(6)**

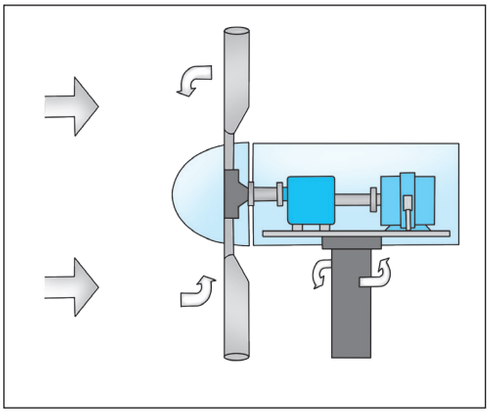


(1) Observe the figure carefully, and explain how power is generated in a solar photovoltaic station.

(2) Explain the working of solar thermal power plant, with the help of a flow chart.

(3) One solar panel produces a potential difference of 18V and current 3A. Describe how you can obtain a potential difference of 72 volts. You can use size of a battery for a solar panel.

Q.4. Answer the following (Any 1) **(5)**



(a) What is a wind turbine?

(b) What is the functional use of gear box?

(c) What are various stages in electricity generation using wind energy?

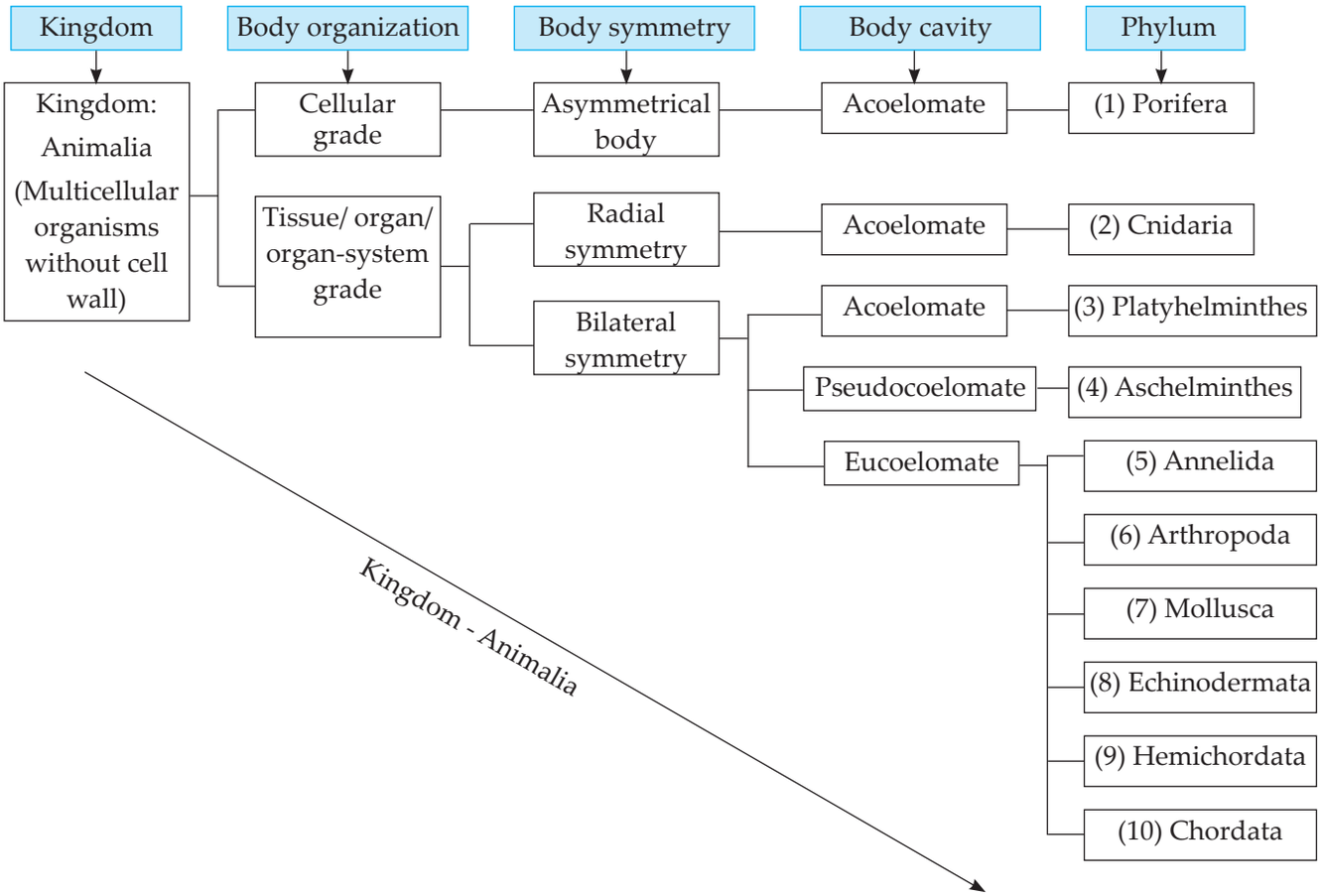
(2) Explain in detail the advantages of hydroelectric power generation and problems associated with hydroelectric power plant.

❖❖❖

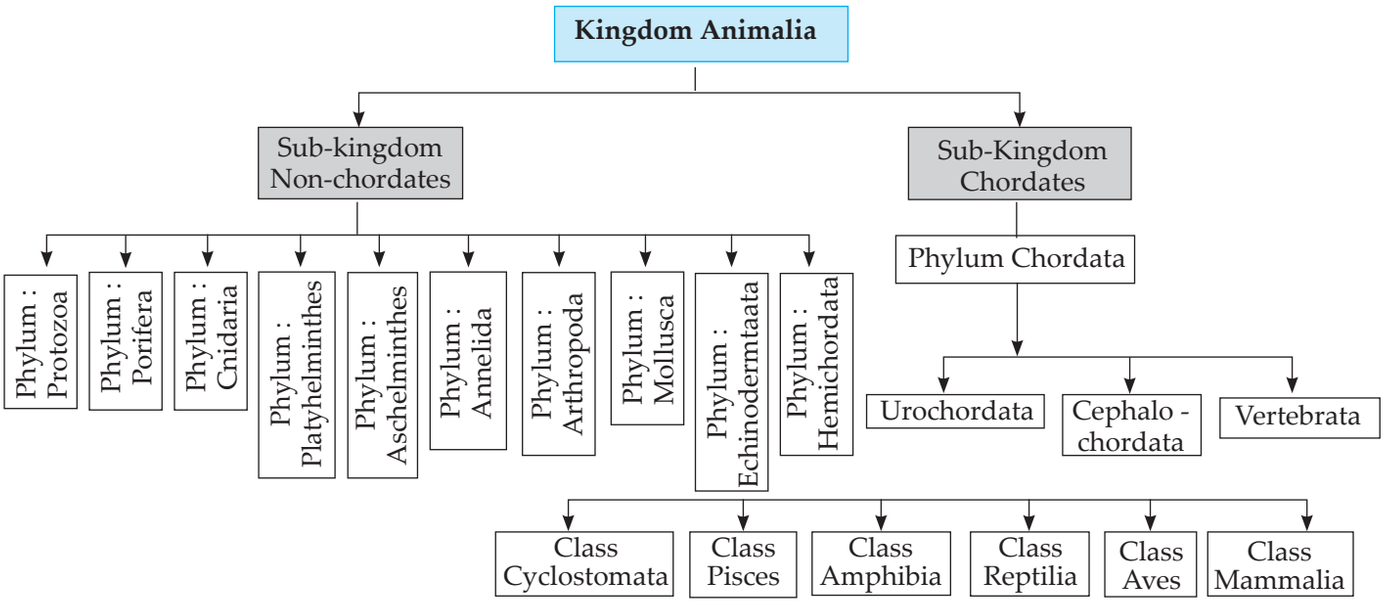
6 Animal Classification

CONCEPT MAP

(1) Criteria of new system of Animal classification:



(2) Conventional system of Animal Classification:



Points to Remember:

- According to recent studies, estimated number of animal species on the earth is approximately **seven millions.**
- It is impossible to study each and every species together. However, the systematic grouping, i.e. **classification** will make it very easy to study such vast variety of animals.
- Greek Philosopher **Aristotle** was the **first** to perform animal classification. Classification proposed by him is known as **'Artificial Method'.**
- Besides Aristotle, this method was followed by **Theophrastus, Pliny, John Ray, Carl Linnaeus,** etc.
- Later on, **'Natural System of Classification'** was followed. It was based on the various criteria like **body organization, types of cells, chromosomes, bio-chemical properties,** etc.
- By the time, system of classification based on evolution was also brought into practice. It was used by **Dobzhansky** and **Meyer.**
- Recently **Carl Woese** has also proposed the animal classification.
- Traditionally, depending upon presence or absence of the notochord, the animal kingdom has been classified into two groups: **Non-chordates** and **Chordates.**
- 'Non-Chordates are further classified into **10** phyla. **Protozoa, Porifera, Cnidaria, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata.**
- Chordates are further classified into **Urochordata, Cephalochordata and Vertebrata.**
- Sub-phylum Vertebrata is divided into six classes **Cyclostomata, Pisces, Amphibia, Reptilia, Aves and Mammalia.**
- According to **Robert Whittaker,** all multicellular animals are included in Kingdom Animalia.
- There are different criteria for classifying animals. They are Grades of Organization, Body symmetry, Germ layers, Body cavity (Coelom), Body segmentation.

MASTER KEY QUESTION SET - 6

Q.1. (A) 1. Fill in the blanks and rewrite the statement:

(1) Greek philosopher ..... classified animals for the first time.

(2) The long rod like supporting structure present on the dorsal side of animal body is called ..... .

(3) According to Robert Whittaker, all multicellular animals are included in kingdom ..... .

(4) Body organization of unicelluar animals is referred to as ..... organization.

(5) In case of multicellular animals, the body organization is referred to as .....

(6) Flat worms show ..... organization.

(7) All higher animals show ..... organization.

(8) The cavity between the body and internal organs is called ..... .

(9) If the body cavity is absent, the animal is called ..... .

(10) Body cavity is absent in ..... .

(11) In Aschelminthes, the body cavity is not formed by mesoderm. So, they are called as ..... .

(12) If the body of animals is divided into small, similar units, then such a body is called as ..... .

(13) Animals belonging to Porifera have special types of cells called ..... .

(14) The animals belong to Porifera bear numerous pores on their body called ..... .

(15) Body of animals from ..... is cylindrical or umbrella-like.

(16) If the body of a coelenterata is cylindrical, it is called ..... .

(17) Spicules are made up of ..... .

(18) The precious stone ..... is derived from coral reefs.

(19) Annelides have ..... for locomotion.

(20) In arthropods, ... exoskeleton is present around the body.

(21) Hemichordates are also called ..... .

(22) Through the point of view of evolution, ... is considered as connecting link between non-chordates and chordates.

(23) The flying mammal is ..... .

(24) Reptilians are ..... blooded animals.

(25) Aves are ..... blooded animals.

Ans. *(1) Aristotle (2) Notochord (3) Animalia (4) protoplasmic grade (5) cellular grade organization (6) tissue organ grade, (7) organ system grade (8) Coelom (9) acoelomate (10) Porifera (11) Pseudocoelomates (12) segmented body (13) collar cells (14) ostia (15) Cnidaria (16) Polyp (17) calcium carbonate (18) Coral (19) setae, (20) chitinous (21) acorn worms (22) Balanoglossus (23) bat (24) cold (25)* warm

Q.1. (A) 2. Find the odd one out.

(1) Annelida, Arthropoda, Reptilia, Mollusca.

Ans. Reptilia - Others are non-chordates whereas reptitia are chrodates.

(2) Protozoa, Cyclostomata, Amphibia, Aves.

Ans. Protozoa - Others are classes of Chordates whereas Protozoa is Non chordate.

(3) *Hydra,* Sea anemone, *Sycon,* Coral.

Ans. *Sycon* - Others are Coelenterates whereas Sycon belongs to Porifera.

(4) Jellyfish, Starfish, Sea-urchin, *Planaria*.

Ans. *Planaria* - Others show radial symmetry whereas *Planaria* shows bilateral symmetry.

(5) Earthworm, Crab, Mosquito, Spider.

Ans. Earthworm - Others belong to Arthropoda whereas earthworm belongs to Annelida.

(6) Scorpion, Earthworm, *Nereis,* Leech.

Ans. Scorpion - Others belong to Annelida whereas Scorpion belongs to Arthropoda.

(7) Spider, Cockroach, Butterfly, Bivalve.

Ans. Bivalve - Others belong to Phylum Arthropoda whereas bivalve belongs to Mollusca.

(8) Bat, Whale, Monkey, Ostrich.

Ans. Ostrich - Others are Mammals whereas ostrich belongs to class aves.

(9) Platyhelminthes, Cnidaria, Arthropoda, Annelida

Ans. Cnidaria - Others are triploblastic whereas cnidaria are diploblastic.

(10) *Sycon*, *Euspongia*, *Adamsia*, *Euplectella*.

Ans. *Adamsia* - Others belong to Phylum Porifera whereas *Adamsia* belongs to Coelenterata.

(11) Sea anemone, *Hydra*, *Aurelia*, *Ascaris*.

Ans. *Ascaris* - Others are coelenterates whereas *Ascaris* belongs to phylum Aschelminthes.

(12) Parrot, Bat, Pigeon, Crow.

Ans. Bat - Others belong to class Aves whereas bat belongs to class mammals.

(13) Bivalve, Butterfly, Octopus, Snail.

Ans. Butterfly - Others belong to Mollusca whereas butterfly belongs to Arthropoda.

(14) Lizard, Snake, Penguin, Python.

Ans. Penguin - Others belong to Reptilia whereas Penguin belongs to mammals.

(15) Dog fish, Shark, Rohu, Salamander.

Ans. Salamander - Others belong to class pisces whereas Salamander belongs to class Amphibia.

(16) Sea horse, Frog, Toad, Salamander.

Ans. Sea horse - Others are amphibians whereas Sea horse belongs to class pisces.

(17) Kangaroo, Kiwi, Penguin, Peacock.

Ans. Kangaroo - Other are Aves whereas Kangaroo belongs to mammals.

(18) Starfish, Dogfish, Brittle star, Sea urchin.

Ans. Dogfish - Others belong to Echinodermata whereas Dogfish belongs to class pisces.

(19) Pseudopodia, Cilia, Setae, Ostia.

Ans. Ostia - Others are locomotory organs whereas ostia are pores on the body of porifera.

Q.1. (A) 3. Complete the analogy.

(1) *Amoeba* : Asymmetrical : : Frog : ..... .

Ans. Bilaterally symmetrical - Body of *Amoeba* is Asymmetrical whereas that of frog is Bilaterally symmetrical.

(2) Fish : Bilateral symmetry : : Starfish : .....

Ans. Radial symmetry - Body of fish is Bilaterally symmetrical while body of starfish is Radially symmetrical.

(3) Ostia : to take in water : : Oscula : ..... .

Ans. To leave water out - Animals in phylum porifera have pores called 'Ostia' which is used to take in water and 'Oscula' is used to leave water out.

(4) Liverfluke : hermaphrodite : : *Ascaris* : ..... .

Ans. Unisexual – Liverfluke is hermaphrodite whereas *Ascaris* is Unisexual.

(5) Sea anemone : Diploblastic : : *Planaria* : ..... .

Ans. Triploblastic - The body of sea anemone is made of two germ layers hence called Diploblastic whereas the body of *Planaria* is made of three germ layers, hence called Triploblastic.

(6) Shark : Pisces : : Toad : ..... .

Ans. Amphibia - Shark belongs to class Pisces whereas Toad belongs to class Amphibia.

(7) Aves : Homeotherms : : Reptilia : ..... .

Ans. Poikilotherms - Members of class aves are Homeotherms (warm blooded) whereas members of class Reptilia are Poikilotherms (cold blooded).

(8) Scolidon : Cartilagenous : : Pomfret : ..... .

Ans. Bony - The exoskeleton of Scolidon is Cartilagenous whereas that of Pomfret is bony.

(9) *Amoeba* : Pseudopodia : : Earthworm : .....

Ans. Setae - *Amoeba* uses Pseudopodia for locomotion while Earthworm uses Setae for locomotion.

(10) Scorpion : Arthropoda : : Snail : ..... .

Ans. Mollusca - Scorpion is a member of class Arthropoda whereas snail is a member of class Mollusca.

(11) Starfish : Tube feet : : *Euglena* : ..... .

Ans. Flagellum - The locomotory organ of Starfish is tube feet whereas that of *Euglena* is Flagellum.

(12) Largest phylum : Arthropoda : : Second largest phylum : ..... .

Ans. Mollusca - Phylum Arthropoda is the largest phylum with highly successful animals in animal kingdom whereas Phylum Mollusca is the second largest Phylum in animal kingdom.

(13) Salamander : Amphibia :: *Balanoglossus* : ..... .

Ans. Hemichordata - Salamander belongs to phylum Amphibia whereas *Balanoglossus* belongs to phylum Hemichordata.

(14) Pigeon : Aves : : Bat : ..... .

Ans. Mammalia - Pigeon belongs to class Aves whereas Bat belongs to phylum Mammalia.

(15) *Herdmania* : Urochordata :: *Amphioxus* ..... .

Ans. Cephalochordata - *Herdmania* belongs to subphylum Urochordata and *Amphioxus* belongs to subphylum Cephalochordata.

(16) Starfish : Echinodermata :: *Balanoglossus* : ..... .

Ans. Hemichordata - Starfish belongs to phylum Echinodermata whereas *Balanoglossus* belongs to phylum Hemichordata.

(17) *Planaria* : Platyheminthes :: *Filarial worm* : ..... .

Ans. Aschelminthes - Planaria belongs to phylum Platyhelminthes whereas *Filarial worm* belongs ot phylum Aschelminthes

(18) Earthworm : Annelida :: Millipede : ..... .

Ans. Arthropoda - Earthworm belongs to phylum Annelida whereas millipede belongs to phylum Arthropoda.

Q.1. (A) 4. Match the following :

(1)

Column A	Column B
(1) Acoelomate	(a) Starfish
(2) Radially Symmetrical	(b) Frog
(3) Bilaterally Symmetrical	(c) *Amoeba*

Ans. *(1 – c), (2 – a), (3 – b).*

(2)

Column A	Column B
(1) Porifera	(a) Sea anemone
(2) Coelenterata	(b) *Ascaris*
(3) Platyhelminthes	(c) *Sycon*
(4) Aschelminthes	(d) Liverfluke

Ans. *(1 – c), (2 – a), (3 – d), (4 – b).*

(3)

Column A	Column B
(1) Annelida	(a) Jointed appendages
(2) Arthropoda	(b) Segmented body
(3) Mollusca	(c) Flat body
(4) Echinodermata	(d) Soft body
	(e) Spiny body

Ans. *(1 – b), (2 – a), (3 – d), (4 – e).*

(4)

Column A	Column B
(1) Hemichordata	(a) *Amphioxus*
(2) Cephalochordata	(b) *Saccoglossus*
(3) Urochordata	(c) *Petromyzon*
(4) Cyclostomata	(d) *Herdmania*

Ans. *(1 – b), (2 – a), (3 – b), (4 – c).*

(5)

Column A	Column B
(1) Pisces	(a) Lungs
(2) Amphibia	(b) Gills
(3) Aves	(c) Skin

Ans. *(1 – b), (2 – c), (3 – a).*

(6)

Column A	Column B
(1) Pisces	(a) Salamander
(2) Amphibia	(b) Penguin
(3) Reptilia	(c) Scoliodon
(4) Aves	(d) Dolphin
(5) Mammalia	(e) Tortoise

Ans. *(1 – c), (2 – a), (3 – e), (4 – b), (5 – d).*

(7)

Column A	Column B
(1) Tube feet	(a) Hydra
(2) Ventral foot	(b) Nereis
(3) Setae	(c) Snail
(4) Tentacles	(d) Earthworm
(5) Parapodia	(e) Starfish

Ans. *(1 – e), (2 – c), (3 – d), (4 – a), (5 – b).*

(8)

Column A (Class)	Column B (Example)
(1) Mammalia	(a) Sea horse
(2) Pisces	(b) Elephant
(3) Reptilia	(c) Toad
(4) Amphibia	(d) Tortoise

Ans. *(1 – b), (2 – a), (3 – d), (4 – c).*

(9)

Column A	Column B
(1) Arthropoda	(a) Head, Foot, Visceral mass
(2) Hemichordata	(b) Head, neck, trunk, tail
(3) Mollusca	(c) Proboscis, collar, trunk
(4) Mammalia	(d) Head, thorax, abdomen

Ans. *(1 – d), (2 – c), (3 – a), (4 – b).*

(10)

Column A	Column B
(1) Protoplasmic grade	(a) Flat worms
(2) Tissue - organ grade	(b) Arthropoda
(3) Cell - tissue grade	(c) Unicellular animals
(4) Organ-system grade	(d) Cnidarians

Ans. *(1 – c), (2 – a), (3 – d), (4 – b).*

(11)

Column A	Column B	Column C
(1) Coelenterata	(i) Body covered by shell	(a) *Balanoglossus*
(2) Aschelminthes	(ii) Gill slits for respiration	(b) Bivalve
(3) Arthropoda	(iii) Mostly parasitic, cylindrical	(c) *Hydra*
(4) Mollusca	(iv) Jointed appendages	(d) Cockroach
(5) Hemichordata	(v) Aquatic with radial symmetry	(e) *Ascaris*

Ans. *(1 – v – c), (2 – iii – e), (3 – iv – d), (4 – i – b), (5 – ii – a).*

Q.1. (A) 5. State whether the following statement is True or False. Correct the false statement.

(1) Platyhelminthes show 'organ system grade organization'.

(2) The first man to classify animals was Aristotle.

(3) Classification proposed by Aristotle is known as 'Natural method of classification'.

(4) In non-chordates, pharyngeal gill-slits are present.

(5) The basic unit of all animals is cell.

(6) The human body is bilaterally symmetrical.

(7) Animals with true body cavity are called acoelomates.

(8) Octopus can change its body colour.

(9) The exoskeleton of echinoderms contain calcium carbonate.

(10) In cyclostomata, the endoskeleton is bony.

(11) Bat is a flying mammal.

(12) Arthropods are hermaphrodites.

(13) The mouth of Aves is modified into beak.

(14) Spider belongs to Annelida.

(15) *Euspongia* is a sedentary animal.

(16) Tentacles of coelenterates help in injecting toxin in the body of prey.

(17) Ascaris is unisexual.

(18) A precious stone called coral is derived from coral reef.

(19) Liverfluke is an ectoparasite.

(20) The body of arthropods is covered by a tough cuticle.

(21) Earthworm belongs to phylum Aschelminthes.

(22) The body of molluscs is covered with calcareous spines.

(23) In amphibia, exoskeleton is in the form of scales.

(24) Amphioxus belongs to urochordata.

(25) Reptiles are homeotherms (warm-blooded).

(26) *Petromyzon* belongs to class Pisces.

(27) In urochordata, notochord is present throughout the body length.

(28) Cnidoblast bearing tentacles are present around the mouth in Porifera.

(29) Platyhelminthes are hermaphrodites.

Ans. *(1) False. Platyhelminthes show 'Tissue organ grade organisation'. (2) True (3) False. The classification was known as 'Artificial method of classification'. (4) False. In non-chordates, pharyngeal gill slits are, absent. (5) True (6) True (7) False. Animals with true body cavity are called eucoelomates. (8) True (9) True (10) False. In cyclostomata, the endoskeleton is Cartilagenous (11) True (12) False. Arthropods are unisexual. (13) True (14) False. Spider belongs to Arthropoda. (15) True (16) False. Tentacles help in capturing prey. (17) True (18) True (19) False. Liverfluke is an endoparasite. (20) False. The body of arthropods is covered by a chitinous exoskeleton. (21) False. Earthworm belongs to phylum Annelida. (22) False. The body of molluscs is soft and slimy. (23) False. In amphibia, exoskeleton is absent. (24) False. Amphioxus belongs to Cephalochordata. (25) False. Reptiles are Poikilotgherms (Cold-blooded). (26) False. Petromyzon belongs to class cyclostomata. (27) False. In urochordata, notochord is present in only tail region. (28) False. Cnidoblast bearing tentacles are present around the mouth in Coelenterata. (29) True.*

Q.1. (A) 6. Name the following:

(1) One Poriferan

Ans. *Sycon*

(2) Animal having tentacles around mouth.

Ans. *Hydra*

(3) Animal whose body is made up of segments.

Ans. Earthworm

(4) A connecting link between Non-chordates and chordates.

Ans. *Balanoglossus*

(5) Cartilagenous fish

Ans. Shark

(6) Aquatic mammal

Ans. Dolphin

(7) Acoelomate, unicellular animal

Ans. *Amoeba*

(8) Animal showing three germ layers

Ans. Triploblastic

(9) Locomotory organs in Annelids.

Ans. Setae, Suckers, Parapodia

Q.1. (A) 7. Answer the following in one sentence each:

(1) How are animals classified broadly?

Ans. Animals are broadly classified into Chordates and Non-chordates.

(2) Who was the first to classify animals?

Ans. Aristotle was the first philosopher to classify animals.

(3) What was the basis of natural system of classification?

Ans. The natural system of classification was based on various criteria like body organization, types of cells, chromosomes, bio-chemical properties, etc.

(4) How are chordates further classified?

Ans. The chordates are further classified as Urochordata, Cephalochordata and Vertebrata (Craniata).

(5) What are Platyhelminthes?

Ans. The animals which are slender, flat like a leaf or strip are called Platyhelminthes.

(6) What do you mean by the term 'triploblastic'?

Ans. The animals whose body is made up of three germ layers, namely ectoderm, mesoderm and endoderm are called 'triploblastic'.

(7) Why are Aschelminthes called round worms?

Ans. The body of Aschelminthes is long, thread-like or cylindrical, hence, are called as 'Round Worms'.

(8) What is Annelida?

Ans. The animals which are long, cylindrical and metamerically segmented are called Annelides.

(9) What are the germ layers found in Cnidarians?

Ans. Cnidarians have two germ layers, namely ectoderm and endoderm.

(10) What do you mean by the term Arthropoda?

Ans. The non-chordates which show jointed appendages are called Arthropods.

(11) What is the substance present in the exoskeleton of Arthropods?

Ans. The substance present is the exoskeleton of Arthropods is chitin.

(12) Name the largest and the second largest phyla.

Ans. 'Arthropoda' is the largest phylum, while 'Mollusca' is the second largest phylum.

(13) Name the different parts in which body of Arthropoda is divided.

Ans. The body of Arthropoda is divided into head, thorax and abdomen.

(14) Name the parts in which the body of Molluscan is divided.

Ans. The body of a Mollusca is divided into head, foot and visceral mass.

(15) Which animal is referred to as friend of farmers?

Ans. Earthworm is referred to as friend of farmers.

(16) What are the parts of the body of Hemichordata?

Ans. The body of Hemichordates is divided into proboscis, collar and trunk.

(17) What are cold-blooded animals?

Ans. The animals whose body temperature changes with that of the surrounding temperature are called cold blooded or poikilothermic animals.

(18) Which is the main respiratory organ for amphibians?

Ans. The skin is the main respiratory organ present in amphibians.

(19) What do you mean by the term 'Homeotherm'?

Ans. The animals which can maintain a constant body temperature irrespective of surrounding temperature are called Homeotherms.

*(20) Which are the animals from phylum Arthropoda those have shortest and longest life span?

Ans. Among arthropods, houseflies have very small life span, while honey bees have longest life span.

Q.1. (A) 8. Identify me:

*(1) I am diploblastic and acoelomate. Which phylum do I belong to?

Ans. Coelenterata (cnidaria)

(2) I locomote with tube feet, I have radial symmetry.

Ans. Starfish

(3) I am a friend of farmers.

Ans. Earthworm

(4) I lay eggs though I am a mammalian.

Ans. Platypus

(5) My digits are without claws and external ear is absent. Which class do I belong to?

Ans. Amphibia

(6) I make pearl in my body.

Ans. Oyster, Bivalve

(7) I am an annelid ectoparasite that sucks blood.

Ans. Leech

(8) I belong to mammalia, but I can fly.

Ans. Bat

(9) I am a mammal who lives in deep oceans.

Ans. Whale

(10) I am a small, fish-like marine animal with notochord present throughout the body length.

Ans. Amphioxus

(11) I am an annelid and hermaphrodite.

Ans. Earthworm

(12) My body is made up of fibres of a protein-spongin.

Ans. Bath sponge

(13) I am a clever molluscan, I can change my colour.

Ans. Octopus

(14) I am considered as the link between Non-chordates and chordates.

Ans. Balanoglossus

(15) I am the largest animal.

Ans. Blue whale

*(16) My body is radially symmetrical. Water vascular system is present in my body. I am referred as fish though I am not. What is my name?

Ans. Jelly fish

*(17) I live in your small intestine. Pseudocoelom is present in my thread like body. In which phylum will you include me?

Ans. Aschelminthes

*(18) Though I am multicellular, there are no tissues in my body. What is the name of my phylum?

Ans. Coelenterata / Cnidaria

Q.1. (B) Choose and write the correct option.

(1) The first person to perform classification of animals was ..... .

(a) Theophrastus (b) Linnaeus
(c) Aristotle (d) Meyer

(2) Pharyngeal gill-slits are absent in ..... .

(a) Non-chordates (b) Chordates
(c) Vertebrates (d) Craniates

(3) In multicellular organisms, the body organization is called ..... organization.

(a) protoplasmic (b) cellular grade
(c) tissue grade (d) organ system

(4) *Amoeba* is a ..... animal.

(a) symmetrical (b) Bilaterally symmetrical
(c) radially symmetrical (d) asymmetrical

(5) Radial symmetry is observed in ..... .

(a) *Amoeba* (b) Octopus
(c) Starfish (d) Fish

(6) The animals with three germ layers are called ..... .

(a) Diploblastic (b) Monoblastic
(c) Triplet (d) Triploblastic

(7) The mammal which lays eggs is ..... .

(a) *Platypus* (b) Bat
(c) Whale (d) Bear

(8) shows bilateral symmetry.

(a) *Amoeba* (b) Starfish
(c) Fish (d) Jellyfish

(9) In annelida, ... help in locomotion.

(a) pseudopodia (b) cilia
(c) flagella (d) setae

(10) The warm blooded animals are called ..... .

(a) Poikilotherms (a) Homeotherms
(c) Ambitherms (d) Parasitic

(11) In ....., the exoskeleton is absent.

(a) Amphibia (b) Aves
(c) Reptilia (d) Mammalia

(12) The animals which do not possess body cavity are called ..... .

(a) Acoelomate (b) Coelomate
(c) Pseudocoelomate (d) Eucoelomate

(13) The ..... are exclusively marine.

(a) Molluscs (b) Coelenterates
(c) Annelids (d) Echinoderms

(14) In ....., the fertilization is external.

(a) Frog (b) Bat
(c) Snake (d) Parrot

*(15) Which special cells are present in the body of sponges (Porifera)?

(a) Collar cells (b) Cnidoblasts
(c) Germ cells (d) Ectodermal cells

*(16) Which of the following animals' body shows bilateral symmetry?

(a) Star fish (b) Jelly fish
(c) Earthworm (d) Sponge

*(17) Which of the following animals can regenerate it's broken body part?

(a) Cockroach (b) Frog
(c) Sparrow (d) Star fish

*(18) Bat is included in which class?

(a) Amphibia (b) Reptilia
(c) Aves (d) Mammalia

(19) ..... has the power of regeneration.

(a) Cockroach (b) Star fish
(c) Frog (d) Sparrow

(20) Phylum ..... has acoelomate type of body cavity.

(a) Annelida (b) Aschelminthes

(b) Cnidaria (d) Mollusca

(21) Exoskeleton is absent in class .....

(a) Pisces (b) Aves

(b) Mammalia (d) Amphibia

Ans. *(1) (c) Aristotle (2) (a) Non-chordates (3) (b) Cellular grade (4) (d) Asymmetrical (5) (c) Starfish (6) (d) Triploblastic (7) (a) Platypus (8) (c) Fish (9) (d) Setae (10) (b) homeotherms (11) (a) Amphibia (12) (a) Acoelomate (13) (d) Echi-noderms (14) (a) Frog (15) (a) Collar cells (16) (c) Earthworm (17) (d) Star fish (18) (d) Mammalia (19) (b) Starfish (20) (b) Cnidaria (21) (d) Amphibia*

Q.2.1. Define the following:

(1) Animal Classification

Ans. Formation of groups and sub-groups of animals depending upon similarities and differences among animals is called as animal classification.

(2) Notochord

Ans. The long, rod like supporting structure present on dorsal side of an animal body is called notochord.

(3) Warm blooded animals

Ans. The animals which can maintain their body temperature constant irrespective of surrounding temperature are called warm blooded animals or homeotherms.

(4) Chordata

Ans. The animals which have dorsal, supporting notochord in their bodies are called chordates.

(5) Diploblastic animals

Ans. The multicellular animals which have two germ layers, namely ectoderm and endoderm that are formed during initial period of their embryonic development, are called diploblastic animals.

(6) Triploblastic animals

Ans. The multicellular animals which have three germ layers, namely ectoderm, mesoderm and endoderm, formed during initial period of their embryonic development are called triploblastic animals.

(7) Hermaphrodite

Ans. The animals which have both, male and female reproductive systems in the same body are called hermaphrodites.

(8) Amphibians

Ans. The animals which can live in water as well as on land are called amphibians.

(9) Acoelomate

Ans. The multicellular animals which do not have body cavity are called acoelomate.

(10) External Fertilization

Ans. If the union of male and female gametes takes place outside the bodies of both organisms, then the fertilization is called as external fertilization.

(11) Ectoparasites

Ans. The parasites which live on the body of the host are called ectoparasites.

(12) Cellular grade organization

Ans. In case of multicellular animals, if tissues are not formed, their body organization is called as 'cellular grade organization.'

(12) Sedentary animals

Ans. The animals which are attached to substratum and do not show locomotion are called sedentary animals.

(13) Segmented body

Ans. If a body of an animal is divided into small, similar units, then such a body is called segmented body and each units is called segment.

(14) Coelom or body cavity

Ans. The cavity between the body and internal organs is called coelom or body cavity.

Q.2.2. Write short notes on:

(1) Germ layers.

Ans.

(i) In case of multicellular animals, germ layers are formed during initial period of their embryonic development.

(ii) These germ layers further develop to form different tissues of the body.

(iii) In case of some animals, there are only two germ layers, namely ectoderm and endoderm. They are called diploblastic animals. e.g. Cnidarians.

(iv) In most of all the remaining animals, three germ layers are formed, namely ectoderm, mesoderm and endoderm, These animals are called triploblastic. e.g. Platyhelminthes onwards all.

(v) Germ layers play major role in initiation of formation of tissues and organs in the body.

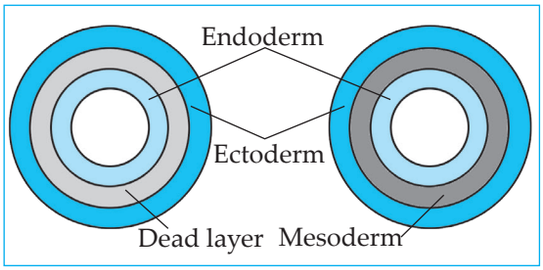


Fig 6.1. Diploblastic and triploblastic

(2) Body Cavity (Coelom).

Ans.

(i) The cavity between the body and internal organs is called body cavity or coelom.

(ii) For multicellular animals, during initial period of their embryonic development, the body cavity is formed either from the mesoderm or gut. Such cavity is present in animals of phylum Annelida and all phyla coming after Annelida. Such animals are called 'eucoelomate' (animals with true body cavity).

(iii) In some multicellular animals, the body cavity is absent. They are known as 'acoelomate' e.g. Porifera, Cnidaria, Platyheminthes.

(iv) In Aschelminthes, the body cavity is formed in a different way than normal. Those animals are called pseudocoelomates.

(3) Body Symmetry.

Ans.

(i) If body of any animal is cut through an imaginary axis, it may or may not produce two equal halves.

Depending upon this property, these are different type of animal bodies.

(ii) In some animals, there is no such imaginary axis of the body through which we can get two equal halves. Such a body is called as asymmetrical body e.g. *Amoeba*, *Paramoecium*, some sponges.

(iii) In some animals, if imaginary cut passes through the central axis but any plane of the body, it gives two equal halves. Such a symmetry is known a radial symmetry e.g. Starfish.

(iv) In some animals, there is only one imaginary axis of body through which we can get equal halves. It is known as bilateral symmetry. e.g. Insects, fish, frog, birds, human, etc.

(4) Advantages of animal classification OR State the importance of animal classification OR Give reason - There is a need for classification of animals.

Ans.

(i) Study of animals becomes convenient.

(ii) Study of few animals from group helps to understand about the entire group.

(iii) Classification gives an idea about evolution of animals.

(iv) Animals can be easily identified with great accuracy.

(v) It helps to understand various adaptations shown by them.

(vi) It helps to understand the relationship of animals with other living organisms.

(vii) It helps to understand the habitat of each animal and its exact role in nature.

Q.2.3. Complete the following chart as per the given information:

***(1)**

Sr. No.	Body cavity	Germ layers	Phylum
(1)	**Absent**	Diploblastic	**Porifera**
(2)	**Absent**	**Triploblastic**	Platyhelminthes
(3)	**Pseudocoelom**	Triploblastic	**Aschelminthes**
(4)	**Present**	Triploblastic	**Arthropoda**

***(2)**

Sr. No.	Class	Features	Examples
(1)	**Cyclostomata**	Jaw-less mouth provided with sucker	Petromyzon
(2)	Pisces	**Respiration by Gills**	Pomfret
(3)	**Amphibia**	Can live in water and on land	Frog
(4)	Mammalia	Presence of mammary glands	**Whale**
(5)	Reptilia	**Cold blooded, creeping movement**	Python

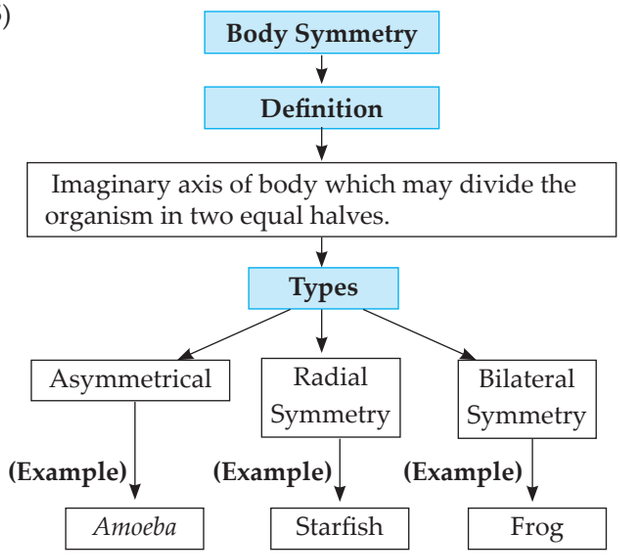
(3) Complete the following table.

Sr. No.	Animal	Organ for locomotion	Phylum/ Class
(1)	**Earthworm**	Setae	Annelida
(2)	**Starfish**	Tube feet	Echinodermata
(3)	***Paramoecium***	Cilia	Protozoa
(4)	**Crab**	Jointed appendages	Arthropoda
(5)	**Pigeon**	Wings	Aves

(4)

	Chordates	Non - Chordates
(1) Notochord	**Present**	Absent
(2) Heart	Dorsal	**Ventral**
(3) Pharyngeal gill-silts	Present	**Absent**

(5)



Q.2.4. Label the following diagrams:

(1) Herdmania

Ans.

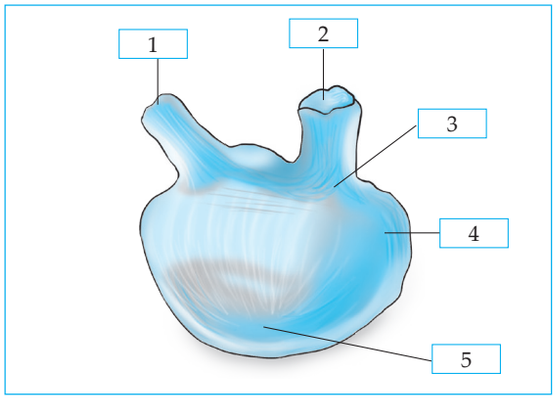


Fig 6.2. Herdmania

Ans. *(1) Branchial aperture (2) Atrial aperture (3) Tunic (4) Body (5) Foot*

(2) Petromyzon

Ans.

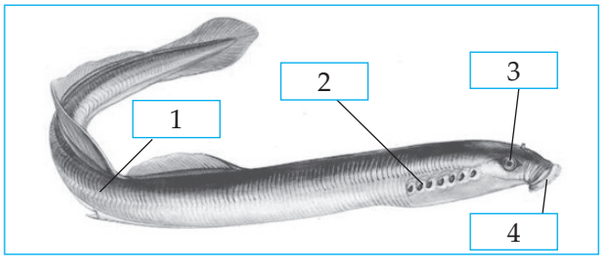


Fig 6.3. Petromyzon

Ans. *(1) Body (2) Gill slits (3) Eye (4) Sucker*

(3) Nereis

Ans.

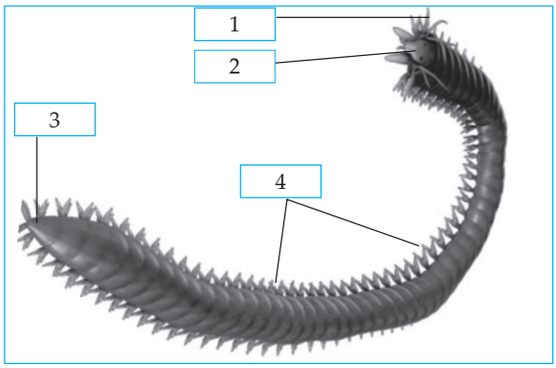
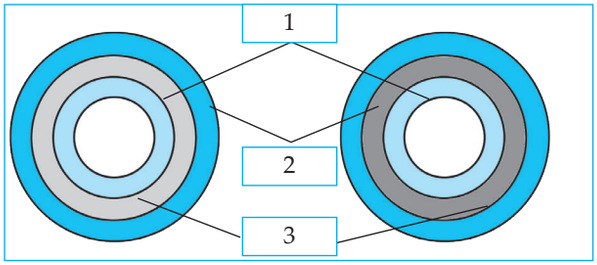


Fig 6.4. Nereis

Ans. *(1) Tentacle (2) Mouth (3) Anus (4) Parapodia*

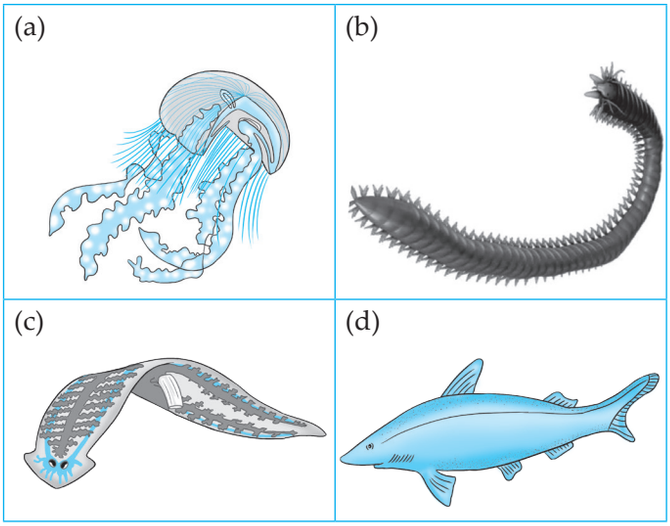
(4) Germ layers

Ans.



Ans. *(1) Endoderm (2) Ectoderm (3) Mesoderm*

(5)



Ans. *(a) Jelly Fish (b) Nereis (c) Planaria (d) Scoliodon*

***(6) Name the body parts in the following diagram**

Ans.

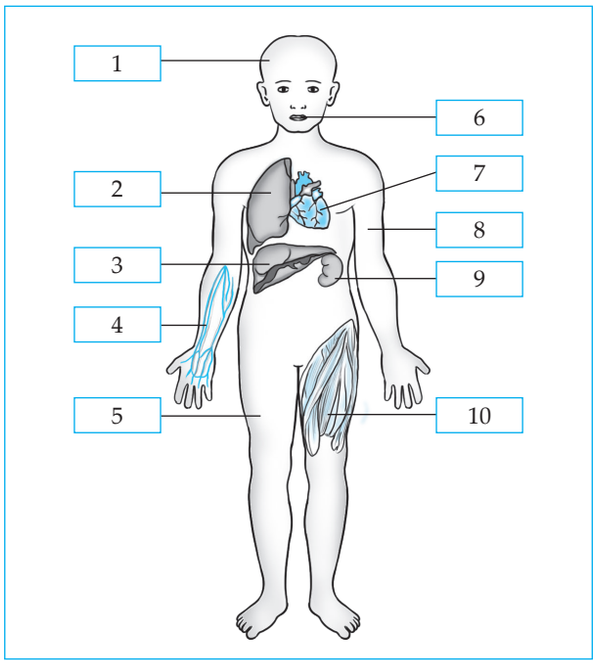


Fig 6.5. Organ- System grade of organization

Ans. *(1) Brain (2) Lungs (3) Liver (4) Bone of forehand (5) Thigh (6) Mouth (7) Heart (8) Arm bone (9) Kidney (10) Thigh muscle.*

(7) Cockroach

Ans.

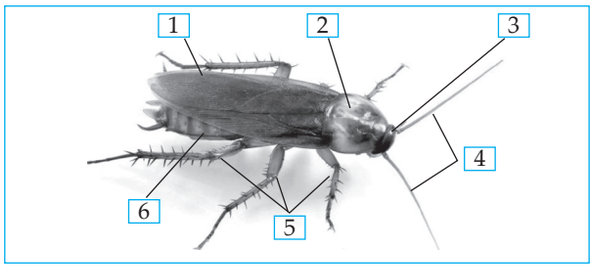


Fig 6.6. Cockroach

Ans. *(1) Wings (2) Thorax (3) Head (4) Antenna (5) Legs (6) Abdomen*

Q.2.5. Answer the following:

***(1) Which criteria are used for classification of organisms?** *(Can you recall; Text Book Page no. 61)*

Ans. Criteria used for classification of animals.

(i) Presence or absence of Notochord and nerve cord

(ii) Grades of organization

(iii) Body symmetry

(iv) Germ layers

(v) Body cavity (Coelom)

(vi) Body segmentation

(vii) Ability to obtain nutrients

(viii) Modes of reproduction.

***(2) How may be the leech used in ayurvedic system of treatment?** *(Get information; Text Book Page no. 69)*

Ans.

(i) According to Ayurveda leech therapy is a method in which localised impure blood is let out to heal the tissue.

(ii) Leechs used to relieve venous congestion and for improved blood circulation.

(iii) Leech therapy is used in diseases like varicose veins, arthritis, Herpes, Psoriasis, Vascular problems, Diabetic wounds, non-healing ulcers, etc.

***(3) Animals like ghariyal and crocodile live in water as well as land. Are they amphibians or reptiles?** *(Use your brain power; Text Book Page no. 74)*

Ans.

(i) Crocodiles and ghariyals are reptiles. Crocodiles and ghariyals breathe through lungs both on land and in water.

(ii) They have dry scaly skin.

(iii) They lay leathery soft eggs on land.

(iv) Amphibians have moist skin with no scales.

(v) They lay eggs in water which hatch into larve that metamorphose from an aquatic to air-breathing form.

(vi) They breathe through their skin when in water and through lungs when on land.

***(4) Animals like whale, walrus live in water (ocean). Whether they are included in pisces or mammalia?** *(Use your brain power; Text Book Page no. 74)*

Ans.

(i) Whales and walrus are included in mammalia. They are aquatic mammals.

(ii) They are walm blooded animals.

(iii) They breath air and mothers feed their babies through mammary glands just like humans do.

(iv) Fishes (Pisces) are cold blooded animals and breathe through their gills and do not have mammary glands.

***(5) What is chitin?**

Ans.

(i) Chitin is a fibrous substance consisting of Polysaccharides.

(ii) It forms the exoskeleton of arthropods and cell walls of fungi.

Q.2.6. Distinguish between:

***(1) Butterfly and Bat**

Ans.

Butterfly	Bat
(i) Butterfly belongs to Non-chordates.	(i) Bats are Chordates.
(ii) Butterfly belongs to Phylum Arthropoda.	(ii) Bat belongs to phylum Chordata.
(iii) It belongs to Class Insecta.	(iii) It belongs to Class Mammalia.
(iv) Exoskeleton is chitinous.	(iv) Exoskeleton is covered with hair.

(2) Non-Chordates and Chordates

Ans.

Non-chordates	Chordates
(i) Notochord is absent.	(i) Notochord is present at some stages.
(ii) The heart if present is dorsal in position.	(ii) The heart is ventral in position.
(iii) They do not posses pharyngeal gill-slits.	(iii) They posses pharyngeal gill-slits.
(iv) Nerve cord if present is double, ventral and solid.	(iv) Nerve cord is single, dorsal and hollow.

(3) Platyhelminthes and Aschelminthes

Ans.

Platyhelminthes	Aschelminthes
(i) Body is slender and flat like a leaf or strip.	(i) They have long, thread like or cylindrical body.
(ii) They are also known as flat worms.	(ii) They are known as round worms.
(iii) They are hermaphrodite.	(iii) They are unisexual.
(iv) They are acoelomate.	(iv) They are pseudocoelomate.

(4) Mollusca and Echinodermata

Ans.

Mollusca	Echinodermata
(i) Molluscs are soft bodied and slimy.	(i) The body is rough with calcareous spines.
(ii) Body shows bilateral symmetry.	(ii) Body show radial symmetry in adult stage.
(iii) They are either marine or fresh water animals.	(iii) They are exclusively marine animals.
(iv) Locomotion with ventral foot.	(iv) Locomotion with tube feet.

(5) Pisces and Amphibia

Ans.

Pisces	Amphibia
(i) These animals are totally aquatic, living in marine or fresh water.	(i) Amphibians can live in water and also on the land.
(ii) Skin is covered with scales.	(ii) Skin is without any exoskeleton.
(iii) Respiration is carried out with the help of gills.	(iii) Respiration is carried out mostly through skin.
(iv) Heart is two chambered.	(iv) Heart is three chambered.

(6) Reptilia and Mammalia

Ans.

Reptilia	Mammalia
(i) Skin is dry and covered with scales.	(i) Skin is covered with hair, or fur.
(ii) They are cold-blooded animals.	(ii) They are warm blooded animals.
(iii) Heart is incompletely four chambered.	(iii) Heart is completely four chambered.
(iv) Pinna or external ear is absent.	(iv) Pinna or external ear is present.

(7) Urochordata and Cephalochordata

Ans.

Urochordata	Cephalochordata
(i) Notochord is present only in tail region of the larvae.	(i) Notochord is present throughout the body length.
(ii) Urochordates are hermaphrodites.	(ii) Cephalochordates are unisexual.

(8) Male Ascaris and Female Ascaris

Ans.

Male ascaris	Female ascaris
(i) It is a short cylindrical worm.	(i) It is a long cylindrical worm.
(ii) Male is thinner than female.	(ii) Female is thicker than male.
(iii) Male shows a curved tail.	(iii) Female has a straight tail.

(9) Cyclostomata and Pisces

Ans.

Cyclostomata	Pisces
(i) The skin is soft and without any scales.	(i) The skin shows presence of scales.
(ii) Endoskeleton is cartilagenous.	(ii) Endoskeleton is cartilagenous or bony.
(iii) Most of them are ectoparasites.	(iii) They are free living.
(iv) These animals have jaw-less mouth.	(iv) These animals have mouth with presence of jaws.

(10) Mammalia and Aves

Ans.

Mammalia	Aves
(i) Mammary glands are present.	(i) Mammary glands are absent.
(ii) Mammals are mostly adapted for terrestrial life.	(ii) Aves are completely adapted for aerial life.
(iii) Limbs are used for walking and running.	(iii) Forelimbs are modified into wings for flying.
(iv) Body is covered with hair or fur.	(iv) Body is covered with feathers.
(v) They are viviparous.	(v) They are oviparous.

Q.2.7. Write the characteristics of following animals with reference to their classification:

Rohu, Grasshopper, Elephant, Penguin, Crocodile, Frog, Lizard, Jelly fish, Centipede, *Balanoglossus*, Amphioxus, Herdmania, *Petromyzon*, Bat, Bathsponge.

Ans.

***(1) Rohu**

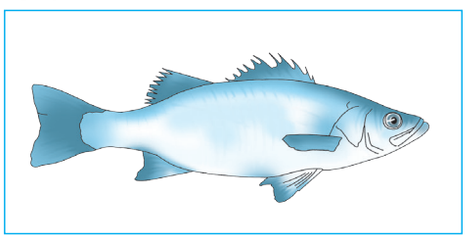


Fig 6.7. Rohu

(i) Rohu belongs to class pisces.
(ii) It is found in fresh water.
(iii) It is a bony fish.
(iv) Skin shows presence of scales.
(v) Respiration occurs with gills.

***(2) Grasshopper**

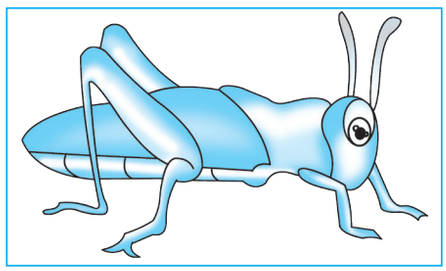


Fig 6.8. Grosshopper

(i) Grasshopper belongs to phylum Arthropoda.
(ii) Body is covered with chitinous exoskeleton.
(iii) Body is divided into head, thorax and abdomen.
(iv) There are two pairs of wings and three pairs of jointed appendages for locomotion.
(v) It is bilaterally symmetrical

***(3) Elephant**

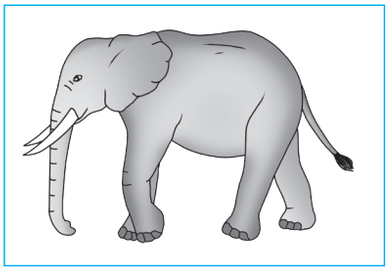


Fig 6.9. Elephant

(i) Elephant belongs to class mammalia.
(ii) Body shows differentiation into head, neck, trunk and tail.
(iii) Mammary glands are present.
(iv) The heart is four chambered.
(v) Largest terrestrial mammal.
(vi) It is warm-blooded.
(vii) Body is divided into head, neck, trunk and tail.

***(4) Penguin**

Fig 6.10. Penguin

(i) This animal belongs to class Aves.
(ii) They are found at the south pole, i.e. at Antarctica, which is a cold region
(iii) Exoskeleton shows feathers.
(iv) Penguin is warm-blooded.
(v) They are adapted to a cold region life.
(vi) Penguin is oviparous.
(vii) Neck is present between head and trunk.

(5) Crocodile

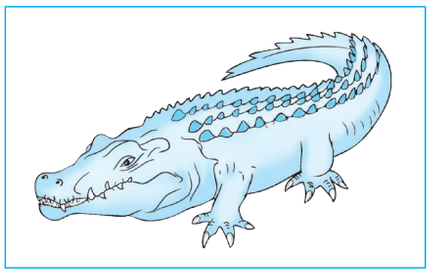


Fig 6.11. Crocodile

(i) Crocodile belongs to class Reptilia.
(ii) Skin is dry and scaly.
(iii) It is a cold-blooded (Poikilothermic) animal.
(iv) Body is divided into head, neck, trunk and tail.
(v) Crocodiles are oviparous.
(vi) It creeps on land.

***(6) Frog**

(i) Frog belongs to class Amphibia.
(ii) Can live in water as well as on land during adult life.
(iii) Skin is without any exoskeleton and is usually kept moist for respiration.
(iv) They have two pairs of appendages. Digits are without claws.
(v) External ear is absent but tympanum (external hearing structure) is present.

***(7) Lizard**

(i) It belongs to class Reptilia.
(ii) It is cold-blooded (Poikilotherm)
(iii) It shows creeping movement as body cannot be lifted up.
(iv) Neck is present between head and trunk.
(v) External ear is absent.

***(9) Jellyfish**

(i) Jelly fish belongs to Phylum Coelenterata.
(ii) Cnidoblast bearing tentacles are present around the mouth. Tentacles are useful for capturing the prey whereas cnidoblasts inject the toxin in the body of the prey.
(iii) Body is umbrella shaped, hence called Medusa.
(iv) It is diploblastic, and shows radial symmetry.

(10) Centipede

(i) Centipede belongs to phylum Arthropoda.
(ii) Body shows many jointed appendages.
(iii) Centipede is triploblastic and eucoelomate and bilaterally symmetrical.
(iv) Chitinous exoskeleton is present around their body.
(v) It is unisexual.

(11) Balanoglossus

(i) *Balanoglossus* belongs to phylum Hemichordata.
(ii) Notochord is present in proboscis region.
(iii) Marine animal lives in burrows in sand.
(iv) It is a unisexual animal.
(v) It has pharyngeal gill slits.

(12) ***Amphioxus***

(i) Amphioxus belongs to sub-phylum Cephalochordata.

(ii) Notochord is present throught the body length.

(iii) Pharynx is very large and contains gill-slits.

(iv) It is unisexual.

(13) Herdmania

(i) *Herdmania* belongs to sub-phylum-Urochordata.

(ii) Body is covered by skin-like test or tunic.

(iii) Notochord is present only in the tail region.

(iv) It is a hermaphrodite.

(14) Petromyzon

(i) Petromyzon belongs to class cyclostomata.

(ii) The skin is soft without scales.

(iii) Endoskeleton is cartilagenous.

(iv) It is an ectoparasite.

(v) It has jawless mouth with suckers.

(vi) Paired appendages are absent.

(15) Bat

(i) Bat belongs to class Mammalia.

(ii) It is adapted for aerial mode of life.

(iii) Bat is a warm blooded animal.

(iv) It is viviparous.

***(16) Bathsponge**

(i) It belongs to phylum porifera.

(ii) It bears numberous pores on its body called ostia and oscula.

(iii) It has special type of cell-collar cells.

(iv) It has good ability of regeneration.

(v) It is always attached to substratum and hence do not show locomotion.

(vi) Its body is supported by spicules or spongin fibres.

Q.2.8. Give the characteristics of the following with examples:

(1) Sub phylum Urochordata

Ans.

(i) Urochordates are marine animals.

(ii) Their body is covered by skin-like test or tunic.

(iii) These animals are hermaphrodites.

(iv) Notochord is present in only tail region of larvae.

(v) e.g. *Herdmania*, *Doliolum*, *Oikopleura*, etc.

(2) Sub phylum Cephalochordata

Ans.

(i) Cephalochordates are small, fish-like, marine animals.

(ii) They have notochord present throughout the body length.

(iii) Pharynx is very large and contains gill-slits.

(iv) These animals are unisexual. *e.g. Amphioxus.*

(3) Sub phylum Vertebrata (Craniata)

Ans.

(i) In these animals, the notochord is replaced by vertebral column.

(ii) Head is well developed and brain is protected in the cranium.

(iii) Endoskeleton is either cartilagenous or bony.

(iv) Some chordates are jaw-less (Agnatha) whereas some are with jaws (Gnathostomata).

(4) Class Cyclostomata

Ans.

(i) These are marine animals having fish-like body with bilateral symmetry.

(ii) They have jaw-less mouth provided with sucker (suctorial mouth).

(iii) Their skin is soft and without any scale.

(iv) Paired appendages are absent.

(v) Endoskeleton is cartilagenous.

(vi) Most of the animals are ectoparasites. e.g. Petromyzon, Myxine, etc.

(5) Class Pisces

Ans.

(i) They are cold blooded (Poikilotherms) aquatic animals living in marine and fresh waters.

(ii) Body is spindle shaped to minimze water resistance.

(iii) They have paired and unpaired fins for swimming. Tail fin is useful as a steering organ while swimming.

(iv) Exoskeleton is in the form of scales and endoskeleton is either cartilagenous or bony.

(v) Respiration is carried out with the help of gills.

e.g. Rohu, *Scoliodon*, *Pomfret*, *Sea horse*, E*lectric ray*, *Sting* ray, etc.

(6) Class Amphibia

Ans.

(i) These animals are strictly aquatic during larval life and perform only aquatic respiration, whereas they can live in water as well as on land during adult life and can perform aquatic as well as aerial respiration.

(ii) They have two pairs of appendages. Digits are without claws.

(iii) Exoskeleton is absent. Skin is without any derivative (appendages) and is always kept moist for respiration.

(iv) External ear is present.

(v) Neck is absent. Eyes are prominent with eye lids.
e.g. Frog, Toad, Salamander, etc.

(7) Class Reptilia

Ans.

(i) According to evolution of animals, these are the first true terrestrial animals with creeping movement.

(ii) They creep on land as their body cannot be lifted up.

(iii) They are cold blooded (Poikilotherms) animals.

(iv) The skin is dry and scaly.

(v) External ear is absent.

(vi) They are oviparous.

(vii) Digits are provided with claws.
e.g. Lizard, crocodile, tortoise, snake, etc.

(8) Class Aves (Birds)

Ans.

(i) Aves are completely adapted for aerial mode of life.

(ii) Their body is spindle shaped to minimize air resistance during flight.

(iii) Forelimbs are modified into wings. Digits are covered with scales and bear claws.

(iv) The exoskeleton is made up of feathers.

(v) Jaws are modified into beak.

(vi) They are unisexual, oviparous animals.

(vii) They are warm blooded (Homeotherm) animals.
e.g. Peacock, parrot, pigeon, duck, penguin, etc.

(9) Class Mammalia

Ans.

(i) Presence of mammary glands is a typical character of mammalia.

(ii) These animals are warm blooded.

(iii) Body is divided into head, neck, trunk and tail.

(iv) Digits are provided with nails, claws, or hooves.

(v) Exoskeleton is in the form of hairs or fur.
e.g. Elephant, human, kangaroo, dolphin, bat, etc.

Q.2.9. Enlist the characteristics of the following phyla:

(1) Phylum - Porifera

Ans.

(i) These animals are with simplest body plan and are called as 'Sponges'. They bear numerous pores on their body. Those pores are called as 'Ostia' and 'Oscula'.

(ii) These are aquatic animals and most of them are marine, few are fresh water dwellers.

(iii) Most of the animals have asymmetrical body.

(iv) They have special type of cells called collar cells'.

(v) They are non-motile, attached to a solid support. Hence, referred to as sedentary animals.

(vi) Their spongy body is supported by spicules or spongin fibres. Spicules are made up of calcium carbonate or silica.

(vii) These organisms feed upon small organisms taken in their body along with water. Water is taken in through ostia and given out through oscula.

(viii) These animals reproduce asexually by budding or by sexual method. They also have a good ability of regeneration.
e.g. *Sycon*, *Euspongia*, (Bath sponge), *Hyalonema*, *Euplectella*, etc.

(2) Phylum Coelenterata (Cnidaria)

Ans. *For diagram Refer Fig 6.12*

(i) Body of coelenterates is cylindrical called 'polyp' or umbrella-like called 'Medusa'.

(ii) Most of them are marine, only few are fresh-water dwellers.

(iii) Body is radially symmetrical and diploblastic.

(iv) Cnidoblast bearing tentacles are present around mouth. Tentacles are useful for capturing the prey, whereas cnidoblasts inject the toxin in the body of prey. These are useful for protection too.
e.g. *Hydra*, *Adamsia*, (Sea anemone), *Physalia* (Portugese-man-of war), *Aurelia* (Jellyfish), Corals, etc.

(3) Phylum Platyhelminthes

Ans.

(i) Body of platyhelminthes is slender and flat like a leaf or strip. Hence called 'flat worms.'

(ii) Body is acoelomate, bilaterally symmetrical.

(iii) Most of them are endoparasites. Few are free living and aquatic.

(iv) They are triploblastic.

(v) These animals are hermaphrodite.
e.g. *Planaria*, tape worm, liverfluke, etc.

(4) Phylum Aschelminthes (Nemathelminthes)

Ans. *For diagram Refer Fig 6.15.*

(i) The body of these animals is long thread-like or cylindrical. Hence, called as round worms.

(ii) They are either free living or endoparasites. Free living are either aquatic or terrestrial.

(iii) These animals are triploblastic and pseudocoelomate.

(iv) Body is unsegmented and covered with cuticle.

(v) These animals are unisexual, i.e. sexes are separate.

e.g. *Ascaris*, (Intestinal worm), Filarial worm, *Loa loa*, (Eye worm)

(5) Phylum - Annelida (Segmented worms)

Ans. *For diagram Refer Fig 6.16.*

(i) The body of these animals is long, cylindrical and metamerically segmented.

(ii) Most of the animals are free-living, but few are ectoparasites. Free living animals may be marine or fresh water dwellers or terrestrial.

(iii) They are triploblastic, bilaterally symmetrical and eucoelomate.

(iv) These animals, are either hermaphrodite or unisexual.

(v) They have setae, parapodia or suckers for locomotion.

(vi) The body is covered with special cuticle.

e.g. Earthworm, Leech, *Nereis* etc.

(6) Phylum - Arthropoda

Ans.

(i) These animals have jointed appendages. Hence, they are called as Arthropods.

(ii) The planet Earth has highest number of animals from this phylum. Hence, these are the largest successful animals in the kingdom animalia.

(iii) These animals are found in all types of habitat ranging from deepest oceans to highest mountains.

(iv) Body of these animals is triploblastic, eucoelomate, bilaterally symmetrical and segmented.

(v) Chitinous exoskeleton is present around their body.

(vi) These animals are unisexual.

e.g. Crab, spider, scorpion, millipede, cockroach, centipede, butterfly, honey bee, etc.

(7) Phylum - Mollusca

Ans.

(i) The body of these animals is soft and slimy. Hence, called 'Molluscs'.

(ii) This is the second largest phylum in animal kingdom.

(iii) These animals are aquatic or terrestrial. Most of the aquatic forms are marine, but few are fresh water dwellers too.

(iv) Body of these animals is non-segmented, triploblastic, eucoelomate, and soft.

(v) Except snail, their body shows bilateral symmetry.

(vi) Body is divided into head, foot and visceral mass.

(vii) Visceral mass is covered with mantle. This mantle secretes hard, calcareous shell. This shell may be internal or external or even absent in some.

(viii) They are unisexual.

e.g. Snail, Octopus, Bivalve, etc.

***(8) Phylum-Echinodermata (Echino-spiny, derma-skin)**

Ans.

(i) Calcareous spines are present on the body of these animals, hence, are called as Echinoderms.

(ii) These animals are found only in ocean.

(iii) Their body is triploblastic, eucoelomate. It is radially symmetrical in adult stage. However, shows bilateral symmetry in larval stage.

(iv) They perform locomotion with the help of tube feet. Tube feet are also useful to catch the prey. Some animals are sedentary.

(v) They have skeleton made up of calcareous spines and /or ossicles (plates).

(vi) These animals are unisexual.

(vii) These animals have good ability of regeneration.

e.g. Starfish, Brittle star, Sea-urchin, Sea cucumber, etc.

(9) Phylum - Hemichordata

Ans. *For diagram Refer Fig. 6.18.*

(i) Body of these animals is divided into three parts- proboscis, collar and trunk.

(ii) Notochord is present in proboscis region only. Hence, they are called as hemichordates.

(iii) These animals are also called as acorn worms.

(iv) These are marine animals live in burrows in sand.

(v) They have one to many pharyngeal gill slits.

(vi) They are unisexual or some may be hermaphrodite.

e.g. *Balanoglossus, Saccoglossus.*

Q.2.10. Give scientific reasons:

***(1) Though tortoise lives on land as well as in water, it cannot be included in class- Amphibia.**

Ans.

(i) The animals which not only live in water but also on land and respire in both climatic conditions are called Amphibians.

(ii) Tortoise respires through lungs but does not have a structure to respire in water.

(iii) Also, tortoise lays eggs with hard shells which is a characteristic of reptiles.

(iv) Tortoise has a neck, whereas neck is absent in amphibian. Therefore, tortoise is not an amphibian.

***(2) Our body irritates if it comes in contact with a jelly fish.**

Ans.

(i) Jelly fish has tentacles with cnidoblasts around mouth.

(ii) The toxin released from the cnidoblasts comes in contact with the body of a person touching it.

(iii) Due to this, there is an itching effect and irritation.

***(3) All vertebrates are chordates but all chordates are not vertebrates.**

Ans.

(i) In some chordates, the notochord is present only in the tail region of larvae.

(ii) In some other chordates, notochord is present throughout the body length.

(iii) In some chordates, the notochord is replaced by vertebral column.

(iv) Due to this, all chordates do not get classified in the same group.

(v) Hence, all vertebrates are chordates but all chordates are not vertebrates.

***(4) *Balanoglossus* is connecting link between non-chordates and chordates.**

Ans.

(i) *Balanoglossus* belongs to Hemichordata meaning half-chordates.

(ii) The body shows proboscis, collar and trunk.

(iii) Its characteristic features resembles with non-chordates as well as chordates.

(iv) Hence, it is a considered as a connecting link between non-chordates and chordates.

***(5) Body temperature of reptiles is not constant.**

Ans.

(i) Reptiles are cold blooded animals or poikilotherms.

(ii) The body temperature of cold blooded animals changes with the surrounding temperature.

(iii) Reptilians have different habitat which have different temperatures.

(iv) In order to adapt to different situations, the body temperatures of reptiles at different locations differ. Hence, their body temperature is not constant.

(6) Frogs can live on land as well as in water.

Ans.

(i) Frog belongs to class Amphibia.

(ii) Amphibians are adapted to live on land and in water.

(iii) They respire with both lungs and skin.

(iv) When frog is on land it respires through lungs, while in water it respires through skin.

(v) Hence, frogs can live on land as well as in water.

(7) Digestive system is feebly developed in endoparasites.

Ans.

(i) Endoparasites reside in the digestive tract of the host animal.

(ii) Thus, they suck readymade digested food from the host body, which needs no further digestion.

(iii) As there is no need for food to digest, their digestive system is feebly developed.

(8) Birds (Aves) are adpated to aerial mode of life.

Ans.

(i) Birds have spindle shaped body which lowers the air resistance during flight.

(ii) The body is covered with light feathers.

(iii) The bones are hollow, mouth is modified into light beak.

(iv) Forelimbs are modified into wings for flying in air.

(v) There are air sacs which help in flight by increasing the buoyancy.

(vi) Hence, birds are adapted to aerial mode of life.

***(9) Earthworm is called as friend of farmers.**

Ans.

(i) Earthworm feeds on dead and decaying matter from the soil, and digests them.

(ii) Their excreta gets mixed with soil which increases the nitrogen content of the soil and it becomes fertile.

(iii) Earthworms are burrowing animals which make the soil porous and due to this oxygen can reach deeper in the soil, thus soil gets aerated.

(iv) Due to this, fertility and productivity of soil increases, hence, it is called 'Friend of Farmers'.

(3) Poriferans are called sedentary animals. OR Why are Poriferans called sedentary animals?

Ans. (i) The animals belonging to Porifera are always attached to substratum, and hence do not show locomotion. (ii) Therefore, they are referred as sedentary animals.

Q.3.1. Answer the following questions:

***(1) To which phylum does Cockroach belong? Justify your answer with scientific reasons.**

Ans.

(i) A cockroach belongs to phylum 'Arthropoda'.

(ii) A cockroach has joint appendages.

(iii) Body is divided into head, thorax and abdomen.

(iv) Two pairs of wings and three pairs of limbs are present for locomotion.

(v) It is bilaterally symmetrical.

(vi) A Cockroach has a pair of antenna which acts as sense organs.

(vii) It has chitinous exorskeleton.

(2) What do you mean by 'Notochord'? Explain.

Ans.

(i) Notochord is a long rod-like supporting structure present on the dorsal side of animal body.

(ii) It keeps the nerve tissue isolated from the remaining body.

(iii) It provides place for the muscles to attach for ease of movements.

(iv) Animals which do not have notochord are called Non-chordates.

(v) In Hemichordates, notochord is present in proboscis region only.

(vi) In Chordates, notochord is present in the body during any developmental stage.

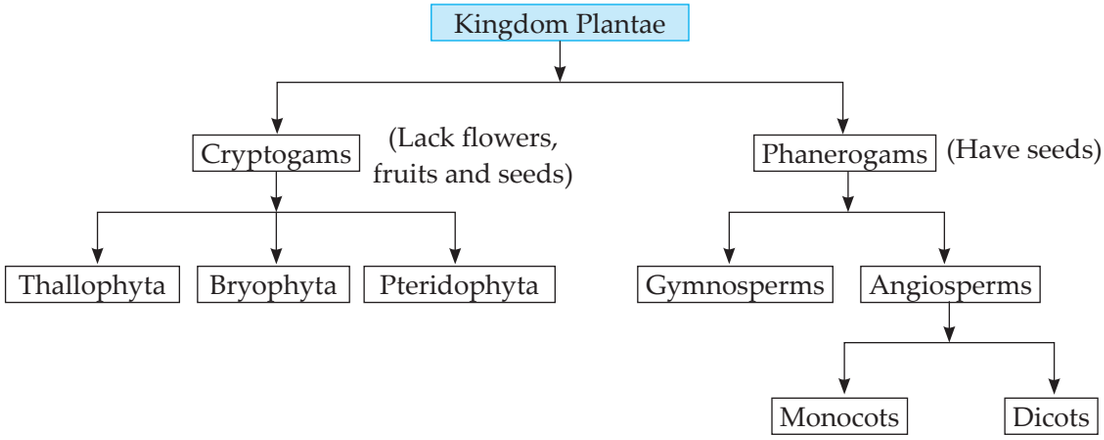
(vii) In Urochordates, it is present only in tail region of larvae.

(viii) In Cephalochordates, notochord is present throughout the body length.

(ix) In Vertebrates, notochord is replaced by vertebral column.

***(3) How are plants classified?** *(Can you recall; Text Book Page no. 61)*

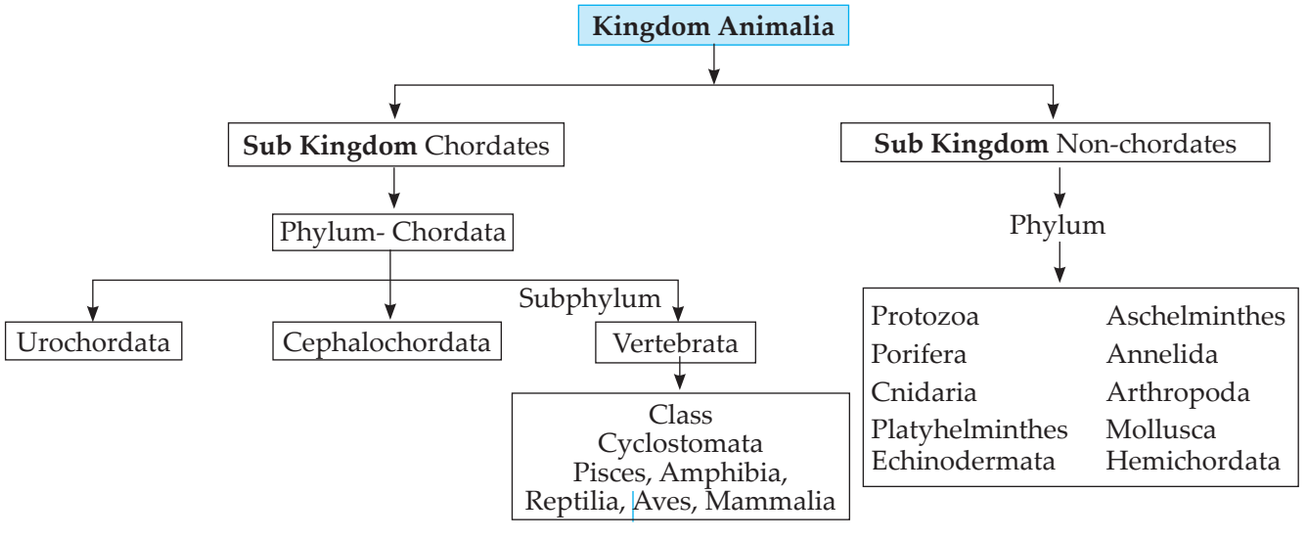
Ans.



Q.3.2. Complete the following flow chart:

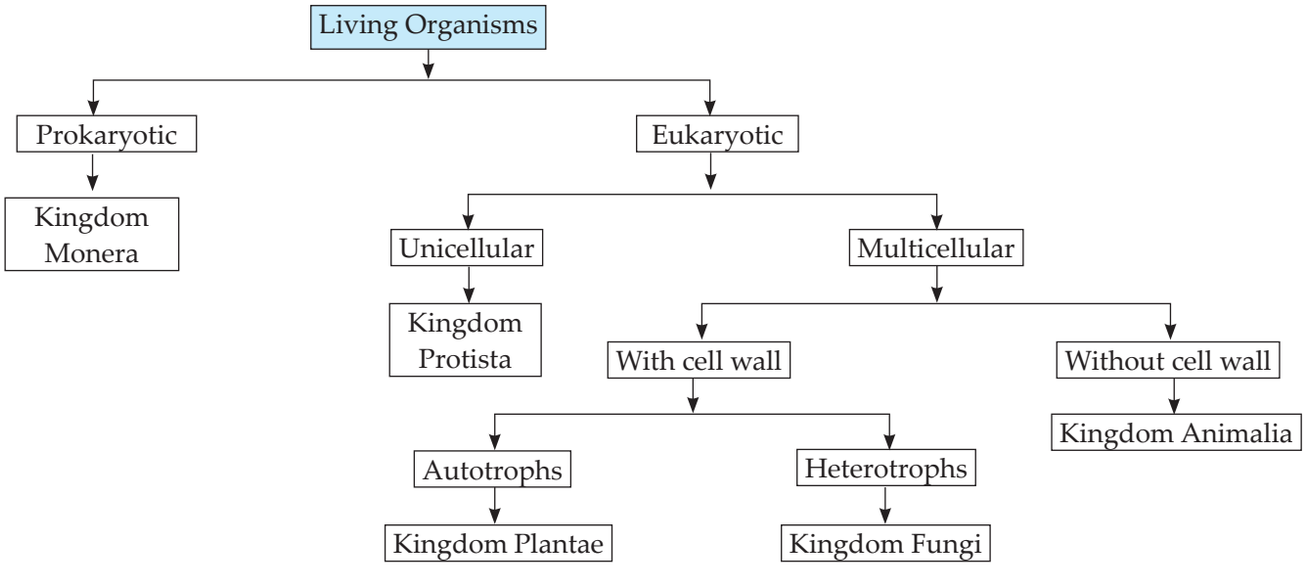
(1) Conventional system of Animal classification.

Ans.

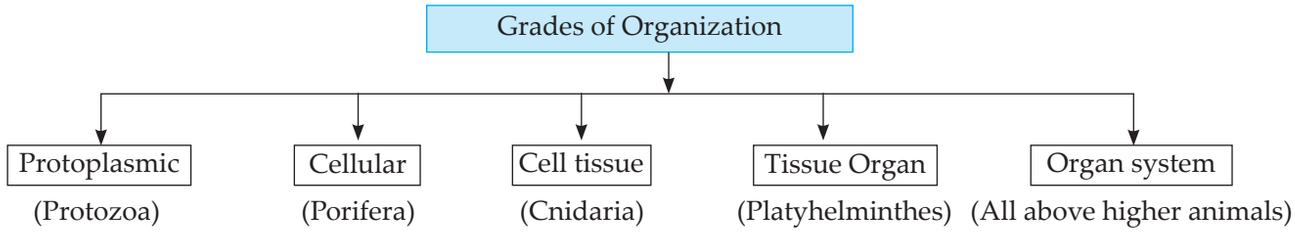


***(2) Complete the chart - Classification of living organisms**

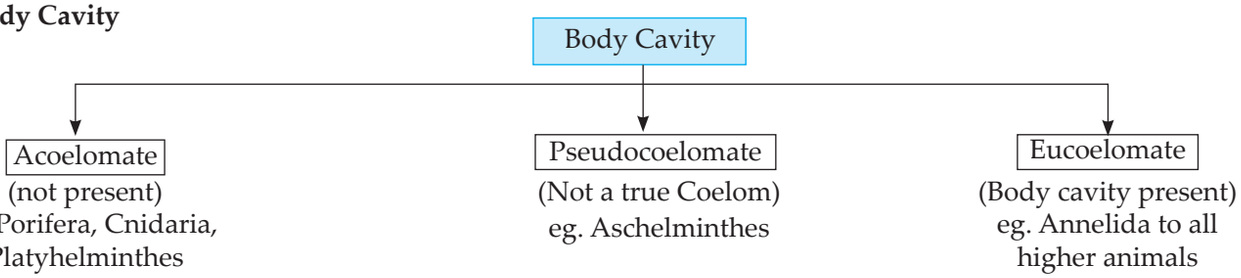
Ans.



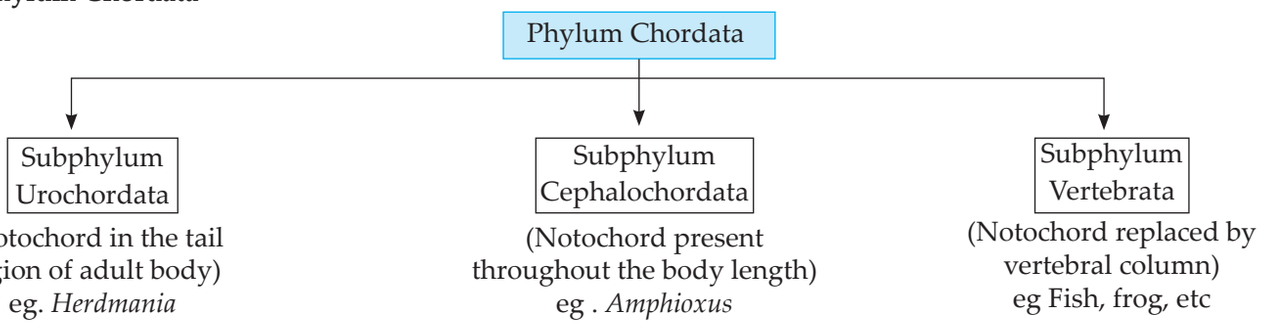
(3)



(4) Body Cavity



(5) Phylum Chordata



Q.3.4. Draw well labelled diagrams and write the classification:

(1) *Hydra

Ans.

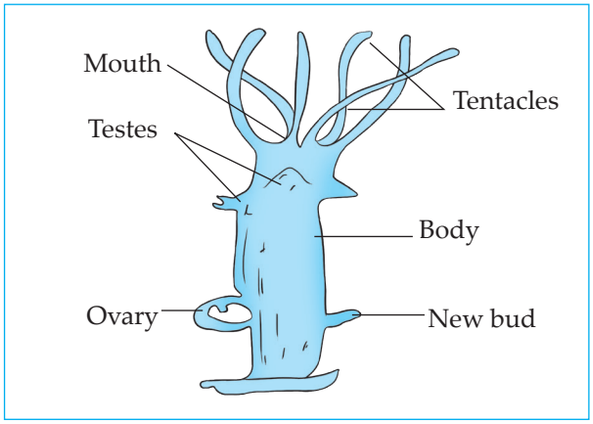


Fig. 6.12. Hydra

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordata
Phylum : Coelenterata

***(2) Jellyfish**

Ans.

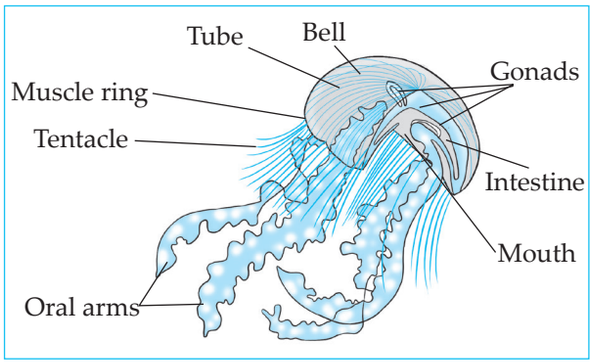


Fig. 6.13. Jellyfish

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordata
Phylum : Coelenterata

(3) *Planaria

Ans.

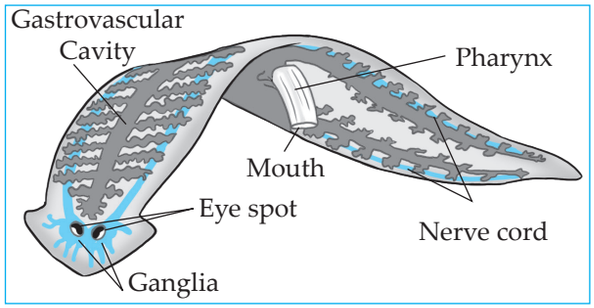


Fig. 6.14. Planaria

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordate
Phylum : Platyhelminthes

***(4) Ascaris (Round worm)**

Ans.

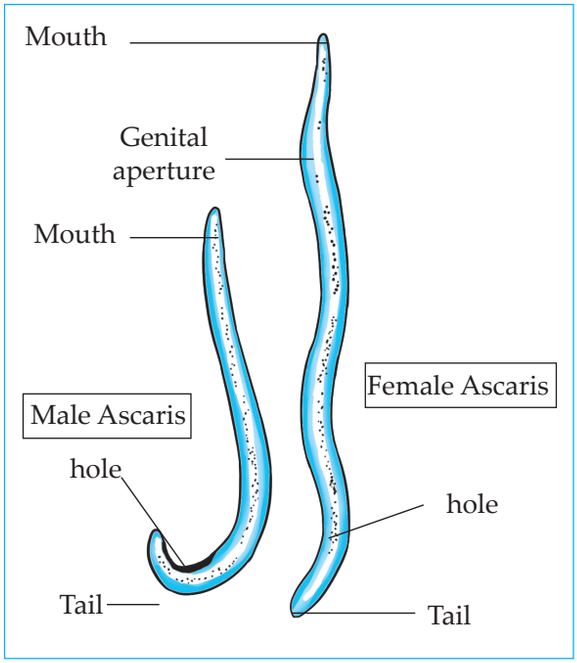


Fig.6.15. Ascaris

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordata
Phylum : Aschelminthes

***(5) Earthworm**

Ans.

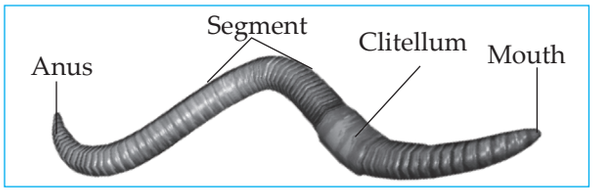


Fig. 6.16. Earthworm

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordata
Phylum : Annelida

***(6) Octopus**

Ans.

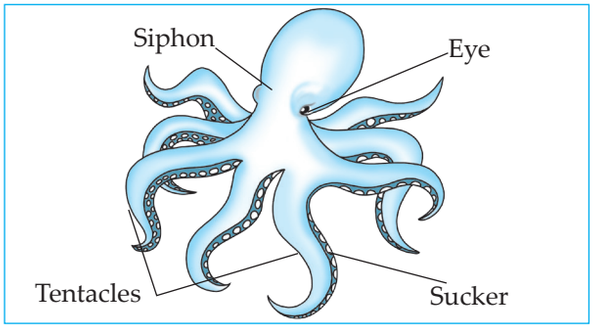


Fig. 6.17. Octopus

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordata
Phylum : Mollusca

(7) Balanoglossus

Ans.

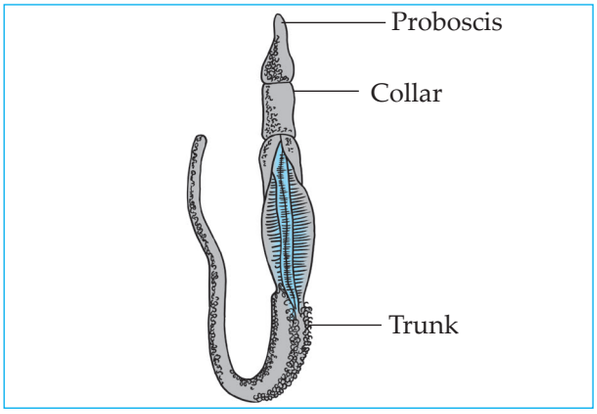


Fig.6.18. Balanoglossus

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordata
Phylum : Hemichordata

***(8) Shark**

Ans.

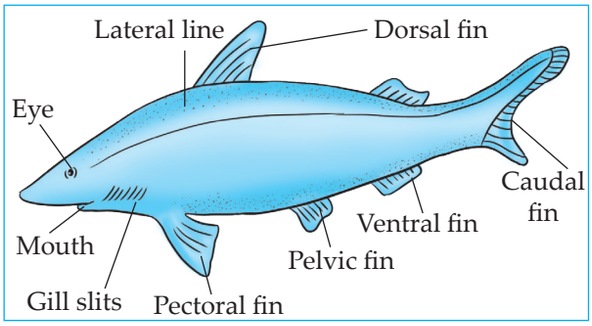


Fig. 6.19. Scoliodon (Dog fish)

Classification:
Kingdom : Animalia
Phylum : Chordata
Sub Phylum : Vertebrata
Class : Pisces

***(9) Frog**

Ans.

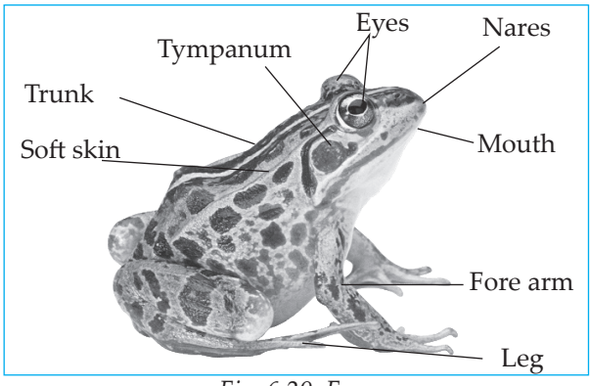


Fig. 6.20. Frog

Classification:
Kingdom : Animalia
Phylum : Chordata
Sub phylum : Vertebrata
Class : Amphibia

***(10) Wall Lizard**

Ans.

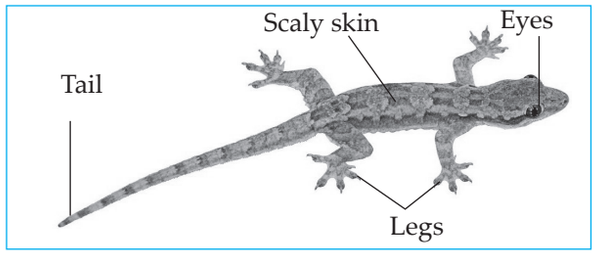


Fig. 6.21. Wall lizard

Classification:
Kingdom : Animalia
Phylum : Chordata
Sub Phylum : Vertebrata
Class : Reptilia

***(11) Pigeon**

Ans.

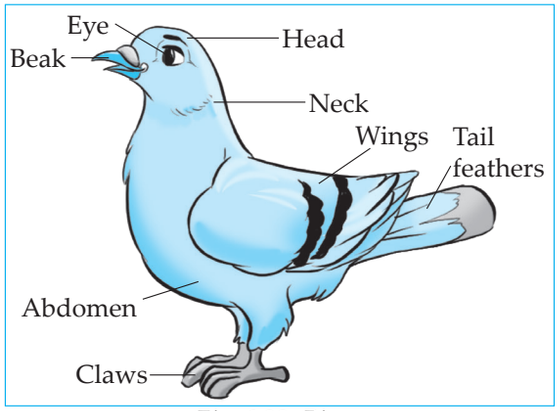


Fig. 6.22. Pigeon

Classification:
Kingdom : Animalia
Phylum : Chordata
Sub Phylum : Vertebrata
Class : Aves

(12) Bat

Ans.

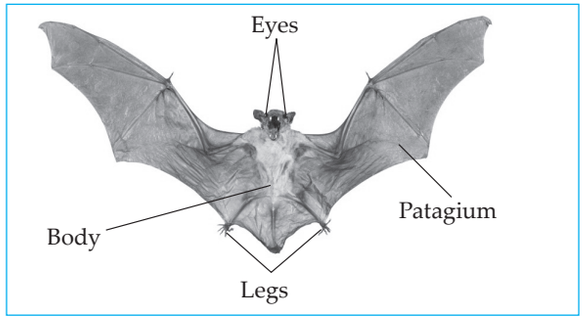


Fig. 6.23. Bat

Classification:
Kingdom : Animalia
Phylum : Chordata
Sub Phylum : Vertebrata
Class : Mammalia

(13) Butterfly

Ans.

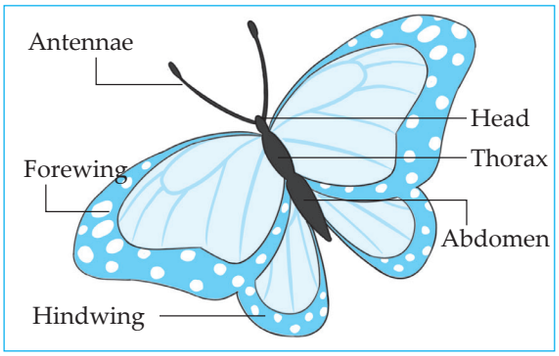


Fig. 6.24. Butterfly

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordata
Phylum : Arthropoda

(14) Starfish

Ans.

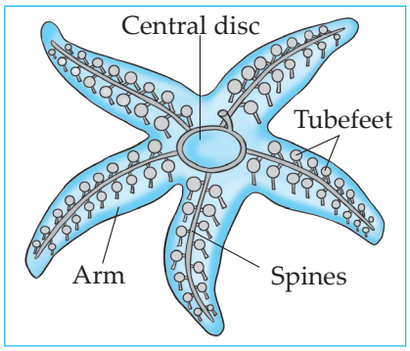


Fig. 6.25. Starfish

Classification:
Kingdom : Animalia
Sub kingdom : Non-chordate
Phylum : Echinodermata

(15) *Sycon*

Ans.

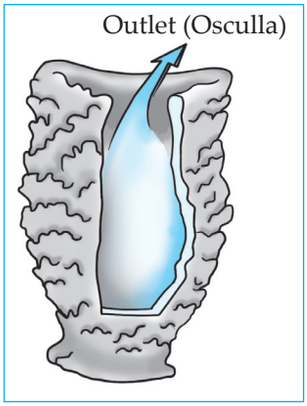


Fig. 6.26. Sycon

Classification:
Kingdom : Animalia
Phylum : Porifera

(16) Liverfluke

Ans.

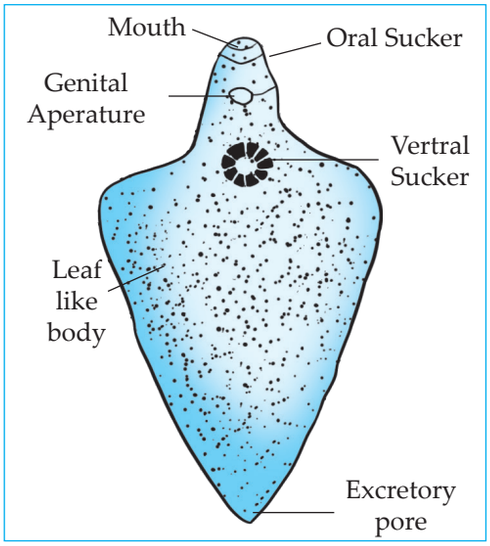


Fig. 6.27. Liverfluke

Classification :
Kingdom : Animalia
Sub kingdom : Non-chordata
Phylum : Echinodermata

Q.4. Answer the following questions in brief:

***(1) Write in brief about progressive changes in animal classification?**

Ans.

(i) There are nearly seven million different species of animals which show a lot of diversity. Hence, it is impossible to study them together.

(ii) Many scientists tried to classify animals into various groups.

(iii) Greek philosopher Aristotle was the first to perform animal classification.

(iv) Aristotle classified animals according to the criteria like body size, habits and habitats. Classification proposed by Aristotle is known as 'Artificial method'.

(v) Besides Aristotle, the 'Artificial method' was followed by Theophrastus, Pliny, John Ray, Linnaeus, etc. Later on 'Natural system of classification' was followed.

(vi) 'Natural system of classification' was based on various criteria like body organization, types of cells, chromosomes, bio-chemical properties etc.

(vii) With time, system of classification based on evolution was also brought into practice. It was used by Dobzhansky and Meyer.

(viii) Recently, Carl Woese has proposed the animal classification. In this way, the classification methods of animals shows progressive changes.

***(2) What is the exact difference between grades of organization and symmetry. Explain with examples.**

Ans.

(i) Grades of organization is the structural organization of animals whereas symmetry is whether the animals body can be divided into equal halves when cut through an imaginary axis.

(ii) In the grades of organization, unicellular organisms have 'Protoplasmic grade organization'.

(iii) In multicellular organisms, there are different grades of organization, namely 'Cellular grade', 'Cell-tissue grade'. In some animals, there is 'Tissue-organ grade organization', while higher animals have organ system grade organization'.

(iv) Examples: 'Protoplasmic grade organization' - *Amoeba*

Cellular grade organization - Porifera

Cell-tissue grade organization - Cnidarians.

Tissue - organ grade organization - Platyhelminthes.

Organ - system grade organization - All higher animals.

(v) Depending upon symmetry, animals are Asymmetrical, Radially symmetrical and Bilaterally symmetrical animals.

(vi) Examples: Asymmetrical - *Amoeba*

Radially symmetrical - Starfish

Bilalateral symmetrical - Cockroach, man.

(vii) Grades of organization is concerned with the structure of animals and this has no relation with symmetry.

***(3) What types of benefit and harm occur to human from animals of phylum Arthropoda?** *(Lets Think; Text Book Page no. 70)*

Ans. Benefits of Arthropoda.

(i) Man eats prawns, lobsters, crabs which are highly proteinaceous and have minerals. It is really a nutritious food. The business of rearing these is profitable.

(ii) Honey bees produce honey and bee wax which have many advantages.

(iii) Silk worms, lac insects supply useful products like silk and lac respectively.

(iv) Many insects bring about pollination which helps in agricultural practices.

Disadvantages of Arthropoda.

(i) Animals like scorpion, honey bee can bite humans which harms the body.

(ii) Insects like mosquito spread malaria, dengue. Bed bugs, lice are ectoparasites and cause various disorders in human body.

***(4) Why has it been said that only insects directly compete with humans for food?**

Ans.

(i) The food that insects derive is concerned with human activities. Stored food grains, pulses etc are easily attacked by insects.

(ii) Cockroach eats almost everything that human can have, hence they struggle to achieve it from human beings.

(iii) Agricultural crops get affected by pests which are insects. Human being uses pesticides which affects the pests and their struggle to get food increases.

(iv) Use of mosquito repellents, fly traps make life of such arthropods difficult.

Hence, it is said that insects directly compete with humans for food.

Characteristics of Non-Chordates						
Phylum	**Habitat**	**Body structure**	**Reproduction**	**Locomotion**	**Special features**	**Examples**
Porifera	Aquatic : Marine/ fresh water	Simplest body plan, Assymmetrical body with many pores on body.	• Asexual reproduction: budding • Sexual reproduction/ Regeneration	Sedentary locomotion (attached to substratum)	• Special cells: • Spongy body supported by spicules spongin fibres: $CaCO_3$ and Silica	*Sycon*, *Euspongia* (Bath sponge) *Hyalonema, Euplectella*
Cnidaria or Coelenterata	Aquatic : Mostly marine/few fresh water	Cylindrical/ umbrella like: Polyp/Medusa	Asexual/sexual	Sedentary free swimming	Cnidoblast bear (stinging cells) tentacles. It is use for capturing prey.	*Hydra*, (Sea anemone) (Portuguese man of war) *Physalia* Jellyfish, Corals, etc.
Platyhelminthes	Free/living/ parasitic/ terrestrial aquatic	Slender, Leaf like flat bodies	Bisexual/sexual animals	Swimming	Flat body is a typical character	*Planaria*, Liver fluke, *Tapeworm*, etc.
Aschelminthes	Endoparasitic free living	Cylindrical, long thread like	Unisexual/sexual animals	Swimming	Non-segmentated bodies with cuticle.	Ascaris (Round worm Filarial worm Loa loa (Eye worm)
Annelida	Free swimming marine, terrestrial , few ectoparasitic	Metameric segmented body cylindrical	Bisexual/sexual animals	Setae, Parapodia and Suckers creeping mode	Special cuticle over body	Earthworm Nereis, Leech.
Arthropoda	Ranging from deepest oceans to highest mountains	Different types of body structures, like hard exoskeleton, eight legged, flying insects, etc.	• Sexual/unisexual animals • Metamorphosis: Egg, à larvae à à pupae à adult	Swimming/creeping	• Largest animal phylum • Chitinous exoskeleton, jointed paired appendages and segmented body.	Crab, prawn, spiders, scorpions. All insects (cockroach, butterfly, ants), Centipede, Millipede.
Mollusca	Marine/fresh water/terrestrial	Soft bodies, Slimy, Some have shells	Unisexual/sexual animals	Swimming/creeping by foot	• Body divisions: Head, foot and visceral mass. • Second largest animal phylum	Oyster, Bivalves, Snail, Octopus, etc.
Echinodermata	Only marine	Skeleton of calcareous spines, radial animals	• Sexual • Good regeneration capacity	• Some sedentary • Some swim • Some creep by tube feet.	Spiny bodies with oral and aboral surfaces.	Star fish, Sea urchin, Brittle star, Sea cucumber
Hemichordata	Only marine	• Proboscis collar and trunk. • Notchord in probosciis	Sexual/Unisexual bisexual animals	Burrowing in sand.	• Connecting link between the nonchordates and chordates • Presence of pharyngeal gill slits.	• *Balanoglossus,* • *Saccoglossus* commonly called *acron* worms.

Characteristics of chordates							
Class	**Habitat**	**Body structure**	**Appendages**	**Mode of respiration**	**Resproduction**	**Temperature Regulation**	**Examples**
Cyclostomata	• Aquatic : Ectoparasite/ marline	• Soft skin, no scales • Jaw less mouth and sucker	• Paired appendages	• Gills	• Oviparous (lays eggs)	• Cold blooded	• Petromyzon, Myxine, etc.
Pisces	• Aquatic: Marine/fresh water	• Exoskeleton: Scales • Endoskeleton: Cartilage/bones • Stream lined body	• Paired and unpaired appendages	• Gills	• Oviparous (lays eggs)	• Cold blooded	• Scoliodon, pomfret, Bombay duck. Sea horse, Electric ray, etc.
Amphibia	• Land and water	• No exoskeleton • Soft and moist skin • Body differentiated into head and trunk	• Two pairs of limbs	• When in water Tadpole/ larvae: gills Adult: Gills • When on and: • lungs	• Metamorphosis: E.g. Larva, adult	• Cold blooded	• Frog, Toad, Salamandar, etc
Reptilia	• Mainly terrestrial, some aquatic	• Skin is dry and scaly • Body differentiated into head, neck and trunk	• Two weak pairs of limbs	• Lungs	• Egg, young, adult	• Warm blooded	• Tortoise, lizard, snake, etc.
Aves	• Terrestrial, some fly	• Exoskeleton in form of feathers • Streamlined body • Body differentiated into head, neck and trunk	• Forelimbs modified into feathers	• Lungs (air sacs)	• Oviparous (lays eggs) • Parental care	• Warm blooded	• Peacock, Parrot, Crow, Duck, Penguin, etc.
Mammalia	• Mainly terrestrial, some aquatic, few aerial	• Exoskeloton in form of hair, fur, wool • Body differentiated into head, neck, torso and tail	• Two pairs of limbs: hands/legs	• Lungs (Diaphragm)	• Majority viviparous, few oviparous (lays eggs)	• Warm blooded	• Kangaroo, Dolphin, Bat, Dog, Human, etc.

❖ ❖ ❖

ASSIGNMENT - 6

Time : 1 hr. **Marks : 20**

Q.1. (A) Answer the following: **(3)**

(1) Fill in the blank :

..... is considered as connecting link between Non-chordates and chordates.

(2) State True or False : Arthropods are hermaphrodites.

(3) Find the odd one out : Bat, Whale, Monkey, Ostrich.

Q.1. (B)Choose and write the correct option: **(2)**

(1) *Amoeba* is a ..... animal.

(a) Symmetrical (b) Bilaterally symmetrical (c) Radially symmetrical (d) Asymmetrical

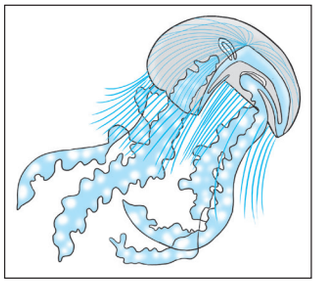
(2) In ....., the fertilization is external.

(a) Frog (b) Bat (c) Snake (d) Parrot

Q.2. (A) Answer the following questions: (Any 2) **(4)**

(1) Distinguish between : Bat and Butterfly

(2) Classify the following:

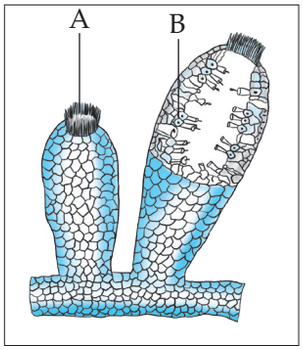


(3) Complete the following table:

	Animal	Organ for locomotion	Example
(1)			Arthropoda
(2)	Pigeon		

Q.3. Answer the following questions: (Any 2) **(6)**

(1)



(1) Identify the animal

(2) Label parts A and B

(3) Write the function of A

(2) Write the characteristic of Penguins with reference to their classification.

(3) Draw a neat labelled diagram of *Hydra.*

Q.4. Answer the following: (Any 1) **(5)**

(1) Write in brief about progressive changes in animal classification.

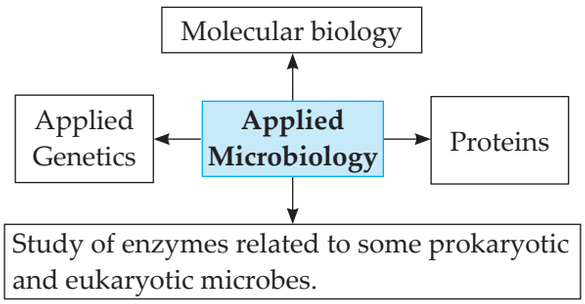
(2) Enlist benefits and harm occuring to humans from animals of Phylum Arthropoda.

❖ ❖ ❖

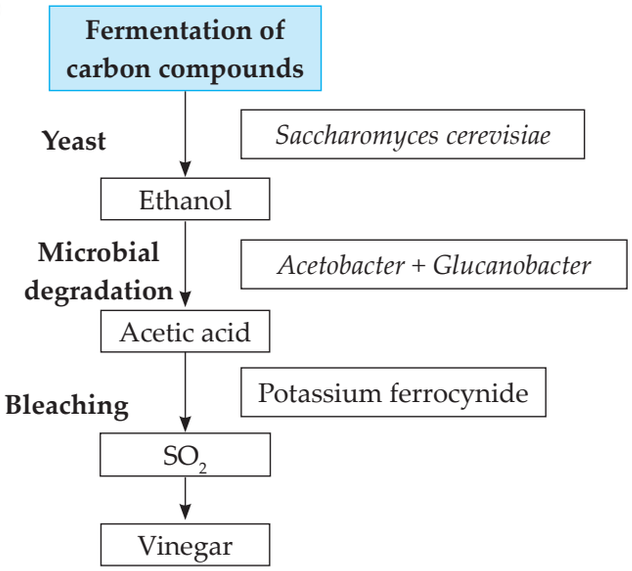
7 Introduction to Microbiology

CONCEPT MAP

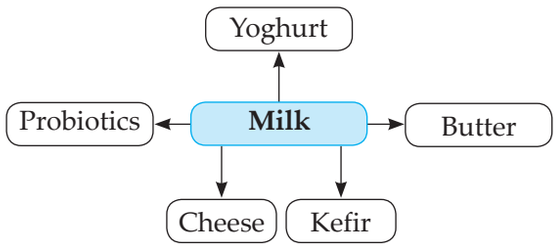
(1)



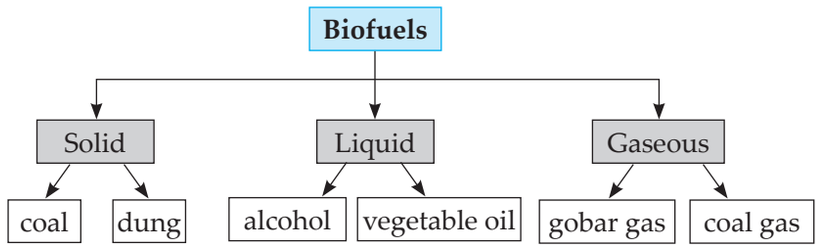
(2)



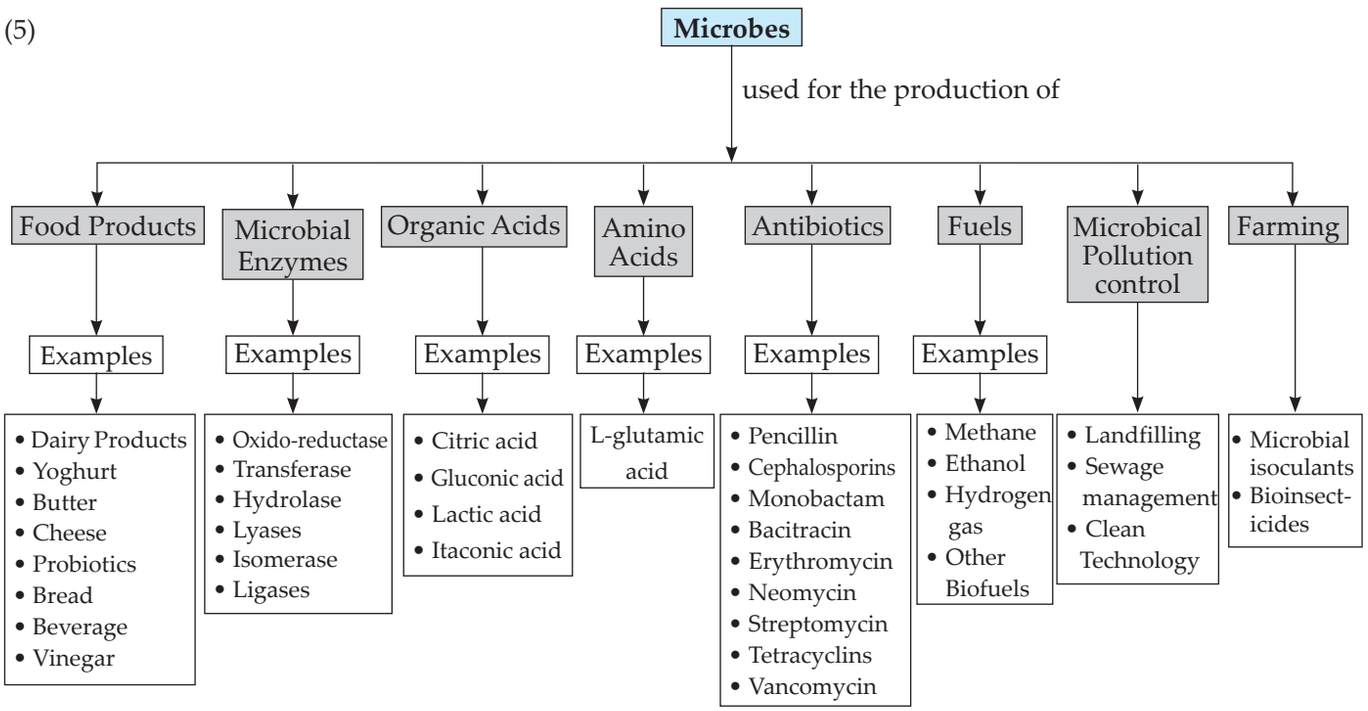
(3)



(4)



(5)



Points to Remember:

- **Applied Microbiology** is a branch of biology which studies the enzymes related to some prokaryotes and eukaryotic microbes, proteins, applied genetics, molecular biology, etc is performed.
- **Industrial Microbiology** - This science is related to commercial use of microbes in which various economic, social and environmental related processes and products are included.
- **Main features of Industrial Microbiology**
  - Various productions with the help of fermentation process. eg. bread, cheese, wine.
    Raw materials for chemicals, enzymes, nutrients, medicines, etc.
  - Use of microbes for garbage management and pollution control.
- **Dairy Products:** Milk is converted into various products for its preservation purposes. eg. cheese, butter, cream, kefir, yoghurt.
- **Microbes** play an important role in disposal of solid waste through biogas plant and compost production.
- **Clean Technology :** Microbes have the natural ability of decomposing the man-made chemicals.
- **Biofuel** is important among the renewable sources of good energy.
- **Microbes** are used for bioremediation of environment.
- **Microbes** in the inoculants help in plant growth by supplying nutrients.
- Some bacteria, fungi and viruses are useful as pesticides.

MASTER KEY QUESTION SET - 7

Q.1. (A) 1. Fill in the blanks and rewrite the completed statements:

(1) Cheese is produced with the help of ..... .

(2) Lactose sugar of the milk is converted into ..... .

(3) Diacetyl has the flavour of ..... .

(4) Yoghurt is a milk product produced with the help of ..... .

(5) Enzyme protease obtained from fungi is used to produce ..... cheese.

(6) Dough rises up due to ..... .

*(7) Chemically vinegar is 4% ..... .

(8) Very small quantity of ..... gas is mixed to produce vinegar.

(9) Rifamycin is effective against ..... .

(10) ..... an alcohol is a clean fuel.

(11) ..... is considered to be the fuel of future.

(12) Phenol oxidizing bacteria decompose the ..... chemicals present in sewage.

(13) ..... , a by-product of fermentation is a biopesticide.

*(14) Salts which can be used as supplement of calcium and iron are obtained from ..... acid.

*(15) Process of ..... of milk proteins occurs due to lactic acid.

*(16) Harmful bacteria like ..... in the intestine are destroyed due to probiotics.

(17) Acetic acid is bleached with the help of .....

(18) ..... imparts thickness to ice-creams.

(19) For maintaining the protein content in yoghurt, ... is mixed with milk.

(20) Shelf life of yoghurt and its probiotic properties can be improved by ..... .

(21) An enzyme ..... obtained from alimentary canal of cattle was traditionally used to produce cheese.

(22) For making bread, the yeast ..... is used.

(23) Mixture of bacterial strains like ..... and ..... is mixed with ethanol for its microbial degradation.

(24) Microbe ..... is used for the production of coffee.

(25) ..... and ..... syrup can be obtained from corn flour by action of enzymes obtained from bacilli and *Streptomyces*.

(26) ..... acid is used in paper, textile, plastic industry and gum production.

(27) ..... acid is used for production of monosodium glutamate (Ajinomoto).

(28) Polysaccharides and glycolipids are used as ..... .

(29) Xylitol and aspartame are used as ..... .

(30) Metals are converted into compounds before leaching with the help of ..... and ..... .

(31) ..... and ..... bacteria are used to clear the oil spills.

(32) Plastic bottles are formed from a chemical substance ..... .

(33) Species like ..... and ..... can decompose PET.

(34) ..... and ..... can control the soil pollution occuring due to acid rain.

(35) ..... convert salts of uranium into insoluble salts.

(36) Solution containing ..... and ..... is used in organic farming.

(37) ..... chemicals are mixed with the soil due to use of chemical pesticides in agriculture.

(38) Bacteria used to clear oil spills are called ..... .

Ans. *(1) Fungi (2) lactic acid (3) butter (4) lactobacilli (5) vegetarian (6) CO_2 (7) acetic acid (8) SO_2 (9) tuberculosis (10) Ethanol (11) Hydrogen gas (12) xenobiotic (13) Spinosad (14) Gluconic acid (15) coagulation (16) clostridium (17) potassium ferrocynide. (18) Xanthan gum. (19) condensed milk powder (20) pasteurization (21) rennet (22) Saccharomyces cerevisiae (23) Acetobacter, Glucanobacter (24) Lactobacillus brevis (25) Glucose, fructose (26) Itaconic acid (27) L-glutamic acid (28) emulsifiers (29) artificial sweetners (30) Thiobacilli, Sulphobacilli (31) Pseudomonas spp. and Alcanovorax borkumensis (32) Polyethylene Terephthalate Polyester (PET) (33) Vibrio, Ideonella sakaiensis. (34) Acidophillum spp., Acidobacillus ferroxidens (35) Geobacter (36) Azotobacter, artificial nitrogenase (37) Fluoroacetamide like (38) Hydrocarbonoclastic bacteria (HCB)*

Q.1. (A) 2. Find the odd word out:

(1) Cheese, kefir, yoghurt, vinegar.

Ans. *Vinegar* - Others are milk products

(2) *Lactobacillus lactis, Lactobacillus delbrueckii, Lactobacillus cremoris, Streptococcus thermophilus.*

Ans. *Lactobacillus delbrueckii* - Others are used in cheese production, whereas *Lactobacillus delbrueckii* is used in yoghurt production.

(3) Cutting, washing, rubbing, scrubbing.

Ans. Scrubbing : This process is not included in cheese production.

(4) *Acidophilus, Bifidobacterium bifidum, Clostridium, Lactobacillus casei.*

Ans. *Clostridium :* Others are useful microbes, whereas *Clostridium* is a harmful microbe.

(5) *Spirulina, Chlorella,* Blue green algae, *Actinomycetes.*

Ans. *Actinomycetes :* Species of fungi - others are probiotic algae.

(6) Chilli sauce, soya sauce, vinegar, monosodium glutamate.

Ans. Chili sauce : Others are formed by microbial fermentation.

(7) Oxidoreductases, tranferases, ligases, papain.

Ans. Papain - Enzyme present in papaya plant whereas others are microbial enzymes.

(8) *Penicillin*, erythromycin, gentamycin, acetic acid.

Ans. Acetic acid - Others are antibiotics.

(9) *Actinomycetes, Streptomyces, Nocardia, Pseudomonas.*

Ans. *Pseudomonas* - HCB bacteria, Others are fungi which decomposes rubber.

(10) Citric acid, Malic acid, Glutamic acid, Lactic acid.

Ans. Glutamic acid - Others are used to impart acidity whereas glutamic acid is used for protein binding.

(11) Beta carotene, lycopene, xanthene, xanthan.

Ans. Xanthan - Others are used as edible colours whereas Xanthan gum is used to impart thickness.

(12) Gentamycin, streptomycin, natamycin, neomycin.

Ans. Natamycin - Others are antibiotics, whereas Natamycin is used as microbial restrictor.

Q.1. (A) 3. Complete the correlation.

(1) *Lactobacilli* : Yogurt production : : *Azotobacter* : ..... .

Ans. Organic farming: Yoghurt is a milk product produced with the help of bacteria *Lactobacilli*, while *Azotobacter* is used in organic farming.

(2) *Ideonella sakaiensis* : PET : : *Actinomycetes* : ..... .

Ans. Rubber: *Ideonella sakaiensis* can decompose PET. Similarly, species of fungi like *Actinomycetes* have the ability of decomposing rubber.

(3) Phenol oxidising bacteria : Sewage :: Hydrocarbonoclastic bacteria : ..... .

Ans. Oil spills: Phenol oxidizing bacteria destroy the Xenobiotic chemicals present in sewage, while Hydrocarbonoclastic bacteria (HCB) destroy pyridines and other chemicals in the oil spills.

(4) Enzyme rennet : Alimentary canal of cattle : : Enzyme protease : .....

Ans. Fungi: Enzyme rennet is obtained from alimentary canal of cattle, whereas enzyme protease is obtained from Fungi.

(5) Probiotic : Diarrhoea : : Antibiotic Rifamycin : .....

Ans. Tuberculosis: Probiotics is used for treatment of diarrhoea, whereas Rifamycin is effective against Tuberculosis.

(6) Flour cereal : Bread : : Sugar molasses : .....

Ans. Ethanol: Flour cereal is used to produce different types of bread, whereas Ethanol is produced by fermentation of sugar molasses.

(7) Dirt removal : Detergents : : Corn flour : .....

Ans. Glucose syrup: Process of dirt removal occurs at low temperature due to mixing of enzymes with detergents, while Glucose syrup can be obtained from corn flour by action of enzymes.

(8) *Pseudomonas spp.* : Oil spills :: *Acidophillum spp.* : .....

Ans. Soil pollution: *Pseudomonas* spp. destroy pyridines and other chemicals in the oil spills, whereas *Acidophillum* spp. control the soil pollution due to acid rain.

(9) Cocoa : Theobroma cacao :: Coffee : .....

Ans. *Caffea arabica:* Cocoa is produced from the fruit *Theobroma cocoa,* whereas coffee is produced from *Caffea arabica.*

(10) Yoghurt : *Lactobacilli delbrueckii* :: coffee : .....

Ans. *Lactobacillus brevis:* Yoghurt is produced with the help of microbe *Lactobacilli,* whereas coffee is produced with the help of microbe *Lactobacillus brevis.*

(11) Gluconic acid : *Aspergillus niger* :: Itaconic acid : .....

Ans. *Aspergillus itaconius:* Gluconic acid is produced with the help of microbe *Aspergillus niger,* while Itaconic acid is produced with the help of microbe *Aspergillus itaconius.*

(12) Polysaccharides : Emulsifiers :: Aspartame : .....

Ans. Artificial sweetner: Polysaccharides obtained by microbial processing is used as emulsifiers, whereas Aspartame is used as Artificial sweetner.

Q.1. (A) 4. Explain the difference in one sentence / one point.

(1) Explain the difference between Applied Microbiology and Industrial Microbiology.

Ans.

(i) In Applied Microbiology, we study enzymes related to some prokaryotic and eukaryotic microbes, proteins, applied genetics and molecular biology.

(ii) In Industrial Microbiology, we study commercial use of microbes in which various economic, social and environment related processes and products are included.

(2) Explain the difference between sweet cream butter and cultured variety of butter.

Ans. Cultured butter is produced by microbes, and sweet cream butter is produced from fresh sweet cream.

Q.1. (A) 5. Match the following:

***(1)**

Column A	Column B
(1) Xylitol	(a) Pigment
(2) Citric acid	(b) To impart sweetness
(3) Lycopene	(c) Microbial restrictor
(4) Nycin	(d) Protein binding emulsifier
	(e) To impart acidity

Ans. *(1 – b), (2 – e), (3 – a), (4 – c)*

(2)

Column A	Column B
(1) Yoghurt	(a) *Lactobacillus lactis*
(2) Bread	(b) *Lactobacillus casei*
(3) Cheese	(c) *Lactobacillus delbrueckii*
(4) Kefir	(d) *Saccharomyces cerevisiae*
	(e) *Aspergillus oryzae*

Ans. *(1 – c), (2 – d), (3 – a), (4 – b)*

(3)

Column A	Column B
(1) Apple	(a) Coffee
(2) Grapes	(b) Cocoa
(3) *Theobroma cacao*	(c) Chocolate
(4) *Caffea arabica*	(d) Wine
	(e) Cider

Ans. *(1 – e), (2 – d), (3 – b), (4 – a)*

(4)

Column A	Column B
(1) *Corynobacterium*	(a) Lactic acid
(2) *Aspergillus niger*	(b) Itaconic acid
(3) *Lactobacillus delbrueckii*	(c) Gluconic acid
(4) *Aspergillus itaconius*	(d) Wine
	(e) L-glulamic acid

Ans. *(1 – e), (2 – c), (3 – a), (4 – b)*

(5) How are the items in group A, B, C interrelated.

A	B	C
(1) Methane fuel	(i) Yeast - *Saccharomyces*	(a) Bio-photolysis of water
(2) Hydrogen fuel	(ii) Microbial anaerobic decomposition	(b) Fermentation of molases
(3) Ethanol fuel	(iii) Photoreduction by bacteria	(c) Urban, agricultural, industrial waste.

Ans. *(1 – ii – c), (2 – iii – a), (3 – i – b)*

(6)

Column A	Column B
(1) Solid fuel	(a) Vegetable oils
(2) Liquid fuel	(b) Gobar gas
(3) Gaseous fuel	(c) Crop residue

Ans. *(1 – c), (2 – a), (3 – b)*

(7)

Column A	Column B
(1) Phenol oxidising bacteria	(a) Prevent leaching of iron, zinc by forming compounds
(2) *Thiobacilli*	(b) Xenobiotic chemicals
(3) *Pseudomonas spp.*	(c) Soil pollution due to acid rain
(4) *Ideonella sakaiensis*	(d) Biopesticide
(5) *Actinomycetes*	(e) Oil spills
(6) *Acidobacillus ferroxidens*	(f) PET
	(g) Rubber

Ans. *(1 – b), (2 – a), (3 – e), (4 – f), (5 – g), (6 – c)*

Q.1. (A) 6. State whether the following statements are True or False. Correct the false statement.

(1) Industrial microbiology uses microbes for garbage management and pollution control.

(2) Various products like food and cosmetics are produced on a large scale with the help of micro-organisms.

(3) Milk is converted into various products for its preservation purpose.

(4) Basic process for production of yoghurt, cheese and cream is different.

(5) Milk is pasteurized at the beginning to destroy unwanted microbes.

(6) Bacterial strains of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* are added to warm temperature milk in 2:1 proportion.

(7) Cheese is produced on large scale from abundantly available cow milk all over the world.

(8) Whey is separated from yoghurt in the production of cheese.

(9) Enzyme protease obtained from fungi is used to produce vegetarian cheese.

(10) Useful microbes become inactive due to antibiotics, probiotics make them active again.

(11) Ajinomoto, a popular chinese food is produced by microbial fermentation.

(12) Probiotics are used for treatment of cough and cold.

(13) Microbial enzymes are inactive at low temperature.

(14) Bio-fuel is among non-renewable source of good energy.

(15) In villages, domestic sewage is disposed off in nearby soil.

(16) Soyabean sauce is produced with the help of fungus *Aspergillus niger.*

(17) Mozzarella cheese is very hard cheese.

(18) On storing for 3 to 12 months, very hard cheese called Parmesan cheese is formed.

(19) Antibiotics maintain the balance of intestinal microorganisms.

(20) Nowadays, probiotics are used for treatment of diarrhoea and treatment of poultry.

(21) Acetic acid is bleached with the help of potassium permanganate.

(22) L-glutamic acid is used for production of monosodium glutamate (Ajinomoto).

(23) Microbes are used for bioremediation of environment polluted due to sewage.

(24) Bacteria used to clear oil spills are called phenol oxidising bacteria.

Ans. *(1) True (2) False. Various products like food and medicines are produced on a large scale with the help of micro-organisms. (3) True (4) False. Basic process for production of yoghurt, cheese and cream is same. (5) True (6) False. Bacterial strains of Streptococcus thermophilus and Lactobacillus delbrueckii are added to warm temperature milk in 1 : 1 proportion. (7) True (8) True (9) True (10) True (11) True (12) False. Probiotics are used in the treatment of diarrhea. (13) False. Microbial enzymes are active at low temperature. (14) False. Bio-fuel is among renewable source of good energy. (15) True (16) False. Soyabean sauce is produced with the help*

of fungus Aspergillus oryzae. (17) False. Mozarella cheese is soft cheese. (18) False. On storing for 3 to 12 months, semi-hard cheddar cheese is formed. (19) False. Probiotics maintain the balance of intestinal microorganisms. (20) True (21) False. Acetic acid is bleached with the help of potassium ferrocynide. (22) True (23) True (24) False: Bacteria used to clear oil spills are called Hydrocarbonoclastic bacteria (HCB).

Q.1. (A) 7. Name the following

(1) Fermented food items

Ans. Bread, Cheese, Yoghurt

(2) Acid present in Yoghurt

Ans. Lactic acid

(3) Sugar present in milk

Ans. Lactose

(4) Dairy product produced with the help of fungi

Ans. Cheese

(5) Bacterial strains which convert milk to Yoghurt.

Ans. *Streptococcus thermophilus, Lactobacillus delbrueckii*

(6) Water in Yoghurt

Ans. Whey

(7) Microbes used in production of cheese.

Ans. *Lactobacillus lactis, Lactobacillus cremoris, Streptococcus thermophilus*

(8) Enzyme from which vegetarian cheese is produced

Ans. Enzyme protease

(9) Steps for process of cheese production.

Ans. Cutting, washing, rubbing, salting, mixing, ripening.

(10) Yeast used in commercial bakery industry.

Ans. Compressed yeast

(11) Ingredients of popular chinese food produced by microbial fermentation.

Ans. Vinegar, soya sauce, monosodium glutamate

(12) Chemical used to impart sour taste and to preserve.

Ans. Vinegar

(13) Alcohol obtained by fermentation of carbon compounds.

Ans. Ethanol

(14) Yeast used for production of Ethanol.

Ans. *Saccharomyces cerevisiae*

(15) Bacterial strains added to ethanol to produce *acetic acid.*

Ans. Acetobacter and *Glucanobacter*

(16) Fungus used in production of soya sauce.

Ans. *Aspergillus oryzae*

(17) Microbial enzymes.

Ans. Oxidoreductases, transferases, hydrolases, lyases, isomerases, ligases, etc.

(18) Industries in which microbial enzymes are used.

Ans. Cheese, plant extracts, textile, leather, paper

(19) Microbe acting on fruit apple and grapes.

Ans. *Saccharomyces cerevisiae*

(20) Microbe acting on fruit *Theobroma cacao.*

Ans. *Candida, Hansenula, Pichia, Saccharomyces*

(21) Microbe acting on fruit *Caffea arabica*.

Ans. *Lactobacillus brevis*

(22) Amino acid obtained from *Aspergillus itaconius*

Ans. Itaconic acid

(23) Amino acid obtained from *Lactobacillus delbrueckii.*

Ans. Lactic acid

(24) Amino acid obtained from Aspergillus niger.

Ans. Citric acid and Gluconic acid

(25) Amino acid obtained from Brevibacterium, Corynobacterium

Ans. L-glutamic acid

(26) Substances which impart acidity.

Ans. Citric, Malic and Lactic acid

(27) Substances which help in protein binding.

Ans. Glutamic acid, Lysine, Tryptophan

(28) Substances which are microbial restrictors.

Ans. Nycin and natamycin

(29) Substances which are antioxidants and vitamins.

Ans. Ascorbic acid (Vit. C), B_{12}, B_2

(30) Substances which are edible colours.

Ans. Beta carotene, lycopene, xanthenes, lutein

(31) Substances which are used as emulsifiers.

Ans. Polysaccharides, glycolipids

(32) Substances which are artificial sweeteners (low calorie)

Ans. Xylitol, aspartame

(33) Substances which are used as essence.

Ans. Vanillin, Ethyl butyrate (fruit flavour), peppermint flavour, essence of various fruits and flowers.

(34) Antibiotics obtained from various strains of gram positive and gram negative bacteria.

Ans. Penicillin, cephalosporins, monobactam, bacitricin, erthromycin, gentamycin, neomycin, streptomycin, tetracylin, vancomycin, etc.

(35) Solid Bio-fuel

Ans. Coal, dung, crop-residue

(36) Liquid Bio-fuel

Ans. Vegetable oils, alcohol

(37) Gaseous Bio-fuel

Ans. Gobar gas, coal gas

(38) Antibiotic effective against tuberculosis.

Ans. Rifamycin

(39) Metals which leach into the environment from low quality metalloids.

Ans. Copper, iron, uranium, zinc

(40) Hydrocarbonoclastic bacteria (HCB)

Ans. *Pseudomonas spp, Alcanovorax borkumensis*

(41) Chemical substance from which plastic bottles are made.

Ans. PET - Polyethylene Terephthalate Polyester

(42) Species of bacteria which decompose PET.

Ans. *Vibrio, Ideonella sakiensis*

(43) Species of fungi which decompose rubber from garbage

Ans. *Actinomycetes, Streptomyces, Nocardia, Actinoplanes.*

(44) A biopesticide

Ans. Spinosad

(45) Bacteria which use sulphuric acid as a source of energy.

Ans. *Acidophillium spp; Acidobacillus ferroxidens*

Q.1 (B) Choose and write the correct option.

(1) Milk is ..... at the beginning to destroy unwanted microbes.

(a) heated (b) cooled
(c) pasteurized (d) powdered

(2) Very hard ..... cheese is formed after ripening for 12 - 18 months.

(a) mozzarella (b) cheddar
(c) parmesan (d) cottage

(3) Most appropriate method of disposal of dry waste is ..... .

(a) sanitary landfill (b) composting
(c) incineration (d) recycling

(4) ..... bacteria present in Root nodules of leguminous plants help in nitrogen fixation.

(a) *Rhizobium* (b) *Azotobacter*
(c) *Geobacter* (d) *Pseudomonas*

(5) Substance prepared by using yeast is ..... .

(a) bread (b) honey
(c) butter (d) yoghurt

(6) Yeast reproduces by..... method of asexual reproduction.

(a) spores (b) budding
(c) binary fission (d) vegetative reproduction

Ans. *(1) (c) pasteurized (2) (c) parmesan (3) (d) recycling (4) (a) Rhizobium (5) (a) bread (6) (b) budding*

Q.2.1. Define the following terms:

(1) Applied microbiology.

Ans. Branch of biology in which study of enzymes related to some prokaryotes and eukaryotic microbes, proteins, applied genetics, molecular biology is performed is called as applied microbiology.

(2) Industrial microbiology.

Ans. Science related to commercial use of microbes in which various economic, social and environment related processes and products are included is called industrial microbiology..

Q.2.2. Answer the following one or two Sentence:

***(1) What for Probiotic food is famous?** *(Can you tell; Textbook Page no. 79)*

Ans. Probiotic food is famous for maintaining the balance of intestinal microorganisms, i.e. increasing the population of microbes helping in digestion and decreasing the population of harmful microbes like *Clostridium*.

***(2) In the earlier class, you had prepared the solution of dry yeast for observation of Yeast. Which substance is prepared by its use on commercial basis?** *(Use your brain power; Textbook Page no. 79)*

Ans. It is used to prepare bread and vinegar.

***(3) Which functions are performed by enzymes secreted in human digestive system? Give names of such enzymes.** *(Can you tell; Textbook Page no. 80)*

Ans.

(i) Enzymes secreted in the digestive system perform the function of digestion.

(ii) Enzyme Protease digests proteins. Enzyme

Amylase digests carbohydrates. Enzyme Lipase digests fats.

***(4) Food materials like cold drinks, ice-creams, juices are available in various colours and flavours. Whether these colours and flavours are really derived from fruits?** *(Use your brain power; Textbook Page no. 81)*

Ans.

(i) Colours and flavours are derived from fruits, vegetables, plants, minerals etc.

(ii) Some colours are natural. Some colours are artificial.

***(5) Which different materials are decomposed in a bio-gas plant?** *(Can you tell; Textbook Page no. 82)*

Ans. Agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste are decomposed in a bio-gas plant.

***(6) Which useful materials are obtained through it? Which is the fuel out of those?** *(Can you tell; Textbook Page no. 82)*

Ans. Methane (CH_4), carbon dioxide (CO_2) and may have small amount of hydrogen sulphide (H_2S), moisture. Slurry is also obtained from the biogas plant. Methane is the fuel out of those.

***(7) Decomposition occurs through which organisms?** *(Can you tell; Textbook Page no. 82)*

Ans. Decomposition occurs through bacteria and fungi.

***(8) Why it is asked to segregate wet and dry waste in each home?** *(Let's think; Textbook Page no. 83)*

Ans. Waste has to be segregated as dry and wet garbage at homes because dry garbage can be given to recycling units and wet garbage can be converted into compost.

***(9) What is done with the segregated waste?** *(Let's think; Textbook Page no. 83)*

Ans. Dry waste is recycled, wet waste is headed to landfills.

***(10) Which is the most appropriate method of disposal of dry waste?** *(Let's think; Textbook Page no. 83)*

Ans.

(i) The most appropriate method of disposal of dry waste is recycling. Segregate the dry waste itself. Separate the commodities.

(ii) Commodities like glass, metals, plastic can be recycled as it becomes commercial/industrial dry waste.

***(11) How the bacteria present in soil and root nodules of leguminous plants are useful?** *(Can you tell; Textbook Page no. 85)*

Ans. *Rhizobium* Bacteria present in soil and root nodules of leguminous plants fix atmospheric nitrogen and convert into nitrites and nitrates and make it available to plants.

***(12) Which plants are cultivated to obtain the fuel?**

Ans.

(i) Crops cultivated to obtain fuel are corn, sugarcane, wheat, soya beans, beet, Jatropha, etc.

(ii) These are the main sources for the most common types of biofuels today.

***(13) Which fuels are obtained from biomass?**

Ans. Fuels obtained from biomass:

(i) Solid fuels : Coal, dung, crop residue

(ii) Liquid fuels : Vegetable oils, alcohol

(iii) Gaseous fuels: Gobar gas, coal gas.

***(14) Which materials should not be present in garbage for its proper microbial decomposition?**

Ans.

(i) Presence of synthetic polymers and insecticides will badly affect the microbial decomposition.

(ii) Toxic levels of elements (Aluminium, Manganese, Boron, Selenium and chlorine, excessive soluble salts and organic phylotoxins) in plant materials affect decomposition of garbage.

Q.2.3. Write short notes on:

(1) Industrial microbiology.

Ans. This science is related to commercial use of microbes in which various economic, social and environment related processes and products are included. Various microbial processes useful for this purpose are carried out, like:

(i) Various productions with the help of fermentation process e.g. bread, cheese, wine, medicines, enzymes, chemicals, etc.

(ii) Use of microbes for garbage management and pollution control.

(2) Dairy products.

Ans.

(i) Since ancient days, milk is converted into various products for its preservation.

(ii) Water content and acidity of the milk changes during formation of these products and texture, taste and flavour is improved.

(iii) Bacteria in milk is used for most milk products. Milk is pasteurized at the beginning to destroy unwanted microbes.

(iv) These processes are performed on a large scale with more skill.

(v) Milk is fermented with the help of *lactobacilli*. Lactose sugar of the milk is converted into lactic acid.

(vi) Milk proteins are coagulated with the help of lactic acid.

(vii) Compounds with taste and flavour are also formed. e.g. Diacetyl has the flavour of butter.

(3) Probiotics.

Ans.

(i) Probiotic products are available in various forms like yoghurt, kefir, sauerkraut (pickle of cabbage), dark chocolate, miso soup, pickles, oils, corn syrup, artificial sweeteners, micro-algae (sea food like spirulina, chlorella, blue green algae, etc.)

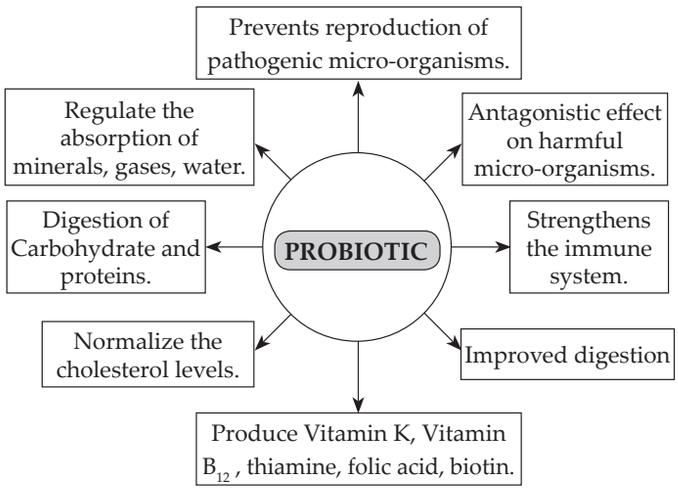
(ii) These products contain active bacteria which increase the population of useful microbes, helping in digestion and decrease the population of harmful microbes.

(iii) These products form the colonies of useful microbes in alimentary canal and control other microbes and other metabolic activities, improve resistance and lower the ill-effects of harmful substances formed during metabolic activities.

(iv) Useful microbes become inactive due to antibiotics. Probiotics make them active again.

(v) Nowadays probiotics are used for treatment of diarrhoea and treatment of poultry also.

FUNCTIONS OF PROBIOTICS



(4) Yoghurt.

Ans.

(i) Yoghurt is a milk product produced with the help of *Lactobacilli*.

(ii) Condensed milk powder is mixed with milk to be fermented for maintaining the protein content for industrial production of yoghurt.

(iii) Milk is boiled and once it cools to warm temperature, bacterial strains of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* are added in 1 : 1 proportion.

(iv) Lactic acid formed due to *Streptococcus* makes the proteins to gel out and gives dense consistency to the yoghurt.

(v) Acetaldehyde like compounds which are formed due to *Lactobacilli* give characteristic taste to Yoghurt.

(vi) Shelf life of Yoghurt and its probiotic properties can be improved by pasteurization.

(6) Vinegar Production.

Ans.

(i) Vinegar is used in each country of the world to impart sour taste to food materials.

(ii) It is also used for preservation of pickles, sauce, ketch-up, chutneys, etc.

(iii) Chemically, vinegar is 4% acetic acid (CH_3COOH).

(iv) Ethanol is obtained by the fermentation of carbon compounds like fruit juices, maple syrup, sugar molasses, starch of roots by yeast *Saccharomyces cerevisiae*.

(v) Microbial degradation of ethanol by mixture of bacterial strains - *Acetobacter* and *Glucanobacter* takes place.

(vi) Acetic acid and other by-products are obtained through it.

(vii) Acetic acid is separated from mixture by rarefaction.

(viii) Acetic acid is bleached with the help of potassium ferrocynide, and is then pasteurized.

(ix) A very small quantity of SO_2 gas is mixed to produce vinegar.

(7) Microbial enzymes.

Ans.

(i) Microbial enzymes have replaced chemical catalysts in chemical industry. These enzymes are active at low temperature, pH and pressure; due to which energy is saved and erosion-proof instruments are also not necessary.

(ii) Enzymes carry out specific processes, hence unnecessary by-products are not formed due to which expenses on purification are minimised.

(iii) In case of microbial enzymatic reactions,

elimination and decomposition of waste material is avoided and enzymes can be reused. Therefore, enzymes are eco-friendly.

(iv) Oxidoreductases, transferases, hydrolases, lyases, isomerases, ligases, etc. are microbial enzymes.

(v) Enzymes are mixed with detergents for removal of dirt at low temperature.

(vi) Glucose and fructose syrup can be obtained from corn flour by action of enzymes obtained from bacilli and *Streptomyces*.

(vii) Microbial enzymes are used in various industries like cheese, plant extracts, textile, leather, paper, etc.

(8) Xanthan gum.

Ans.

(i) Xanthan gum is obtained by fermentation of starch and molasses with the help of *Xanthomonas* species.

(ii) It is variously useful due to properties like solubility in hot and cold water, high density, etc.

(iii) It is used in production of pigments, fertilizers weedicides, textile pigments, tooth pastes, high quality paper.

(iv) It imparts thickness to ice-creams, puddings, chocolates, milk shakes, chocolate drinks, instant soups, etc.

(9) Antibiotics.

Ans.

(i) Antibiotics are medicines obtained from bacteria and fungi.

(ii) They are used to control human and animal diseases.

(iii) Antibiotics like penicillin, cephalosporins, erythromycin, gentamycin, neomycin, tetracyclins, etc. are used against various strains of gram positive and gram negative bacteria.

(iv) Example: Rifamycin is effective against tuberculosis.

(10) Land-filling sites.

Ans.

(i) Composting is one of the best methods to dispose off degradable waste accumulated in urban areas.

(ii) Large pits are dug in open spaces far away from the residential area.

(iii) Pits are lined with plastic sheet/liner to avoid leaching of toxic and harmful materials which pollute the soil.

(iv) Compressed waste is dumped in the pit.

(v) It is covered with layers of soil, saw dust, leafy waste and specific biochemicals.

(vi) Bioreactors are mixed at some places.

(vii) Microbes present in the soil and other top layers decompose the waste.

(viii) Completely filled pit is sealed with soil slurry.

(ix) Best quality compost is formed after few days. Land filling sites can be reused after removal of compost.

(11) Sewage Management.

Ans.

(i) In villages, domestic sewage is disposed off either in nearby soil or in biogas plant.

(ii) In cities sewage is carried to processing unit for microbial action.

(iii) Microbes are mixed with sewage to decompose compounds as well as pathogens.

(iv) They release Methane and CO_2 by decomposition of carbon compounds present in sewage.

(v) Phenol oxidising bacteria decompose the xenobiotic chemicals present in sewage.

(vi) The sludge that settles down in this process can again be used as fertilizer.

(vii) Water released after microbial treatment is environmentally safe.

(viii) Microbes are used for bioremediation of environment polluted due to sewage.

(12) Clean Technology.

Ans.

(i) Human being has made a very fast progress in technology.

(ii) However, environmental pollution is also increasing with the same speed.

(iii) Microbes have the natural ability of decomposing the manmade chemicals.

(iv) Hydrocarbons and some other chemical are transformed with the help of these abilities.

(v) Some microbes remove sulphur from the fuels.

(vi) Metals like copper, iron, uranium, zinc etc. leach into the environment from low quality metalloids. These are converted into compounds before leaching with the help of *Thiobacilli* and *Sulphobacilli*.

(13) Microbial Inoculants.

Ans.

(i) Microbes-containing inoculants are produced by process of fermentation.

(ii) Innoculants are sprayed on seeds before sowing

(iii) Some innoculants are released into plants.

(iv) Microbes in the innoculants help in plant growth by supplying nutrients.

(v) They improve the quality of vegetarian food. Solution containing *Azotobacter* and artificial nitrogenase is used in organic farming.

(vi) This solution prevents soil pollution due to chemical fertilizers.

(vii) Fluroacetamide-like chemicals are mixed with the soil due to use of chemical pesticides in agriculture. These are harmful to other plants and animals as well as cause skin diseases to humans.

(viii) These pesticides in the soil can be destroyed with the help of microbial inoculants.

(14) Bioinsecticides.

Ans.

(i) Bacterial and fungal toxins which can destroy pests and pathogens can be directly integrated into plants with the help of biotechnology.

(ii) Insects do not consume such plants, as they are toxic to insects.

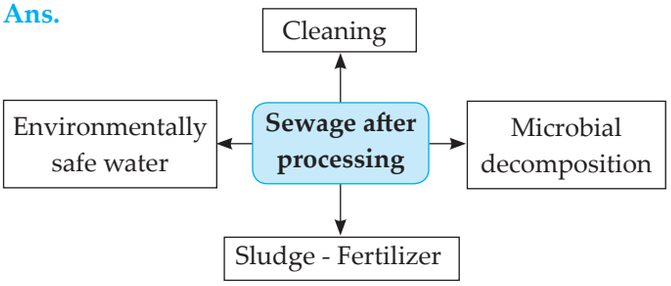
(iii) Similar to bacteria, some species of fungi and viruses are useful as pesticides.

(iv) Spinosad, a by-product of fermentation is a biopesticide.

Q.2.4. Complete the following concept maps:

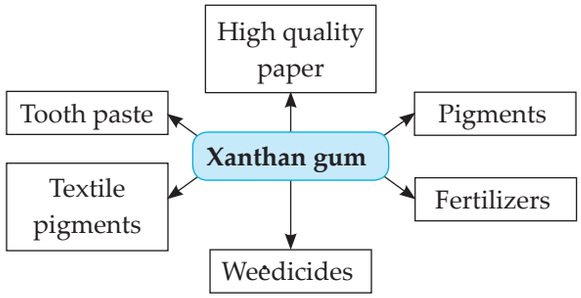
***(1) Complete the following conceptual picture.**

Ans.



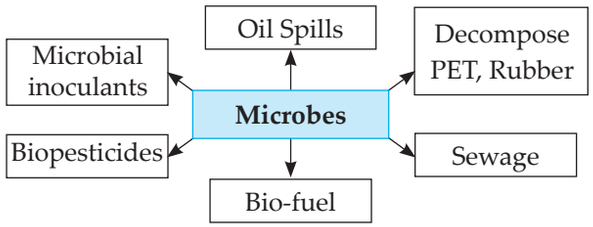
***(2) Complete the following conceptual picture with respect to uses.**

Ans.



***(3) Complete the following conceptual picture related to environment management.**

Ans.



Q.2.5 Distinguish between:

(1) Yoghurt and Cheese

Ans.

Yoghurt	Cheese
(i) Milk product produced with the help of *Streptococcus thermophilus, Lactobacillus delbrueckii*	(i) Milk product produced with the help of *Lactobacillus lactis, Lactobacillus cremoris Streptococcus thermophilus*.
(ii) Only bacterial fermentation is required.	(ii) Bacterial and fungi both microbes are required.

(2) Chemical catalyst and Microbial enzymes

Ans.

Chemical catalyst	Microbial enzymes
(i) Catalysts are active at high temperature, pressure.	(i) Enzymes are active at low temperature, pH pressure.
(ii) Large amount of energy is required.	(ii) Energy is saved and erosion proof instruments are also not necessary.

Q.2.6. Give scientific reasons:

(1) Milk is pasteurized at the beginning.

Ans.

(i) Milk is converted into various products for its preservation purpose.

(ii) Milk is pasteurized at the beginning to destroy unwanted microbes.

(2) Whey is removed during cheese production.

Ans.

(i) Whey (water in yoghurt) is removed during cheese production to impart dense texture to cheese.

***(3) Microbial enzymes are used instead of chemical catalysts in chemical industry.**

Ans.

(i) Microbial enzymes are active at low temperature, pH and pressure, due to which energy is saved and erosion - proof instruments are also not necessary.

(ii) Enzymes carry out specific processes, hence unnecessary by-products are not formed due which expenses on purification are minimised.

(iii) Elimination and decomposition of waste materials is avoided and enzymes can be reused. Such enzymes are eco-friendly.

(iv) Therefore microbial enzymes are used instead of chemical catalysts in chemical industry.

***(4) Enzymes obtained by microbial process are mixed with detergents.**

Ans.

(i) Enzymes obtained by microbial process are active at low temperature, pH and pressure.

(ii) Hence enzymes mixed with detergents help in process of dirt/muck removal even at low temperature.

***(5) Use of mutant strains has been increased in industrial microbiology.**

Ans.

(i) Use of microbes to obtain a product which is cheaper is now a trend is industrial Microbiology. Mutant strains are genetically improved strains which give higher yields and therefore decrease the cost of the products.

(ii) Mutant strains are formed by alterations of nucleotides is DNA of micro organisms to suit the needs of the industry.

(iii) Mutant strains are used for producing virus resistant bacterial strains are used in Dairy industry (milk products) so as to avoid the unwanted bacteria and virues attacking and out membering the original ones.

(iv) In alcohol industry mutant strains improve the flavour and quality of wine or beer.

Q.3.1. Question based on any incident:

(1) Priya's mother has left for office, asking her to set curds for the meals, suggest ways in which Priya will set curds.

Ans.

(i) Priya will take some milk in a bowl.

(ii) Heat the milk and allow it to cool.

(iii) To the warm milk spoonful of curd is added. and stirred.

(iv) It is allowed to stand for sometime i.e. 5-6 hrs to get fresh curd.

(v) The fresh curd is moved to the refrigerator.

(2) Suresh is down with diarrhoea. Suggest food that can help him with his stomach trouble.

Ans.

(i) Suresh can eat fresh yoghurt.

(ii) It is a probiotic which contains active bacteria. e.g. *Lactobacillus*.

(iii) These microbes maintain the balance of intestinal microorganisms.

(iv) They increase the population of microbes helping the digestion and decrease the population of harmful microorganisms e.g. *Clostridium*.

(3) Swati was suffering with Tuberculosis. She was advised a course on antibiotics. Suggest methods by which swati can improve her health by her food.

Ans.

(i) A strong and heavy course of antibiotics will inactivate useful microbes in her intestine.

(ii) Probiotic milk products like yoghurt, dark chocolate, kefir, miso soup, pickles will activate her intestinal useful microbes again.

(iii) They will also improve her resistance.

(4) Bhikaji Tambe a farmer in Kolhapur has planned a big harvest of sugarcane in his field. Suggest him ways and means for a high yield with organic farming.

Ans.

(i) Bhikaji Tambe can add solution of *Azotobacter* and artificial nitrogenase to get good quality sugarcane and a high yeld also.

(ii) Use of bioinsecticides will also help in good harvest.

Q.3.2. Complete the paragraph:

(1) Compressed waste is _____ in the pit. It is covered with layers of _____ , _____ , leafy waste and _____ . _____ are mixed at some places. _____ present in the soil and other top layers _____ the waste. Completely filled pit is _____ with soil _____ , Best quality _____ is formed after few days.

Choose the correct alternative from below.

(compost, microbes, saw dust, slurry sealed, soil, dumped, bioreactors, biochemicals, decompose)

Ans. Compressed waste is **dumped** in the pit. It is covered with layers of **soil**, **sawdust**, leafy waste and **biochemicals**. **Bioreactors** are mixed at some places. **Microbes** present in the soil and other top layers **decompose** the waste. Completely filled pit is **sealed** with soil slurry. Best quality **compost** is formed after few days.

Q.3.3. Complete the table:

(1)

Fruit	Microbe used	Role of Microbe	Name of beverage
1. *Theobroma cacao*	*Candida, Hansenula*	**Separating seeds from fruit**	Cocoa
2. Apple	***Saccharomyces cerevisiae***	Fermentation of juice	**Cider**

(2)

Substances obtained by microbial processing	Roles
(1) Glutamic acid, Tryptophan, **Lysine**	(a) **Protein binding**
(2) Polysaccharides, glycolipids	(b) **Emulsifiers**
(3) Lutein, Xanthenes, **betacarotene**	(c) **Edible colors**
(4) Xylitol, **aspartame**	(d) Artificial sweetner (low calorie)

(3) Enlist different microbes and their role in production of beverages.

Ans.

Sr. No.	Fruit	Microbe used	Role of microbe	Name of beverage
1.	*Caffea arabica*	*Lactobacillus brevis*	Separating seeds from fruit	Coffee
2.	*Theobroma cacao*	*Candida, Hansenula, Pichia, Saccharomyces*	Separating seeds from fruit	Cocoa
3.	Grapes	*Saccharomyces cerevisiae*	Fermentation of juice	Wine
4.	Apple	*Saccharomyces cerevisiae*	Fermentation of juice	Cider

(4) Enlist the sources of various organic acids, the microbes used to produce them and their uses.

Ans.

Source	Microbe	Amino acid	Use
Sugar and beet molasses, ammonia salt	*Brevibacterium, Corynobacterium*	L-glutamic acid	Production of monosodium glutamate (Ajinomoto)
Sugar molasses, salt	*Aspergillus niger*	Citric acid	Drinks, toffees, chocolate production
Glucose, corn steep liquor	*Aspergillus niger*	Gluconic acid	Production of minerals used as supplement for calcium and iron
Molasses, corn steep liquor	*Lactobacillus delbrueckii*	Lactic acid	Source of nitrogen, production of vitamins.
Molasses, corn steep liquor	*Aspergillus itaconius*	Itaconic acid	Paper, textile, plastic industry, gum production

Q.3.4. Figure based Question:

(1) Observe the following diagram and answer the questions:

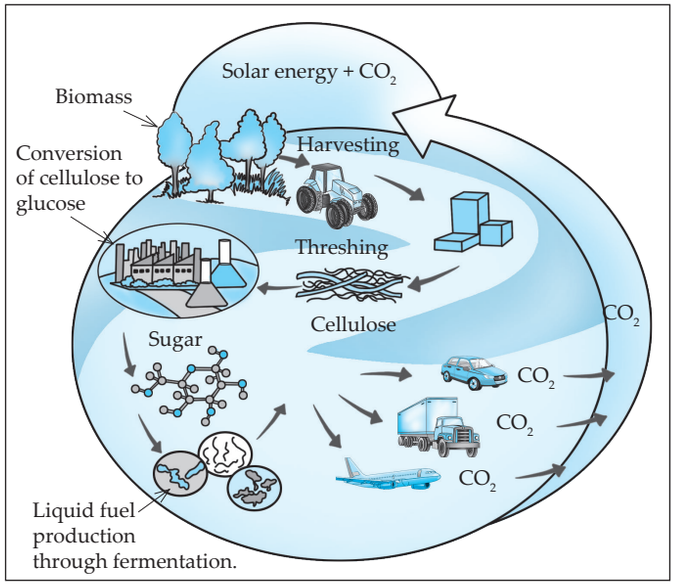


Fig. 7.1 Biofuel Production

(i) Solar energy + CO_2 contributes to which process?

Ans. Photosynthesis

(ii) What is biomass?

Ans. Biomass is organic matter used to produce fuel.

(iii) Who helps in the conversion of cellulose to glucose?

Ans. Enzymes.

(iv) Name the liquid fuel produced through Fermentation.

Ans. Ethanol.

(v) Classify the fuels.

Ans. Solid fuel, Liquid fuel, Gaseous fuel.

(vi) Who ferments sugar into liquid fuel?

Ans. Microbes.

Q.3.5. Answer the following:

***(1) Which type of cheese is used in western food like pizza, burger, sandwich, etc?**

What is the difference between those types of cheese. *(Lets think; Textbook Page no. 78)*

Ans.

(i) Cheese used in pizza are - mozzarella, provolone, cheddar and Parmesan.

(ii) Cheese used in burger is cheddar.

(iii) Cheese used in sandwich - Mozzarella, Cheddar.

(iv) Mozzarella is a softer, Italian cheese that has a subtle taste. Its not aged for long.

(v) White cheddar is a hard type of cheese that usually has a more pungent or sharp flavour. Its origin is Somerset, England and is aged for 12 - 16 months. Yellowish whitish in colour and usually crumbly in texture. Its hard, sharp tasting cheese best used in grilled cheese sandwiches.

(vi) Provolone is a semi-hard Italian cheese which is blended with Mozzarella. The flavour of provolone varies greatly depending on how long its been aged.

(vii) Parmesan cheese is aged 3-8 months which makes it a bit hard in texture. Made from cow's milk it has its origin in Italy and is granular in nature.

***(2) (A) What do you mean by antibiotic?** *(Can you recall; Textbook Page no. 82)*

Ans. Carbon compounds obtained from some bacteria and fungi for destroying or preventing the growth of harmful micro-organisms are called antibiotics.

(B) Which precautions should be taken about their consumption? *(Can you recall; Textbook Page no. 82)*

Ans.

(i) Antibiotics should be taken only when prescribed by a doctor.

(ii) Don't purchase any antibiotic from medical stores without a prescription from a doctor.

(iii) Don't consume antibiotics on your own to treat common diseases like a throat infection, common cold or influenza.

(iv) Even if you feel well before completing of the prescribed course of the antibiotic, you must continue and complete it.

(v) Don't suggest to others the antibiotics which were useful to you.

***(3) Observe the garbage vans of grampanchayat and municipality. Nowaday, there is facility of decreasing the volume of garbage by compaction in those vans. Explain the advantages of this activity.** *(Observe; Textbook Page no. 83)*

Ans.

(i) Waste compaction is the process of compacting waste, reducing it in size.

(ii) Garbage compactors and waste collection vehicles compress waste so that more of it can be stored in the same space.

Advantage of compaction of garbage:

(i) Compacted waste means less trips to the landfill are needed.

(ii) This is a more eco-friendly solution to waste removal. Fewer trips to the landfills will reduce transportation costs and the pollution or emissions created from those trips.

(iii) Reduces insect and rodent problems.

(iv) Controls odour.

***(4) You must have seen or read the news of dead fishes or oily water accumulating at the sea coasts. Why does this happen?** *(Can you tell; Textbook Page no. 84)*

Ans.

(i) This happens due to oil spills.

(ii) An oil spill is the release of a liquid petroleum hydrocarbon into the environment especially the marine ecosystem, due to human activity and is a form of pollution.

(iii) Oil spills may be due to release of crude oil from tankers, offshore platforms, drilling rigs and wells, as well as spills of refined petroleum product.

***(5) Explain the importance of biopesticides in organic farming.**

Ans.

(i) Fluoroacetamide-like chemicals are mixed with soil due to use of chemical pesticides in agriculture.

(ii) These prove to be harmful to other plants and animals as well as cause skin disease to humans. Therefore biopesticides are used nowadays.

(iii) Bacterial and fungal toxins which can destroy pests and pathogens can be directly integrated into plants with the help of biotechnology.

(iv) Being toxic to insects, plants are saved from them.

(v) Spinosad, is a biopesticide. It is a by-product of fermentation.

***(6) Which are the reasons for increasing the popularity of probiotic products?**

Ans.

(i) Probiotics are milk products containing active bacteria.

(ii) These microbes maintain the balance of intestinal organisms.

(iii) These products form the colonies of useful microbes in alimentary canal and control other microbes and their metabolic activities, improve resistance and lower the effects of harmful substances formed during metabolic activities.

(iv) Useful microbes become inactive due to antibiotics, probiotics make them active again.

(v) Nowadays, probiotics are used for treatment of diarrhoea and treatment of poultry also.

***(7) How the bread and other products produced using baker's yeast are nutritious?**

Ans.

(i) Compressed yeast is used in commercial bakery industry.

(ii) It is available in dry, granular form for domestic use.

(iii) Yeast produced for commercial use contains various useful contents like carbohydrates, fats, proteins, various vitamins and minerals.

(iv) Due to this, bread and other products produced with the help of yeast become nutritive.

***(8) Which different microbes are useful to us?** *(Can you recall; Textbook Page no. 77)*

Ans.

(i) *Lactobacilli* is used for Yoghurt production.

(ii) Yeast - *Saccharomyces cerevisiae* is used for vinegar and bread production.

(iii) *Acidophilus*, *Lactobacillus casei*, *Bifidobacterium bifidum* are probiotic microbes.

(iv) *Acetobacter*, *Glucanobacter* is mixed for microbial degradation of ethanol.

***(9) Which different products can be produced with the help of microbes?** *(Can you recall; Textbook Page no. 77)*

Ans.

(i) Products produced with the help of microbes are bread, cheese, wine, yoghurt, butter, probiotics and vinegar.

(ii) They are also used for producing chemicals, enzymes, nutrients, medicines like antibiotics and also for Bio-fuel.

(iii) They are used in garbage management and pollution control.

***(10) We use the fermentation process while conversion of milk into Yoghurt. Which microbes are useful for this process?** *(Can you recall; Textbook Page no. 77)*

Ans.

(i) Milk is fermented with the help of *Lactobacilli*.

(ii) Bacterial strains of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* are added to warm milk in 1:1 proportion.

***(11) How does the bread become spongy? OR How is bread produced?**

Ans.

(i) Different types of breads are produced from flour of cereal.

(ii) Dough for bread is formed by mixing of baker's yeast - *Saccharomyces cerevisiae*, water, salt and other necessary materials with flour.

(iii) Due to fermentation of carbohydrates by yeast, sugar is converted into carbon-dioxide (CO_2) and ethanol (C_2H_5OH).

(iv) Dough rises up due to CO_2 and the bread becomes spongy.

(12) Explain the production of cheese.

Ans.

(i) Abundantly available cow's milk is used for large scale production of cheese.

(ii) Chemical and microbiological tests of milk are performed first.

(iii) Colours and some microbes like *Lactobacillus lactis, Lactobacillus cremoris* and *Streptococcus thermophilus* are mixed with milk to impart sourness.

(iv) Whey (water in yoghurt) is removed to impart dense texture.

(v) Enzyme protease obtained from fungi is used to produce vegetarian cheese.

(vi) The solid yoghurt is cut into pieces, washed, rubbed, salted and mixed with essential microbes, pigments and flavours.

(vii) Cheese is pressed and cut into pieces and stored for ripening.

(13) Explain the role of microbes in farming.

Ans.

(i) Microbes containing inoculants help in plant growth by supplying nutrients.

(ii) Solution containing *Azotobacter* and artificial nitrogenase is used in organic farming.

(iii) Pesticides like Fluoracetamide can be destroyed with the help of microbes.

(iv) *Spinosad,* a by-product of fermentation is a bio-pesticide.

***(14) Which precautions are necessary for proper decomposition of domestic waste?**

Ans.

(i) Segregation of waste - waste has to be segregated into dry and wet and accordingly headed for disposal.

(ii) Dry wastes need to be sent for recycling.

(iii) Wet wastes need to be sent to land-filling sites for composting.

***(15) What are the benefits of mixing ethanol with petrol and diesel?**

Ans.

(i) Ethanol is a renewable, domestically produced transportation fuel.

(ii) It burns more cleanly producing less carbon emission.

(iii) Reduces dependence of fossil fuels.

(iv) Enhances the octane content in the fuel.

***(16) How can the oil spills of rivers and oceans be cleaned?**

Ans.

(i) Bacteria like *Pseudomonas* spp. and *Alcanovorax borkumensis* have the ability to destroy the pyridines and other chemicals.

(ii) Hence, these bacteria are used to clear the oil spills.

(iii) These are called as Hydrocarbonoclastic bacteria (HCB).

(iv) HCB decompose the hydrocarbons and bring about the reaction of carbon with oxygen. CO_2 and water is formed in the process.

(17) What are the different types of cheese?

Ans.

(i) Freshly prepared cheese is always soft. eg. Cottage cheese, cream cheese, mozzarella cheese.

(ii) On storing for 3 to 12 months, semi-hard cheddar cheese is formed.

(iii) After ripening for 12 - 18 months, very hard cheese called parmesan cheese is formed.

***(18) Why it is necessary to ban the use of plastic bags?**

Ans.

(i) Plastic bags pollute our land and water resources.

(ii) Plastic bags do not degrade easily.

(iii) Plastic bags are harmful to wild life, marine and human health. Hence, plastic bags should be banned.

***(19) How can the soil polluted by acid rain be made fertile again?**

Ans.

(i) Sulphuric acid is present in the acid rain and in materials coming out of mines.

(ii) Erosion of bridges, metal statues, occurs due to acid rain.

(iii) Sulphuric acid is the source of energy for some species of bacteria like *Acidophillium spp.* and *Acidobacillus ferroxidens*.

(iv) Hence, these bacteria can control the soil pollution occurring due to acid rain, and the soil can be made fertile again.

Q.4.1. Answer in detail.

(1) Describe in brief Biofuel production with the help of a neat labeled diagram.

Ans.

(i) Biofuel is important among the renewable source of good energy.

(ii) Biofuel is produced by plants by photosynthesis where Carbohydrates and Oxygen is prepared using Solar energy.

(iii) These fuels are available is solid (Coal, dung, crop residue), liquid (Vegetable oils, alcohol), gaseous (gobar gas, Coal gas) forms.

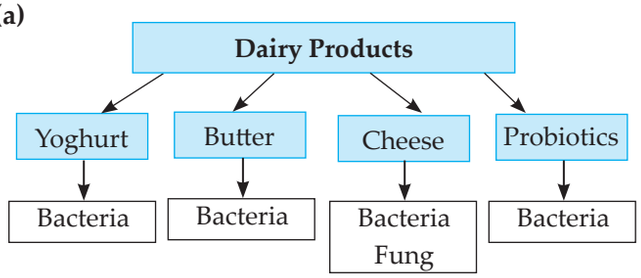
(iv) For biofuel production, biomass is harvested and transported for threshing. Later the cellulose obtained from the residues left after threshing is converted to glucose.

(v) The glucose is further converted to liquid fuel through fermentation, which is used for various purposes.

(vi) CO_2 released during the burning of these biofuel which is again absorbed by plants for photosynthesis.

(2) Complete the flow chart and answer the questions given below:

(a)



(b) What is the basic purpose behind conversion of milk into various dairy products?

Ans. To preserve milk

(c) Give example of one microbe used in any two of the above dairy products.

Ans. *Streptococcus thermophilus* is used in both yoghurt and cheese production.

(3) Explain the role of microbes in chemical pollution.

Ans.

(i) Some microbes remove the sulphur from fuels.

(ii) Metals like copper, iron, uranium, zinc, etc. leach into environment from low quality metalloids. These are converted into compounds before leaching with the help of *Thiobacilli* and *Sulphobacilli*.

(iii) Bacteria like *Pseudomonas* spp and *Alcanovorax borkumensis* have ability to destroy the pyridines and other chemicals. Hence, these bacteria are used to clear oil spills.

(iv) Species like *Vibrio*, *Ideonella sakaiensis* decompose PET (Polyethylene Terephthalate Polyester).

(v) Species of fungi like *Actinomycetes*, *Streptomyces*, *Nocardia*, *Actinoplanes* have the ability to decompose rubber from garbage.

(vi) Bacteria like *Acidophillium* spp. and *Acidobacillus ferroxidens* control the soil pollution occurring due to acid rain.

(vii) *Geobacter* convert water soluble salts of uranium into insoluble salts and hence prevent these salts from mixing with ground water sources.

***(4) Which fuels can be obtained by microbial processes? Why is it necessary to increase the use of such fuels?**

Ans.

(i) Various fuels like methane, ethanol, hydrogen gas, etc. are fuels obtained by microbial processes.

(ii) It is necessary to increase the usage of such fuels so as to reduce exhaustion of fossil fuel resources.

(iii) Most of thse fuels can be obtained by anaceobic decomposition of waste products such as domestic waste, agricultural waste, etc. Hence, their cost of production is relatively very high.

(iv) When methane is burned, comparatively lower amounts of smog forming pollutatnts, toxic air and gases are generated.

(v) Ethanol is a clean fuel. It is obtained during fermentation of molasses by *Saccharomyces*.

(vi) Hydrogen gas is considered as the fuel of future since it does not emit any harmful substances on buring and is produced by bio-photolysis of water.

(vii) As a result, it is necessary to increase the use of fuels obtained by microbial processes.

Types:

(i) Ethanol-biologically produced alcohols, most commonly ethanol and less commonly propanol and butanol are produced by the action of micro-organisms and enzymes through the fermentation of sugar or starch cellulose.

(ii) Bibutanol also called biogasoline is often claimed to provide a direct replacement for gasoline.

Biogas is methane produced by the process of anaerobic digestion of organic material by anerobea.

***(5) What is role of microbes in compost production?**

Ans. All biodegradable waste can be converted into compost.

(i) Bacteria, fungi and actinomycetes are the microbes that decompose the organic matter.

(ii) Aerobic bacteria are the most important ones.

(iii) Microbes break down the organic matter and produce carbon dioxide, water, heat and humus which makes it very nutritious.

(iv) They provide the most rapid and effective composting.

(v) Their excreta contains plant nutrients such as nitrogen, phosphorus and magnesium.

(vi) *Actinomycetes* are responsible for the earthy smell of the compost.

(vii) They decompose cellulose, starches and proteins liberating carbon, nitrogen and ammonia in the process, which are useful for higher plants.

(viii) Fungi breakdown cellulose and lignin and take over the final stage of composting.

(ix) Thus microbes help in recycling the nutrients through composting.

(5) Explain the process of Land - filling site with a neet labelled diagram.

Ans.

(i) Degradable waste being accumulated in urban areas is used for this purpose.

(ii) Large pits are dug in open spaces far away from

the residential area and those pits are lined with plastic sheets as a precaution against pollution of soil due to leaching of toxic and harmful materials.

(iii) Compressed waste is dumped in the pit. It is covered with layers of soil, saw dust, leafy waste and specific biochemicals.

(iv) Bioreactors are mixed at some places.

(v) Microbes present in soil and other top layers decompose the waste.

(vi) Completely filled pit is sealed with soil slurry.

(vii) Best quality compost is formed after few days.

(viii) Such land filling sites can be reused after removal of compost.

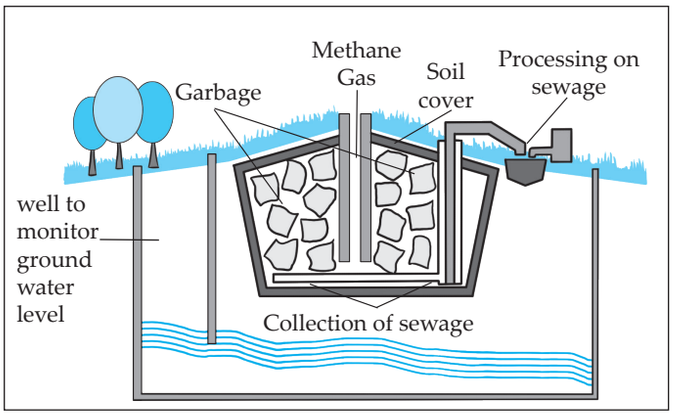


Fig. 7.2 Modern landfill site

***(6) How the sewage generated in your house or apartment is disposed off ?** *(Collect information; Textbook Page no. 84)*

Ans.

(i) Sewage or domestic wastewater or municipal waste water that is produced from a community of people.

(ii) It consist mainly of grey water from sinks, tubs, showers, dish washers and clothes washers, black water - the water used to flush toilets combines with human waster, soaps, detergents, toilet paper, etc.

(iii) Sewage usually travels from a buildings plumbing either into a sewer, which will carry it elsewhere or into an onsite sewage facility.

(iv) In many developing countries the bulk of domestic and industrial wastewater is discharged without any treatment or after primary treatment only.

(v) In the primary treatment the process of removing contaminants from wastewater and produce treated wastewater that is safer for the environment.

(vi) A by-product of sewage treatment is usually a semi-solid waster or slurry called sewage sludge. The sludge has to undergo further treatment before being suitable for disposal or application to land.

(vii) The first part of filtration of sewage typically includes a bar screen to filter solids and large objects which are then collected in dumpsters and disposed in landfills.

(vii) The second part removes dissolved and suspended biological matter. The secondary treatment is typically performed by indigenous water borne micro-organisms in a managed habitat.

(viii) Tertiary / third part is ejection into a highly sensitive ecosystem. Treated water is sometimes disinfected chemically or physically prior to discharge into a stream, lagoon etc. It can be used for ground water recharge as it is sufficiently clean.

Q.4.2 Paragraph based questions

Read the paragraph and answer the following questions:

> In cities sewage needs to be carried to processing unit and acted upon by microbial process. Microbes which can decompose any compound as well as destroy the pathogens of cholera, typhoid are mixed with sewage. They release methane and carbondioxide by decomposition of the carbon compounds present in sewage. Phenol oxidising bacteria decompose the xenobiotic chemicals present in sewage.

(1) Where is sewage in cities disposed off?

Ans. In cities sewage needs to be carried to processing unit and acted upon by microbial process.

(2) Which disease pathogens are destroyed by microbes?

Ans. Microbes can destroy pathogens of Cholera and Typhoid.

(3) Which gases are released by decomposition of carbon compounds?

Ans. Methane and Carbon-dioxide are released by the decomposition of carbon compounds.

(4) What is the role of Phenol oxidising bacteria?

Ans. Phenol oxidising bacteria decompose the Xenobiotic chemicals present in sewage.

(5) Give a heading to the paragraph.

Ans. Sewage Management in cities.

❖ ❖ ❖

ASSIGNMENT - 7

Time : 1 hour **Marks : 20**

Q.1.(A) Answer the following: **(3)**

(1) Fill in the blanks: Acetic acid is bleached with the help of ..... .

(2) Find the odd man out: Penicillin, erythromycin, gentomycin, acetic acid

(3) Complete the analogy: Yoghurt : Bacteria :: Cheese : .....

Q.1(B) Choose and write the correct option. **(2)**

(1) Most appropriate method of disposal of dry waste is ..... .

(a) sanitary landfill (b) composting (c) incineration (d) recycling

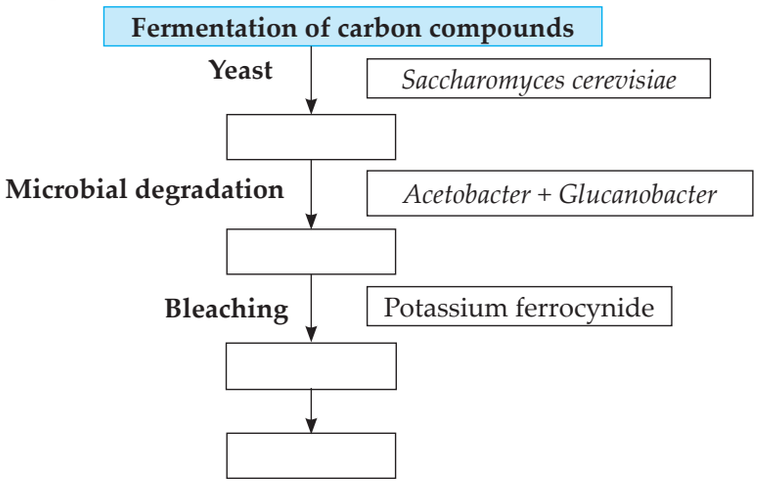
(2) ..... bacteria present in root nodules of leguminous plants help in nitrogen fixation.

(a) *Rhizobium* (b) *Azotobacter* (c) *Geobacter* (d) *Pseudomonas*

Q.2.Answer the following. (Any 2) **(4)**

(1) Write a note on importance of probiotics.

(2) Complete the chart.



(3) Give scientific reason: Milk is pasteurized at the beginning.

Q.3.Answer the following (Any 2) **(6)**

(1)

Source	Microbe	Use
(1) Sugar Molasses	_____	Production of Monosodium glutamate
(2) Sugar Molasses and salt	*A spergillus niger*	_____
(3) Glucose and corn steep liquor	*A spergillus niger*	_____
(4) Molasses and corn steep liquor	_____	Production of Vitamins

(2) What is the role of microbes in compost production?

(3) Explain the importance of biopesticides in organic farming.

(4) Write a short note on Xanthan gum.

Q.4.Answer in detail (Any 1) **(5)**

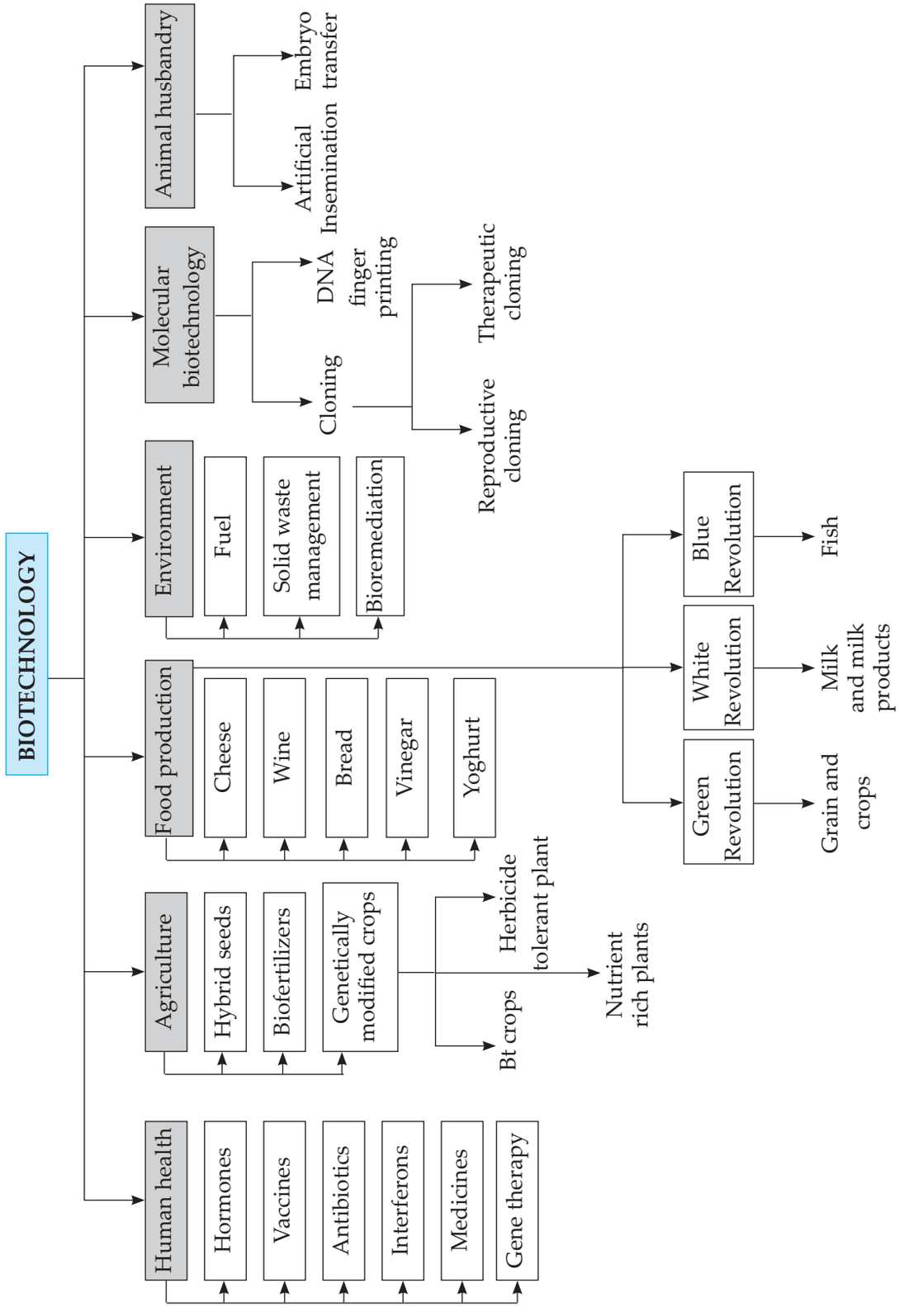
(1) Explain in detail Biofuel production with a neat labelled diagram.

(2) Describe the process of Land filling site with a neat labelled diagram.

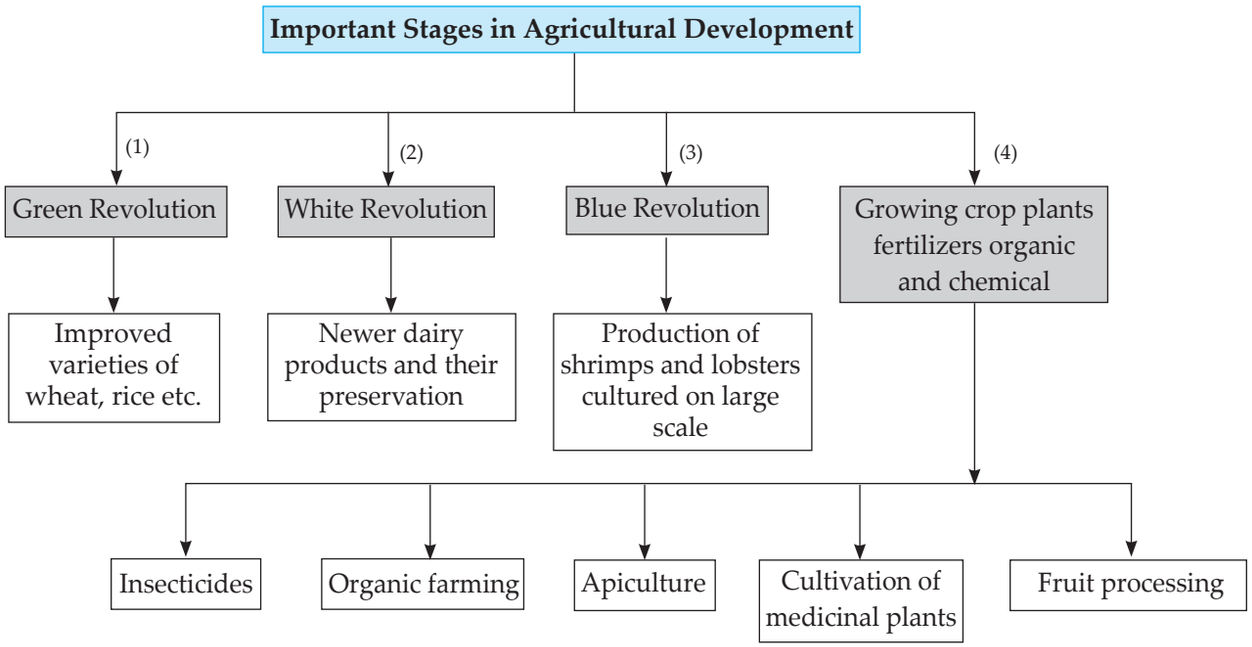
❖ ❖ ❖

8 Cell Biology and Biotechnology

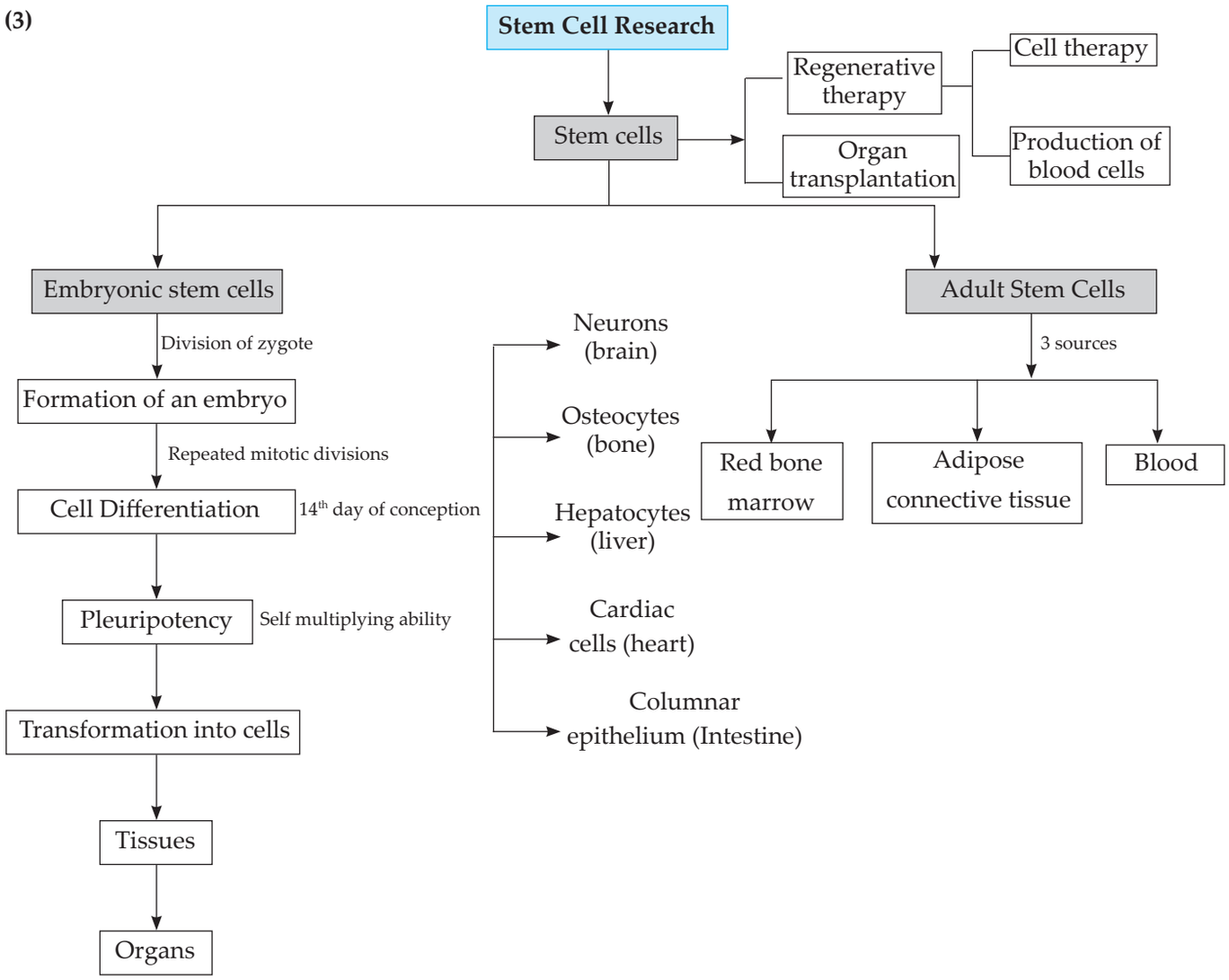
CONCEPT MAP



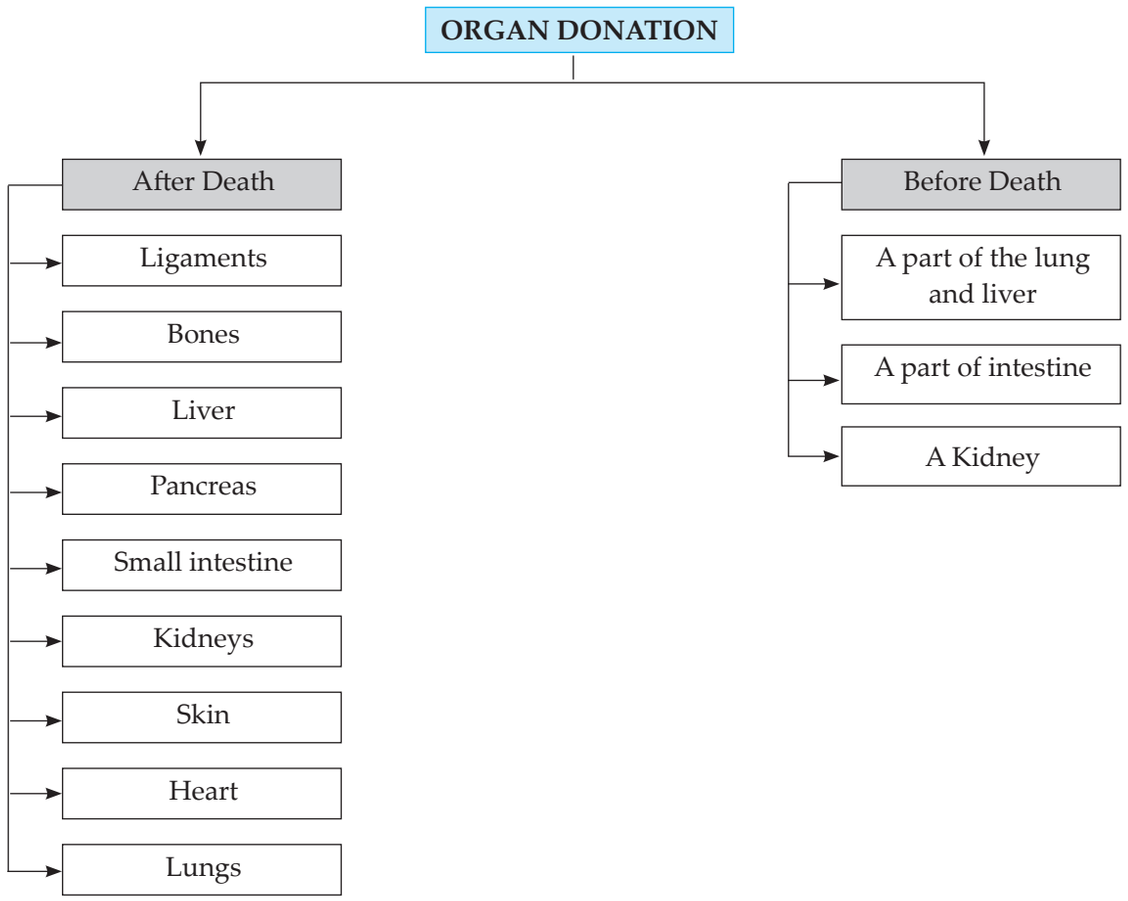
(2)


Important Stages in Agricultural Development
(1)
(2)
(3)
(4)
Green Revolution
White Revolution
Blue Revolution
Growing crop plants fertilizers organic and chemical
Improved varieties of wheat, rice etc.
Newer dairy products and their preservation
Production of shrimps and lobsters cultured on large scale
Insecticides
Organic farming
Apiculture
Cultivation of medicinal plants
Fruit processing

(3)


Stem Cell Research
Stem cells
Regenerative therapy
Organ transplantation
Cell therapy
Production of blood cells
Embryonic stem cells
Division of zygote
Formation of an embryo
Repeated mitotic divisions
Cell Differentiation
14th day of conception
Pleuripotency
Self multiplying ability
Transformation into cells
Tissues
Organs
Adult Stem Cells
3 sources
Red bone marrow
Adipose connective tissue
Blood
Neurons (brain)
Osteocytes (bone)
Hepatocytes (liver)
Cardiac cells (heart)
Columnar epithelium (Intestine)

(4)



Points to Remember:

- **Cytology / Cell Biology** - Study of the structure, types, organelles of the cell, cell division, etc.
- **Research Institute dedicated for research on cells :**
  - **National Centre for Cell Science** is located in **Pune.**
  - **Instem** is located in **Bengaluru.**
- **Stem cells** are special cells present in the body of multicellular organisms, which **give rise to all other types of cells** present in the body
- Stem cells are found in **umbilical cord, red bone marrow and adipose connective tissue**.
- **Cell differentiation** start on **14th** day of **conception**.
- **Osteocytes, hepatocytes, neurons** are formed due to differentiation.
- **Uses of stem cell**.
  - **Regenerative therapy** includes cell therapy in which **stem cells** are used to **replace dead cells** in case of conditions like **diabetes**, **myocardial infarction**, **Alzeheimer's disease** and **Parkinson's disease**.
  - It is also used to **produce blood cells** in conditions like **anemia**, **thalassaemia** and **leukemia**.
  - **Organ transplantation** : organs like kidney, liver can be produced with the help of stem cells and transplantation takes place only when there is a **donor available**.
  - Various factors like **blood group, diseases** and **disorders, age** etc are first considered during transplantation.
- Some organs can be donated **during life time** and some can be donated **after death (posthumous)**.

- Body and organ donation can **save life** of needy individuals.
- **Biotechnology** is bringing **artificial genetic changes** and **hybridization** in organisms for human welfare.
- **Biotechnology** includes following areas: Use of microbes for **Yoghurt** formation from **milk** and **alcohol** from **molasses**.
  - Production of **antibiotics** and **vaccines** with help of specific cells.
  - Use of Bio - molecules like **DNA** and **proteins** in human welfare.
  - Gene manipulation helps in development of **desired plant, animals** and **products**.
  - Genetically modified bacteria is used for production of **human growth hormone** .
  - Use of **genetic** and **non - genetic** technique for **tissue culture** and production of **hybrid seeds**.
- **Benefits of Biotechnology**
  - **Increase** in per hectare yield of crop-land has become possible.
  - **Expenses** on **disease control** have minimized since development of resistant varieties.
  - Development of **fast fruit setting** varieties and their yield per annum.
  - Development of **stress resistant varieties** which can withstand variable **temperature, water-stress, changing fertility** of soil, etc.
- **Commercial applications of Biotechnology**
  - **Crop Biotechnology** is used in agricultural field to improve yield and variety.
  - **Hybrid seeds and Genetically modified crops** are developments of crop biotechnology.
  - **Bt Cotton, Golden Rice**, **Herbicide tolerant plants** and **Biofertilizers** are examples of development in crop biotechnology.
- Biotechnology has made advances in Animal husbandry. Two main methods as **artificial insemination** and **embryo transfer** have helped to improve both quantity and quality of animal products.
- Biotechnology helps in **diagnosis** and **treatment** of diseases at an early stage. Various **vaccines** and **antibiotics** are produced.
  - Traditionally vaccines were prepared with help of **pathogens** which were **completely** or **partially** killed. Due to this, there were chances of infection.
  - Therefore, artificial vaccines were produced by using antigen with the help of gene isolated from the pathogen and sometimes proteins were used which acted as antigen.
  - Vaccines produced with the help of biotechnology are more thermostable and remain active for longer duration.
  - Edible Vaccines are in progress and presently potatoes are being produced with help of biotechnology. They are called as **Transgenic Potatoes**.
  - Consumption of these potatoes generates immunity against bacteria like ***Vibrio cholerae*** and ***Escherichia coli*** and disease caused by them.
  - Biotechnology is useful in **production of hormones** like **insulin, somatotropin** and **blood clotting factors**.
  - **Interferon,** a small sized protein molecule is used in treatment of **viral diseases**.
  - **Gene therapy** which is used to treat genetic disorders **in somatic cells** has become possible due to biotechnology.
  - **Cloning:** Production of **replica of any cell** or **organ** or **entire organism.** It has been possible due to development in biotechnology.
  - **Reproductive cloning** and **therapeutic cloning** are the processes used for cloning.
- Various **industrial chemicals** can be produced through less expensive processes. e.g. Alcohol production from sugar molasses.

- Biotechnology has helped to solve **environment** related problems. e.g. Microbial decomposition of waste.
- Bio-remediation, biopesticides, biofertilizers etc. are the new concepts in biotechnology.
- Food items like **bread, cheese, wine, beer, yoghurt** are oldest items produced with the help of biotechnology.
- **DNA fingerprinting** is one of the most important developments in biotechnology which has found application in **Forensic Science**.
- All the research work is done in **Centre for DNA fingerprinting and Diagnostics, Hyderabad**.
- **Green Revolution** is an important stage in agricultural development.
- **Dr. Norman Borlaug** (USA) and **Dr. M.S. Swaminathan** (India) have valuable contribution in green Revolution.
- **White Revolution** was led by **Dr. Verghese Kurien** in various parts of India which were rich in milk and milk products.
- Government launched **Nil-Kranti Mission in 2016** to promote **pisciculture**. This was termed as **Blue Revolution**.
- **Organic manure** and **chemical fertilizers** are used as fertilizers
- Use of insectides should be reduced as they enter food-web through nature and food and its **bio-magnification occurs**.
- **DDT, malathion** and **chloropyriphos** have been proved dangerous.
- **Organic farming** and **organic products** are available now which can prevent the harmful effects of fertilizers.
- **Apiculture** is culturing of bee for honey and wax.
- India, has a great tradition of **ayurveda** that cures many diseases. Therefore, **medicinal plants** are cultivated.
- Fruits are **perishable agro-products :** They can be preserved by **cold storage, drying, salting, air tight packaging, preparing murabba** and **evaporating**.

MASTER KEY QUESTION SET - 8

Q.1. (A) 1. Fill in the blanks and rewrite the completed statements:

(1) Cells of the embryo undergo repeated ..... division.

(2) Availability of ..... is an important requirement in organ transplantation.

(3) All the cells except sperm and ova in the body are called as ..... cells.

(4) Alcohol is produced from sugar molasses with the help of ..... yeast.

(5) The ..... bacteria are useful for cleaning the hydrocarbon and oil pollutants from soil and water.

(6) Sunflower can absorb ..... and arsenic.

(7) Water holding capacity of the soil improves with soil conservation due to use of .....

(8) We have great tradition of ..... that cures the diseases with the help of natural sources.

*(9) Government of India has encouraged the ..... for improving the productivity by launching NKM - 16.

*(10) ..... is the revolutionary event in biotechnology after cloning.

*(11) Methods like artificial insemination and embryo transplant are mainly used for .....

*(12) The disease related with the synthesis of insulin is ..... .

(13) ..... play an important role in wound healing.

(14) The mass of cells at the earliest stage of development are called ..... .

(15) Stem cells are present in the ..... by which the foetus is joined to the uterus of the mother.

(16) Stem cells are present in ..... and ..... of adult human being.

(17) Stem cell vials are stored in ..... at –135 ^{0}C to –190 ^{0}C.

(18) The property of self-multiplying of stem cells is called as ..... .

(19) Bringing about artifical genetic changes and hybridization in organisms for human welfare is called ..... .

(20) Crops developed with desired characters by integrating foreign gene with their genome are called as ..... crops.

(21) Bt cotton and Bt brinjal are developed by using gene isolated from ..... .

(22) A gene synthesizing ..... has been introduced in Golden Rice.

(23) ..... is the antigen containing material given to acquire immunity.

(24) Potatoes which can be used as edible vaccines are called ..... .

(25) ..... is used is the treatment of viral diseases.

(26) ..... arises due to genetic changes in hepatocytes (liver cells).

(27) Production of replica of any cell or organ or entire organism is called ..... .

(28) The fern ..... can absorb arsenic from the soil.

(29) The bacterium ..... is highly radiation resistant organism.

(30) Grasses like alfalfa, clover and rye are used for ..... .

(31) ..... discovered microbes for cleaning the oil spills.

(32) Production of various useful organisms with the help of water is called as ..... revolution.

(33) Cell differentiation starts from ..... day of conception.

Ans. *(1) mitotic (2) donor (3) somatic (4) transgenic (5) Pseudomonas (6) Uranium (7) manures (8) ayurveda (9) pisciculture (10) Stem cell research (11) animal husbandry (12) Diabetes (13) Stem cells (14) Stem cells (15) umbilical cord (16) red bone marrow, adipose connective tissue (17) liquid nitrogen (18) pleuripotency (19) biotechnology (20) genetically modified (21) Bacillus thuringiensis (22) Vitamin A (beta carotene) (23) Vaccine (24) transgenic potatoes (25) Interferon (26) Phenylketonuria (27) cloning (28) Pteris vitata (29) Deinococcus radiodurans (30) phyto-remediation (31) Dr. Anand Mohan Chakravarti (32) blue (33) 14th.*

Q.1. (A) 2. Find the odd word out:

(1) Cord blood, red bone marrow, epithelial tissue, adipose connective tissue.

Ans. Epithelial tissue - They are tissues present in surface of skin, cover of internal organs. Others are sources of stem cells.

(2) Liver, heart, eyes, kidney.

Ans. Kidney - It can be donated during life time. Other organs can be donated after death only.

(3) Cytology, molecular biology, genetic engineering, cosmology.

Ans. Cosmology - It is study of the universe. Others are sciences included in biotechnology.

(4) *Rhizobium, Azotobacter, Nostoc, Lactobacilli.*

Ans. *Lactobacilli* - It is a bacteria present in milk. Others are biofertilizers.

(5) Alfalfa, rye, clover, bamboo.

Ans. Bamboo - Others are grasses used for phyto-remediation.

(6) Somatostatin, erythropoietin, interleukin, phenylketonuria.

Ans. Phenylketonuria - It is a genetic disorder - Others are proteins to treat various disorders.

(7) DDT, malathion, chloropyriphos, NPK.

Ans. NPK - These are essential elements. Others are names of pesticides.

Q.1. (A) 3. Considering the relationship in the first pair, complete the second pair and rewrite:

(1) National Centre for Science : : Pune : Instem : : ..... .

Ans. Bengaluru - The National Centre for Cell Science is established at Pune and 'Instem' is established at Bengaluru.

(2) Green revolution : Dr. M. S. Swaminathan and Dr. Norman Borlaug : : White revolution : ..... .

Ans. Dr. Verghese Kurien - Dr. M.S. Swaminathan and Dr. Norman Borlaug have valuable contribution in Green Revolution, whereas Dr. Verghese Kurien has contributed in white revolution.

(3) National Pomegranate Research Institute : Solapur : : National Citrus Research Institute : .....

Ans. Nagpur - National Pomegranate Research Institute is established in Solapur, whereas National Citrus Research Institute is established in Nagpur.

*(4) White revolution : Dairy : : Blue revolution : ..... .

Ans. Aquatic organisms - White revolution involves improved production of dairy and dairy products whereas, Blue revolution involves improved production of Aquatic organisms.

*(5) Insulin : Diabetes : : Interleukin : ..... .

Ans. Cancer - Insulin is used to treat diabetes, whereas Interleukin is used to treat cancer.

*(6) Interferon : ..... :: Erythropoietin: Anemia.

Ans. Viral Infection - Erythropoietin is used for treating conditions like anaemia, whereas interferons are used to treat viral infections.

*(7) ..... : Dwarfness :: Factor VIII : Hemophilia

Ans. Somatostatin - Factor VIII is used for treating condition like haemophilia, whereas somatostatin is used for treating dwarfism.

*(8) Crop resistant to bollworm :: Crop ..... synthesizing large quantities of vitamin A : Golden rice.

Ans. Bt cotton - Golden rice is an improved crop variety synthesizing large quantities of vitamin A whereas, Bt cotton is an example of crop resistant to boll worm.

*(9) Osteocytes : Bone cells :: Hepatocytes : ..... .

Ans. Liver cells - Bone cells are also called as osteocytes, while liver cells are also called as hepatocytes.

*(10) *Adhatoda vasica* : ..... :: *Melia azadiracta* : Neem

Ans. Adulsa - Local name of plant *Melia azadiracta* is neem while local name of plant *Adhatoda vasica* is Adulsa.

Q.1. (A) 4. Match the columns:

(1)

Column 'A'	Column 'B'
(1) National centre for cell science	(a) Delhi
(2) Instem	(b) Pune
(3) Centre for DNA fingerprinting and diagnostics.	(c) Bengaluru
(4) Indian Agricultural Research Institute	(d) Hyderabad

Ans. *(1 - b), (2 - c), (3 - d), (4 - a)*

(2)

Column 'A'	Column 'B'
(1) Bt Brinjal	(a) *Azotobacter*
(2) Weeds	(b) *Bacillus thuringiensis*
(3) Golden Rice	(c) Herbicides
(4) Biofertilizer	(d) Vitamin A
	(e) Hybrid seeds

Ans. *(1 - b), (2 - c), (3 - d), (4 - a)*

(3)

Column 'A'	Column 'B'
(1) Dr. Anand Mohan Chakravarti	(a) Green revolutionn
(2) Dr. M. S. Swaminathan and Dr. Norman Borlaug	(b) White revolution
(3) Dr. Verghese Kurien	(c) Blue revolution
	(d) Cleaning of oil spillage

Ans. *(1 - d), (2 - a), (3 - b)*

***(4)**

Column 'A'	Column 'B'
(1) Interferon	(a) Diabetes
(2) Factor VIII	(b) Dwarfness
(3) Somatostatin	(c) Viral Infection
(4) Interleukin	(d) Cancer
	(e) Hemophilia

Ans. *(1 - c), (2 - e), (3 - b), (4 - d)*

(5)

Column 'A'	Column 'B'
(1) Erythropoietin	(a) Viral infection
(2) Interferon	(b) Dwarfism
(3) Insulin	(c) Anaemia
(4) Somatostatin	(d) Diabetes

Ans. *(1 – c), (2 – a), (3 – d), (4 – b).*

Q.1. (A) 5. State whether the statement is true or false. Correct the false statement:

(1) Cell Biology includes the study of cell division.

(2) Stem cells do not play an important role in wound healing.

(3) Research institutes specially dedicated for research on cells are established at Solapur and Nagpur.

(4) Stem cells are present in the umbilical cord by which the foetus is joined to the uterus of the mother.

(5) 320 different types of cells in human body are formed from single type of cells.

(6) Stem cells are parent cells of all types of human cells.

(7) Skin from all parts of the body can be donated.

(8) There is considerable progress mainly in the field of agriculture and pharmacy due to biotechnology.

(9) Genetic biotechnology involves use of either cell or tissue.

(10) Genetically modified Golden Rice variety contains 50 times more amount of Beta carotene.

(11) Vaccines produced with the help of biotechnology are thermo-stable.

(12) Transgenic *E.coli* are used for production of interferon.

(13) Phenylketonuria arises due to genetic changes in osteocytes.

(14) There is world - wide support to human cloning on various issues.

(15) Grasses like alfalfa, clover, rye are used in phytoremediation.

(16) DNA sequence of each person is unique as that of the fingerprints.

(17) 30% to 60% subsidies are offered by Government for pisciculture.

(18) Chemical fertilizers increase the fertility of soil.

*(19) Changes in genes of the cells are brought about in non-genetic technique.

*(20) Gene from *Bacillus thuringiensis* is introduced into soyabean.

(21) The bacteria *Pseudomonas* is highly radiation resistant organism.

(22) Cell differentiation starts from 5^{th} - 7^{th} day of conception.

(23) Embryonic cells after differentiation are called as embryonic stem cells.

(24) Process of excretion can occur with the help of single kidney.

(25) A clone can be produced by fusion of a nucleus of ovum with the enucleated somatic cell.

(26) Genes can also be cloned and millions of copies of same gene can be produced.

(27) Genetically modified variety of cotton can absorb selenium from the soil.

(28) Dr. Verghese Kurien has a valuable contribution in green revolution.

Ans. *(1) True (2) False. Stem cells play an important role in wound healing. (3) False. Research institutes specially dedicated for research on cells are established at Pune and Bengaluru. (4) True (5) False. 220 different types of cells in human body are formed from single type of cells. (6) True (7) False. Skin from certain parts of the body can be donated. (8) True (9) False. Non genetic biotechnology involves use of either cell or tissue. (10) False. Genetically modified Golden Rice variety contains 23 times more amount of Beta Carotene. (11) True (12) True (13) False. Phenylketonuria arises due to genetic changes in hepatocytes. (14) False. There is world - wide opposition to human cloning on various issues. (15) True (16) True (17) False. 50% to 100% subsidies are offered by Government for pisciculture. (18) False. Chemical fertilizers decrease the fertility of soil. (19) False. Changes in genes of the cells are brought about in genetic technique. (20) False. Gene from Bacillus thuringiensis is introduced into cotton and brinjal. (21) False. The bacteria Deinococcus radiodurans is highly radiation resistant organism. (22) False. Cell differentiation starts from 14th day of conception. (23) False. Embryonic cells before differentiation are called as embryonic stem cells. (24) True (25) False. A clone can be produced by fusion of a nucleus of somatic cell with the enucleated ovum. (26) True (27) False. Genetically modified variety of Indian mustard can absorb selenium from the soil. (28) False. Dr. Verghese Kurien has a valuable contribtion in white revolution.*

Q.1. (A) 6. Name the following:

(1) Special cells present in the body of multicellular organisms.

Ans. Stem cells

(2) Types of stem cells.

Ans. Embryonic stem cells and Adult stem cells.

(3) Sources of adult stem cells.

Ans. Red bone marrow, adipose connective tissue and blood.

(4) Source of stem cell immediately after birth.

Ans. Cord blood

(5) Organs which can be donated only after death.

Ans. Liver, heart, eyes.

(6) Branches of Science included in Biotechnology.

Ans. Cytology, biochemistry, molecular biology and genetic engineering.

(7) Genetically modified crops.

Ans. Bt - Cotton, Bt - Brinjal and Golden Rice.

(8) Plant used as Biofertilizer.

Ans. *Azolla*

(9) Edible vaccines.

Ans. Transgenic potatoes

(10) Protein used in treatment of viral disease.

Ans. Interferon

(11) Genetic disorder in somatic cell

Ans. Phenylketonuria

(12) New concepts in biotechnology

Ans. Bio-remediation, biopesticides, biofertilizers, bio-sensors.

(13) Bacteria used as biofertilizer

Ans. *Rhizobium, Azotobacter, Nostoc, Anabaena.*

(14) Bacterium which is radiation resistant.

Ans. *Deinococcus radiodurans*

(15) Discovery of cleaning of oil-spillage by microbes in oceans

Ans. Dr. Anand Mohan Chakravarti

(16) Contributors of Green revolution

Ans. Dr. M. S. Swaminathan, Dr. Norman Borlaug.

(17) Pioneer of White Revolution

Ans. Dr. Verghese Kurien

(18) Government pisciculture program

Ans. Nil-Kranti Mission - 2016 (NKM - 16).

(19) Soil less farming.

Ans. Hydroponics

(20) Pesticides

Ans. DDT, malathion and chloropyriphos.

(21) Plants used in phyto-remedilation.

Ans. *Pteris vitata*, alfalalfa, clover, rye, sunflower.

(22) Disease in which cell therapy is used.

Ans. Diabetes, myocardial infarction, Alzheimer's disease, Parkinson's disease.

(23) Protein used in treatment of viral disease.

Ans. Interferon

(24) Research institutes in India.

Ans.

(i) Indian Agricultural Research Institute.

(ii) National Citrus Research Institute.

(iii) Indian Institute of Sciences.

(iv) National Pomegranate Research Institute.

***Q.1. (A) 7. Answer the following in one sentence.**

(1) What is a cell? *(Can you recall; Textbook page no. 88)*

Ans. Cell is defined as a basic structural, and functional and unit of life.

(2) What is a tissue? *(Can you recall; Textbook page no. 88)*

Ans. A group of cells having the same origin, same structure and same function is called as tissue.

(3) Which technique in relation to tissues have you studied in earlier classes? *(Can you recall; Textbook page no. 88)*

Ans. Tissue culture is the technique studied in earlier classes.

(4) Just like the grafting in plants, is the organ transplantation possible in humans? *(Use your brain; Textbook page no. 89)*

Ans. Yes, Human organ transplantation is possible. It is normally the only treatment for end stage of organ failure such as liver and heart.

(5) What is biotechnology? *(Recall a little; Textbook page no. 91)*

Ans. The technique of bringing about improvements in living organisms by artificial genetic changes and by hybridization for the welfare of human beings are together called biotechnology.

Q.1. (B) Choose and write the correct option:

(1) Stem cell preserved in sterile vials are kept in liquid nitrogen at ..... to .....

(a) –135 °C to –190 °C (b) –125 °C to –150 °C

(c) 135 °C to 190 °C (d) 133 °C to 187 °C

(2) Indian Agriculture Research institute is at .....

(a) Solapur (b) Bengaluru (c) Delhi (d) Pune

(3) In Nil-Kranti Mission - 2016 program, government is offering subsidies of .....

(a) 15% - 20% (b) 50% - 100%

(c) 75% - 77% (d) 35% - 50%

(4) Adulsa is taken is cure ..... .

(a) cough (b) fever (c) dysentery (d) vomiting

(5) Pesticides are infact a type of ..... .

(a) fertilizer (b) poison

(c) manner (d) organic product

(6) In soil-less farming i.e. hydroponics ..... chemical fertilizer are used.
(a) solid (b) liquid (c) gaseous (d) plasma

(7) National pomegranate Research Institute is located at .....
(a) Solapur (b) Pune
(c) Nagpur (d) New Delhi

(8) DNA fingerprinting is mainly useful in ..... science.
(a) formal science (b) natural science
(c) social science (d) forensic science

(9) Interferon is a group of small sized protein molecule used in treatment of ..... disease.
(a) cancer (b) diabetes (c) anemia (d) viral

(10) Cattle feeding on transgenic ..... does not contract a viral disease-rinderpest.
(a) potato (b) onion (c) tobacco (d) tomato

(11) Human Insulin gene now is been inserted into the genome of ..... .
(a) horse (b) cat (c) bacteria (d) virus

(12) Stem cells are present in ..... .
(a) umbilical cord (b) bone marrow
(c) adipose connective tissue
(d) All of the above

(13) A clone is produced by fusion of nucleus of somatic cell with an enucleated.
(a) sperm (b) ovum (c) stem cell (d) hepatocyte

Ans. *(1) (a) –135°C to –190°C, (2) (c) Delhi (3) (b) 50% - 100% (4) (a) cough (5) (b) poison (6) (b) liquid (7) (a) Solapur (8) (d) forensic science (9) (d) viral (10) (d) tomato (11) (c) bacteria (12) (d) All of the above (13) (b) ovum.*

Q.2.1. Define the following:

(1) Cytology / Cell Biology

Ans. The study of cell division, structure, types and organelles of the cell is called as Cytology/Cell Biology.

(2) Stem cells

Ans. Special type of cells present in the body of multicellular organisms, which give rise to all other types of cells present in the body are called as stem cells.

(3) Pleuripotency

Ans. Stem cells are primary type of undifferentiated cells with self multiplying ability and they are parent cells of all types of human cells. This property of stem cells is called as Pleuripotency.

(4) Genetically Modified crops

Ans. Crops developed with desired characters by integrating foreign gene with their genome are called as genetically modified crops.

(5) Vaccine

Ans. Vaccine is the antigen containing material given to acquire either permanent or temporary immunity against a specific pathogen or disease.

(6) Cloning.

Ans. Production of replica of any cell or organ or entire organism is called cloning.

(7) Bio-remediation

Ans. Absorption or destruction of toxic chemicals and harmful pollutants with the help of plants and micro-organisms is called as bio-remediation.

(8) Blue revolution

Ans. Production of various useful acquatic organisms with the help of water is called as blue revolution.

(9) Cell therapy

Ans. The use of stem cells to replace the dead cells in conditions like diabetes, myocardial infarction, Alzheimer's disease, etc. is called cell therapy.

(10) Biotechnology

Ans. Biotechnology is bringing about artificial genetic changes and hybridization in organisms for human welfare.

Q.2.2. Write short notes:

(1) Stem Cells.

Ans.

(i) Stem cells are special types of cells present in the body of multicellular organisms.

(ii) These cells give rise to all other types of cells.

(iii) These cells play an important role in wound healing. All the stem cells are almost alike when they are in the form of a mass of cells during earliest stage of development.

(iv) During further development, stem cells undergo cell differentiation.

(v) Stem cells are present in umbilical cord, blastocyst stage of embryonic development, red bone marrow, adipose connective tissue.

(vi) It has become possible to produce different types of tissues and the degenerated part of any organ with the help of these stem cells.

(vii) Stem cells are of two types - Embryonic stem cells and Adult stem cells.

(2) Organ transplantation.

Ans.

(i) Various organs in the human body become less efficient or completely functionless due to various reasons like ageing, accidents, infections, disorders, etc.

(ii) Life of such person becomes difficult or fatality may occur and life can be saved when the person gets the necessary organ.

(iii) Availability of donor is an important requirement in organ transplantation.

(iv) As the process of excretion can occur with the help of single kidney, person can donate the other one. Similarly, skin from certain parts of the body can be donated.

(v) Various factors like blood group, diseases, disorders, age, etc. of the donor and recipient need to be paid attention during transplantation.

(vi) Organs like liver, heart and eyes can be donated after death only, i.e. posthumous donation of body and organs.

(3) Organ and body donation.

Ans.

(i) Many organs remain functional for certain period even after death occurs under specific conditions.

(ii) Organs or body donation can save life of other needful persons.

(iii) A miserable life can be made comfortable after death. Body can be made available for research in medical studies.

(iv) Awareness about these concepts is increasing in our country and people are voluntarily donating their bodies.

(v) Life of many people can be saved by organ and body donation.

(vi) Blinds can regain the vision.

(vii) Life of many people can be rendered comfortable by donation of organs like liver, kidneys, heart, heart-valves, skin, etc.

(viii) Many government and social organisations are working towards increasing awareness about body donation.

***(4) Biotechnology : Professional uses.**

(i) Use of various abilities of microbes like yoghurt production from milk and alcohol from molasses.

(ii) Use of productivity of cells eg. Production of antibiotics and vaccines with the help of specific cells.

(iii) Use of bio-molecules like DNA and proteins in human welfare.

(iv) Development of plants, animals and products of desired quality by gene manipulation. eg. Production of growth hormone with the help of genetically modified bacteria.

(v) Use of genetic and non-genetic technique.

Non-genetic biotechnology involves use of either cell or tissue. eg. tissue culture, production of hybrid seeds.

(5) Benefits of Biotechnology.

Ans.

(i) It has become possible to increase the per hectre yield irrespective of the limitations of crop-land area.

(ii) Expenses on disease control have minimized since development of resistant varieties.

(iii) Due to development of fast fruit setting varieties yield per annum has been increased.

(iv) Development of stress resistant varieties which can withstand variable temperature, water-stress, changing fertility of soil, etc. has become possible.

(6) Genetically modified crops.

Ans.

(i) Crops developed with desired characters by integrating foreign gene with their genome are called as genetically modified crops.

(ii) High yielding varieties with resistance to disease, alkalinity, weeds other stresses like extreme cold and drought are produced.

(iii) A gene had been isolated from the bacterium *Bacillus thuringiensis* and integrated with the gene of cotton and brinjal.

(iv) This improved variety - Bt cotton, Bt Brinjal kills the pests and yield is maintained.

(iv) A gene synthesizing the Vitamin A (Beta carotene) has been introduced in the variety of rice. This variety contains 23 times more amount of beta carotene than the original variety.

(v) Herbicide tolerant plant varieties are being developed. Due to this, it has become possible to selectively destroy the weeds.

(7) Biofertilizers.

Ans.

(i) Due to use of biofertilizers instead of chemical fertilizers, nitrogen fixation and phosphate solubilization abilities of the plants are improved.

(ii) Mainly the bacteria like *Rhizobiun, Azotobacter, Nostoc, Anabaena* and plants like *Azolla* are used as biofertilizers.

(8) Edible vaccines.

Ans. Edible vaccines are given as food by incorporating them in food stuff.

(i) Work on production of edible vaccines is in progress and presently, potatoes are being produced with the help of biotechnology.

(ii) These potatoes are called as transgenic potatoes.

(iii) These potatoes will act against bacteria like *Vibrio cholerae, Escherichia coli*.

(iv) Consumption of these raw potatoes generates immunity against cholera and the diseases due to *E-coli*.

(9) Green Revolution.

Ans.

(i) Various methods applied for harvesting maximum yield from minimum land are collectively called as green revolution.

(ii) At the beginning of the 20th century all the underdeveloped and developing countries had been badly affected by the effects of poor quality and quantity of food. It was one of the problem of population explosion.

(iii) Improvised dwarf varieties of wheat and rice, proper use of fertilizers, pesticides and water management has led to the increased production of food grains and thereby large population had been saved from hunger.

(iv) Dr. Norman Borlaug (USA) and Dr. M. S. Swaminathan (India) have made valuable contribution in green revolution.

(10) White revolution.

Ans.

(i) Various parts of India were rich in milk and milk products. However, these products were not sufficient to meet the needs of far-flung regions.

(ii) Dr. Verghese Kurien proved through the co-operative movement and use of biotechnology that Dairy cannot be allied but a mainstream business.

(iii) He put forward the co-operative dairy movement of Anand, Gujarat at all time high status.

(iv) While achieving self-sufficiency in dairy business various experiments were performed for quality control, newer dairy products and their preservation.

(11) Blue revolution.

Ans.

(i) Production of various useful aquatic organisms with the help of water is called as blue revolution.

(ii) Farm ponds and fishes are very common in East Asian countries.

(iii) Along with aquatic plants and animals, fishes and shrimps are also cultivated.

(iv) Government of India has vowed to increase the production by encouraging the people for pisciculture by launching Nil-Kranti Mission - 2016 (NKM - 16) program. 50%-100% subsidies are offered in this case.

(v) Marine and fresh water fishery is possible on large scale.

(vi) Fresh water fishes like rohu, catla and other fishery products like shrimp and lobsters are being cultured on large scale.

(12) Organic farming.

Ans.

(i) Organic farming relies on fertilizers of organic origin such as compost manure, green manure and places emphasis on biological pest control.

(ii) It includes complete ban on chemical fertilizers and pesticides and use of local, sturdy varieties and thereby maintaining natural balance.

(iii) Poisonous chemicals from pesticides, chemical fertilizers have reached the human body through food and water.

(iv) Their effects on environment like reducing soil fertility, pest infestation and harmful effects on human body are apparent.

(v) Hence, organic farming is a welcome decision.

***(13) Importance of medicinal plants.**

Ans.

(i) India has been gifted with a great biodiversity.

Indian citizens have a strong and humble relation with nature.

(ii) We have a great tradition of ayurveda that cures the diseases with the help of natural sources.

(iii) Medicinal plants find applications in food industry, pharmaceuticals, agriculture and cosmetics.

(iv) There are infinite medicinal plants which come together and form a branch of medical science called ayurveda.

Plants like lemon, turmeric, Aloe-Vera, Adulsa, Basil, Neem, Garlic, Ashwagandha, etc. are used to cure many ailments.

(v) Many of these remedies are present in the house itself.

(vi) Many plants have various parts that are used like roots, bark stem, leaves, fruits, etc.

Q.2.3. Distinguish between:

(1) Stem cells and cells

Ans.

Stem Cells	Cells
(i) Stem cells are formed during the blastocyst stage of embryonic development.	(i) Cells are formed from stem cell by the process of cell differentiation.
(ii) Present at selective places in the body like cord blood, connective adipose tissue, bone marrow, etc.	(ii) Present everywhere in the body.

Q.2.4. Answer the following:

(1) State the uses of stem cells.

Ans.

(i) Regenerative Therapy:

(a) Cell Therapy : Stem cells are used to replace the dead cells in case of conditions like diabetes, myocardial infarction, Alzheimer's disease, Parkinson's disease, etc.

(b) To produce blood cells required in conditions like anaemia, thalassaemia, leukemia, etc.

(ii) Organ Transplantation : In case of failure of organs like kidney and liver, those can be produced with the help of stem cells and transplanted.

***(2) In which various fields the biotechnology has been useful?** *(Recall a little; Textbook page no. 91)*

Ans. It is useful in production of cash crops, improvement in varieties of cash crops, increase in abilities of plants to withstand environmental stresses, vaccine production, early diagnosis of congenital diseases, organ transplant, cancer research, production of artificial skin, cartilage, etc. in laboratories.

(3) What is Gene therapy?

Ans.

(i) Gene therapy to treat genetic disorders in somatic cells has become possible due to biotechnology.

(ii) All the cells except sperms and ova in the body are called as somatic cells.

(iii) E.g. Phenylketonuria (PKT) arises due to genetic changes in hepatocytes (liver cells).

(iv) It has become possible to treat PKT with gene therapy.

(4) What is DNA finger printing?

Ans.

(i) DNA sequence of each person is unique as that of the fingerprints.

(ii) Due to this, identity of any person can be established with the help of its available DNA. This is called as DNA fingerprinting.

(iii) It is mainly useful in forensic sciences.

(iv) Identity of the criminal can be established with the help of any part of its body found at the site of crime.

(v) Similarly, identity of father of any child can be established.

(vi) This research is performed in Center for DNA fingerprinting and Diagnostics, Hyderabad.

(5) How are stem cells preserved?

Ans.

(i) For preservation, stem cell samples are carefully collected from sources like cord blood, red bone marrow or embryo (blastocyst) and are kept in small, sterile vials.

(ii) Those vials are kept in liquid nitrogen at –135 °C to –190 °C.

***(6) What are the functions of tissue?** *(Can you recall; Textbook page no. 88)*

Ans. Functions of tissues are also based on its types. Connective tissue : Function is to give shape to organs and hold them in place.

Muscular tissues : cause movement.

Epithelial tissues : Protection of external / internal organs, absorption of water / nutrients and elimination of waste.

Secretion of enzymes and hormones.

Nervous tissue : Enables us to respond to stimuli like touch, sound, odour, colour etc.

***(7) Which are the various processes in tissue culture?** *(Can you recall; Textbook page no. 88)*

Ans. The various processes used in tissue culture are as follows:

(i) Selection of source plant.

(ii) Removal of Bulb corm of source plant.

(iii) Primary treatment of the part.

(iv) Reproduction and Multiplication.

(v) Shooting and Rooting

(vi) Primary hardening.

(vii) Secondary hardening.

***(8) Which new species of the rice have been developed in India?** *(Collect information; Textbook page no. 97)*

Ans.

(i) BPT 2270 (Bhavapuri Sannalu)

(ii) BPT 2231 (Akshaya)

(iii) Pusa 1460

(iv) RPB10226

***(9) Which products produced through biotechnology do you use in your daily life?**

Ans.

(i) Biodiesel

(ii) Household products : Washing detergents.

(iii) Bioplastic

(iv) Fabric

(v) Personal care products : Shampoos, skin care, etc.

(vi) Food and drink : Flavours, fragrances, Sweetners yoghurt, cheese, juicy and pulpy fruits, Golden rice, GM crops, bread, vinegar, wine, beer, etc.

(vii) Healthcare - Vaccines, antibiotics, etc.

Q.2.5. Give Scientific reasons:

(1) Herbicides tolerant plant varieties of crops are being developed.

Ans.

(i) Weeds always affect the growth of main crop.

(ii) If herbicides are used to destroy the weeds, it affects the main crop too.

(iii) So herbicide tolerant plant varieties of crops are being developed.

(iv) Due to this, it has become possible to selectively destroy the weeds.

(2) DNA fingerprinting is useful in forensic sciences and paternity testing.

Ans.

(i) DNA sample helps to establish identity of each individual.

(ii) Each individual has a unique DNA sequence pattern and so it is called as DNA fingerprint of each individual.

(iii) Identity of a criminal can be found easily from various sources of DNA (blood, semen, etc.) on a crime scene.

(iv) DNA fingerprinting is also done for paternity testing.

Q.3.1. Answer the following:

***(1) Why some of the organs in human body are most valuable?**

Ans. Various organs in human body become less efficient or completely functionless, due to various reasons like ageing, accidents, infections etc.

(ii) Life of such persons become difficult, miserable, uncomfortable. Sometimes fatality may also occur.

(iii) Many organs in human body remain functional for certain period even after death occurs under specific conditions.

(iv) These organs can be transplanted on donation.

Hence, certain organs like heart, kidneys, eyes, liver, heart valves, skin, etc. are more valuable.

***(2) Explain the importance of fruit processing in human life.**

Ans.

(i) Fruits are perishable agro - produce.

(ii) Fruits contain vitamins, proteins, minerals and dietary fibres.

(iii) There is a need to process fruits in order to increase their storage or shelf - life significantly.

(iv) Various products are prepared from fruits like chocolates, jams, juices and jellies and are used daily.

(v) Fruit processing is done in such a way that it can be used throughout the year.

(vi) Fruit processing include various methods ranging from cold storage to drying, salting, air tight packing, pickling, evaporating, etc.

***(3) Explain the meaning of Vaccination.**

Ans.

(i) Vaccine is the antigen containing material given to acquire either permanent or temporary immunity against a specific pathogen or disease.

(ii) Traditionally, vaccines were prepared with the help of pathogens which may be completely or partially killed.

(iii) However due to this, there were chances of contracting the disease in certain persons.

(iv) Hence, as an alternative, scientists have given artificially produced vaccines with the help of biotechnology.

(v) A safer vaccine was produced with the help of gene isolated from the pathogen and an antigen produced from it.

(vi) Now, proteins which act as antigens are injected in pure form instead of injecting the killed or semikilled pathogens.

(vii) These proteins keep the persons away from the disease by keeping the immune system active.

(viii) Vaccines produced with the help of biotechnology are more thermostable and remain active for longer duration. E.g. vaccines of polio, hepatitis etc.

(ix) Edible vaccines are produced in combination with transgenic potatoes. These potatoes will act against bacteria like *Vibri o cholerae* and *Escherichia coli* and consumption of such raw potatoes will generate immunity against cholera and various other disease caused by *E. coli.*

***(4) What is the impact of biotechnology on agriculture and other related fields?** *(Recall a little; Textbook page no. 91)*

Ans.

(i) Genetically modified crops are being produced by introducing changes in DNA of natural crops.

(ii) It has become possible to increase the per hectare yield irrespective of the limitations of crop-land area.

(iii) Expenses on disease control have minimized since development of resistant varieties.

(iv) Due to development of fast fruit setting varieties, yield per annum has been increased.

(v) Development of stress resistant varieties which can withstand variable temperature, water-stress, changing fertility of soil, etc. has become possible.

(vi) Biofertilizers, bioinsecticides have been developed with the help of biotechnology which prevent the soil from being polluted and increase the yield.

(vii) With the help of biotechnology, plants and microorganisms are used for absorption or destruction of toxic chemicals and harmful pollutants. This is called bioremediation.

(5) Why are artificial bee boxes used for Apiculture?

Ans.

(i) Worst method of harvesting / collecting the honey from bee hives is driving away the bees by smoking the hive with burning torch and then cutting the hive into pieces.

(ii) This causes destruction of hive and large scale death of bees.

(iii) Hence with artificial bee box it is easy to collect the honey without destroying the hive and bees.

(6) Explain the extraction of Insulin.

Ans.

(i) Earlier, insulin was being collected from the pancreas of horses.

(ii) Nowadays, due to biotechnology, insulin is prepared with the help of bacteria.

(iii) For this purpose, human insulin gene has been inserted into the genome of bacteria.

***(7) Give 5 examples of each of the fruiting and flowering plants developed through tissue culture and mention their benefits.** *(Make a list and discuss; Textbook page no. 93)*

Ans. Fruits and flowers developed through tissue culture are :

Fruits : Pineapple, Banana, Pomegranate, Papaya Apple, etc.

Flowers : Marigold, Rose, Shevanti, Lily, Gerbera daisy, etc.

Benefits of tissue cultured fruits and flowers:

(i) These are almost pest and disease resistant.

(ii) Mature plant is obtained in less time.

(iii) More plants with desired characteristics like bigger size, colourful fruits and disease resistance, etc. are obtained.

(iv) Planting is possible all through the year.

(v) Rare and endangered varieties also can be grown by tissue culture.

***(8) Which fruit processing industries you observe in your surrounding? What is their effect?** *(Make a list and discuss; Textbook page no. 99)*

Ans.

(i) Fruit processing industries like Jam making, Jelly-making industries are observed in the surrounding.

(ii) Fruit processing industries directly have a positive impact on higher productivity, improved quality and safety (in the farming sector).

(iii) It benefits the local farmers.

(iv) These industries power the wastage and increase the shelf life of fruits by involving scientific methods.

(v) These industries create employment in rural and semi urban regions and boost rural economy.

Q.3.2. Answer the following questions:

***(1) Mohan is suffering from Cirrhosis of Liver. His chances of survival is only 20%. Doctors are advising transplant of the Liver.**

(i) What are the 2 possibilities of saving Mohan's life.

Ans. Steam cell transplant and organ transplant are the two possibilities of saving Mohan's life.

(ii) What factor should be considered before transplant of the liver by Mohan and the donar.

Ans. Factors like blood group, disease, disorder, age, etc. of the donar and the recipient - Mohan should be checked.

(2) 2.5 years old yagnesh has met with an accident. He has lost his life. His parents want to donate his organs?

(i) Which organs can be donated after death.

Ans. Yagnesh parents can donate his heart, pancrease, kidneys, skin, bone, liver, lungs and eyes.

(ii) Which concept has convinced Yagnesh parents for donating his organs?

Ans. A liberal view behind the concept of organ and body donation is that after death. Our body should be useful to other needful persons so that their miserable life would be comfortable.

(3) Amol has renal failure. His Nephrologist has advised him renal transplant.

(i) Can his mother donate him one kidney?

Ans. Amol's mother can donate him one kidney as the process of excretion can occur with the help of single kidney.

(ii) What factors should be checked before transplant by the doctor for Amol's mother and Amol.

Ans. Doctor will cross check factors like blood group, disease disorder, age, etc. of the donar - Amol's mother and Amol i.e. recipient.

Q.3.3. Label the diagram and answer the questions below:

(1)

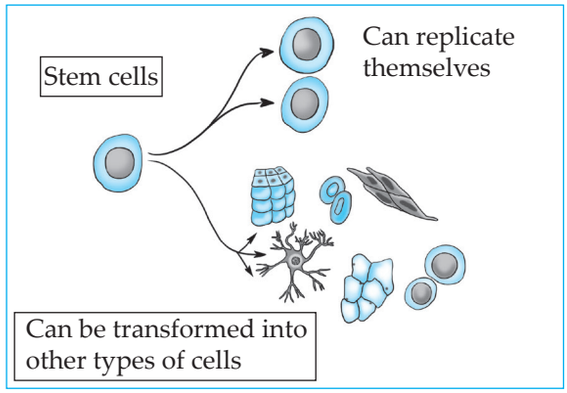


Fig. 8.1. Stem cell therapy

(a) Label the diagram and give a heading.

Ans. Stem cell therapy.

(b) Which type of cells are shown in the diagram?

Ans. Stem cells are shown in the diagram.

(c) Define the type of cells.

Ans. (i) Stem cells are special cells present in the body of multicellular organisms, formed at the blastocyst stage of embryonic development. (ii) These cells give rise to all other types of cells.

(d) Which cells can be formed due to the cell mentioned in the diagram?

Ans. Stem cell gives rise to neurons, hepatocytes, (liver cells), Osteocytes (bone cells).

(e) State any one use of these cells with respect to the diseases cured by it.

Ans. Diseases like diabetes, myocardial infarction, etc. can be cured by stem cells.

***(2)**

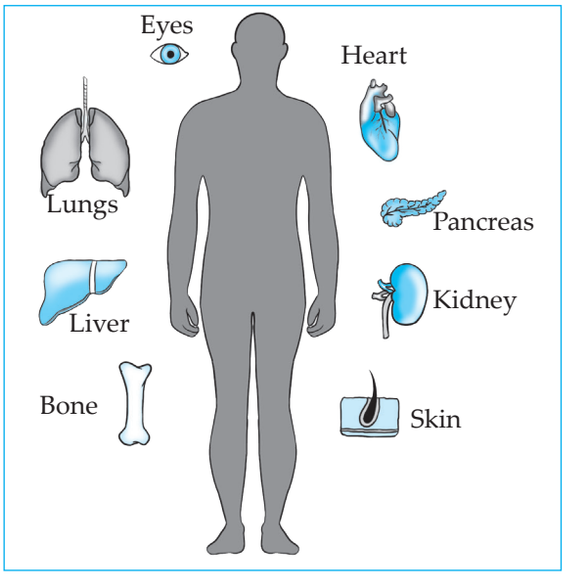


Fig. 8.2. Organs that can be donated

(a) Label the organs in the diagram and name the diagram / caption.

Ans. Organs that can be donated.

(b) List the organs that can be donated.

Ans. Organs that can be donated - eyes, lungs, liver, bones, heart, pancreas, kidney, skin

(c) What is posthumous donation?

Ans. Posthumous donation is donation of body and organs, after death.

***(3) Assign names in the figure given below. Explain the various stages those are kept blank.** *(Observe; Textbook page no. 88)*

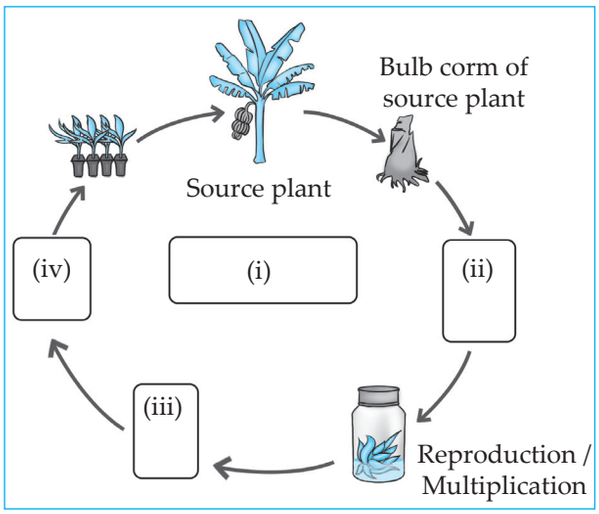


Fig. 8.3 Tissue Culture

Ans. (A) Various processes in tissue culture (B) Primary treatment (C) Shooting and rooting (D) Primary hardening

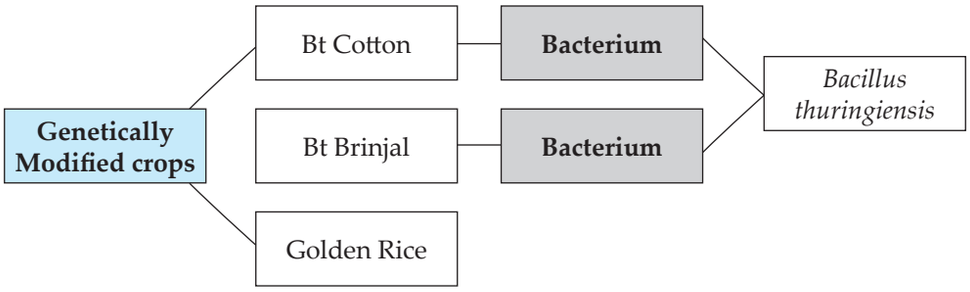
(i) The diagram represents the various processes in tissue culture staring with source plant.

(ii) Primary treatment : It is the initiation phase. Plant tissue is sterilized *In vitro* and initiated into culture.

(iii) Shooting and rooting : It is the phase of root formation. Hormones are introduced to induce rooting and also for the formation of a complete plantlet.

(iv) Primary hardening: Hardening is gradually exposing the plants to adjust to the environment conditions.

(4) Based on the Genetically modified crops fill in the blanks and answer the questions based on it.



(a) What is produced in the leaves of cotton plant?

Ans. Toxin.

(b) How does the bollworm die?

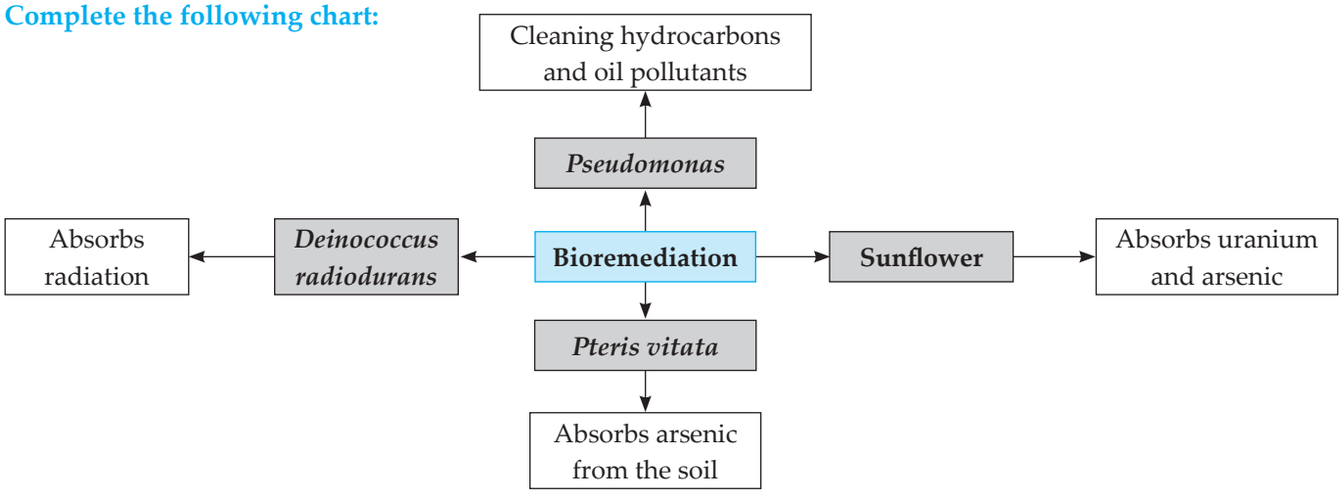
Ans. If the worm feeds on leaves, the toxin destroys its alimentary canal and the worm dies.

(c) Which type of gene is introduced in Golden Rice?

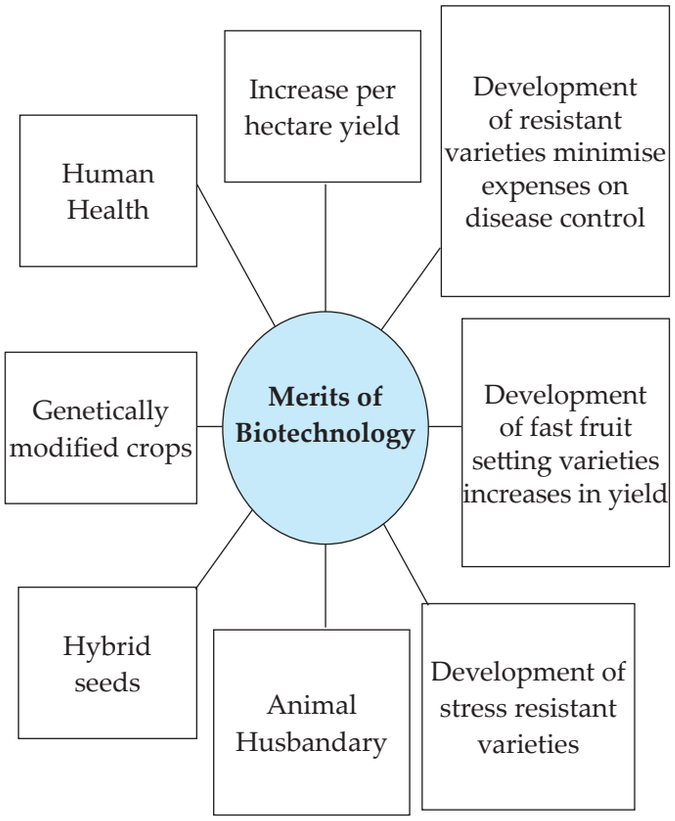
Ans. A gene synthesizing the Vitamin A (Beta Carotene) has been introduced is this variety of rice.

Q.3.4. Complete the following chart:

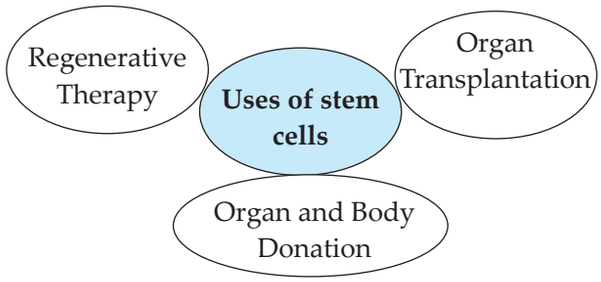
(1)



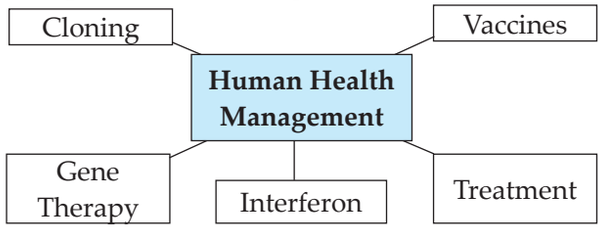
***(2)**



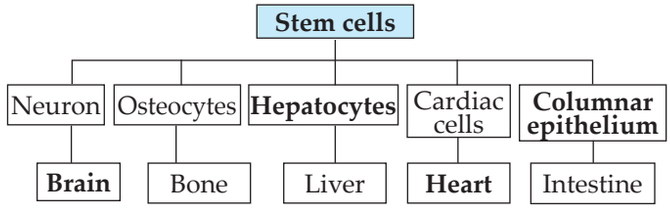
***(3) Write the correct answer in blank circles.**



(4) Complete the following chart.



(6) Complete the following chart.



Q.4.1. Explain the formation of transgenic potatoes with the help of a diagram.

Ans.

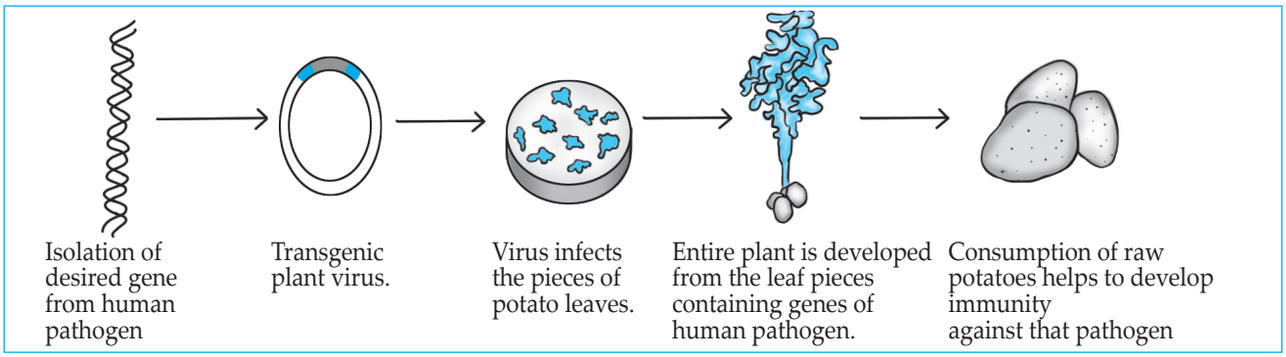


Fig. 8.4 Transgenic Potatoes

Q.4.2. Read the given paragraph and answer the questions:

(1)

Work on production of edible vaccines is in progress and presently, potatoes are being produced with the help of biotechnology. These potatoes are called as transgenic potatoes. These potatoes will act against bacteria like *Vibrio cholerae, Escherichia coli.* Consumption of these raw potatoes generates the immunity against cholera and the disease caused due to E. coli.

(a) Edible Vaccines are taken in which form of food?

Ans. Potatoes.

(b) What is the other name of this food?

Ans. Transgenic potatoes.

(c) List the bacteria against which these food will act.

Ans. *Vibrio cholerae, Escherichia coli.*

(d) Against which disease immunity is generated?

Ans. Immunity is generated against cholera and disease caused due to *E. coli.*

(2)

DNA sequence of each person is unique as that of the fingerprints. Due to this, identity of any person can be established with the help of its available DNA. This is called as DNA fingerprinting. It is mainly useful in forensic sciences. Identity of the criminal can be established with the help of any part of its body found at the site of crime. Similarly, identity of father of any child can be established. This research is performed in Centre for DNA fingerprinting and Diagnostics, Hyderabad.

(a) What is DNA fingerprinting?

Ans. Establishing identity of a person with the help of its available DNA is called as DNA fingerprinting.

(b) DNA fingerprinting is mainly used in which stream of science?

Ans. DNA fingerprinting is mainly used in forensic science.

(c) What is the use of DNA fingerprinting?

Ans. It is used to identify criminals. It is also used in parternal or maternal identification.

(d) Where is DNA fingerprinting research performed?

Ans. DNA fingerprinting research is performed at the 'Centre for DNA fingerprinting and Diagnostics', Hyderabad.

(3)

A sheep 'Dolly' was born in Scotland by cloning technique on 5th July 1996. Nucleus from the udder cell of sheep of 'Finn Dorset' variety had been introduced into enucleated ovum of Scottish sheep. Then, the ovum was allowed to develop in the uterus of Scottish sheep and thereby 'Dolly' had been born. It was showing the characters as per the chromosomes in nucleus and any character of Scottish sheep was not visible.

(a) In which year was the first cloning technique done?

Ans. The first cloning technique was done on 5th July 1996.

(b) Name the varieties of sheep breed used to form the clone.

Ans. Finn Dorset and Scottish sheep were breed used to form the clone.

(c) Explain the meaning of the word enucleated ovum.

Ans. Enucleated ovum means to remove nucleus of cell, and the cell loses all its genetic information.

(d) Whose character Dolly was showing and why?

Ans. Sheep Dolly was showing characters of Finn Dorset as nucleus which contains genetic material (DNA) from the udder cell of sheep Finn Dorset was taken and enucleated ovum of Scottish sheep was taken.

Q.4.3. Answer the following in detail:

***(1) Which precautions you will take during spraying of pesticide?**

Ans.

(i) Pesticides are in fact a type of poison. This poison enters the food web through water, food and its bio-magnification occurs.

(ii) Various pesticides like DDT, malathion, chloropyriphos, etc. are dangerous.

(iii) Precautions to be taken are as follows:

(a) Apply only recommended dose.

(b) Cover nose with cloth before spraying or even filling up the pump can of pesticide.

(c) Always wear gloves while handling the apparatus.

(d) Avoid spillage of pesticide.

(e) Do not smell the pesticide.

(f) Read the instructions carefully.

(g) Do not apply against the wind direction, rains, sunny day.

(h) Containers, buckets used for spraying should not be used for domestic purposes.

(i) Avoid entry of animals and workers in the field during spraying.

***(2) Write a comparative note on usefulness and harmfulness of biotechnology.**

Ans. Usefulness of biotechnology:

(i) Biotechnology has worked for human welfare.

(ii) There is considerable progress in the field of agriculture, pharmacy, plant as well as animal life.

(iii) Scientist have modified plants, animals, human beings using various techniques of biotechnology.

(iv) Biotechnology has modified shape, size, taste, seed/seedless fruits and vegetables.

(v) Reliable, rapid and consistent enzymes have been created which play a mojor role in food processing.

(vi) A number of dairy products are made available to us.

(vii) A number of human and animal diseases have found cure and prevention.

(viii) Biotechnology has modified plants to have their own pest resistant traits.

(ix) Diagnostic kits are available for various diseases.

Harmful effects of Biotechnology are as follows.

(i) High cost of genetic engineering apparatus.

(ii) Crosses between different species gives rise to hazardous organisms.

(iii) During experimentation when more Transgenic potatoes are grown, it can be life threatening

(iv) Thus, biotechnology should be balanced.

(3) What is Biotechnology? What are its commercial applications?

Ans.

(i) Biotechnology is bringing about artificial genetic changes and hybridization in organisms for human welfare.

(ii) Various branches of science like cytology, biochemistry, molecular biology and genetic engineering are included in biotechnology.

(iii) Commercial applications of biotechnology are as follows:

(a) Crop Biotechnology: Biotechnology is used in agricultural field to improve yield and variety, i.e. hybrid seeds, genetically modified crops, herbicide tolerant plants and biofertilizers.

(b) Animal Husbandry: Artificial insemination and embryo transfer are used to improve quality and quantity of animal products.

(c) Human Health: Diagnosis and treatment of the disease are two aspects of human health management.

(d) With the help of biotechnology, disease can be diagnosed before the onset of symptoms.

(e) Vaccines and vaccination, treatment, interferon, gene therapy, cloning, i.e. reproductive and therapeutic cloning are also some important developments of biotechnology.

(f) Industrial Products: Various industrial chemicals can be produced through less expensive processes.

(g) Environment - Biotechnology helps in solving various environmental problems.

(h) Food Biotechnology: Improved quality of food is produced with the help of micro organisms.

(i) DNA fingerprinting: Identity of any person can be established with the help of its available DNA.

❖ ❖ ❖

ASSIGNMENT - 8

Time : 1 hr. **Marks : 20**

Q.1. (A) Answer the following questions: **(3)**

(1) Fill in the blanks:

The disease related with synthesis of insulin is ..... .

(2) Find the odd one out:

Red bone marrow, adipose connective tissue, blood, neurons.

(3) Complete the analogy:

Interferon : ..... : : Erythropoietin : Anemia.

Q.1. (B) Choose and write the correct option: **(2)**

(1) From the following processes find the odd-one out ..... .

(a) Biopesticide (b) Biotertilizers (c) Biosensors (d) Biology.

(2) Phenylketonuria arises due to genetic changes in ..... .

(a) neurons (b) hepatocytes (c) osteocytes (d) blood corpuscles.

Q.2. Answer the following questions: (Any 2) **(4)**

(1) Write short note on : Biofertilizers

(2) Give Scientific reason:

Sewage should be released into rivers only after oxidation.

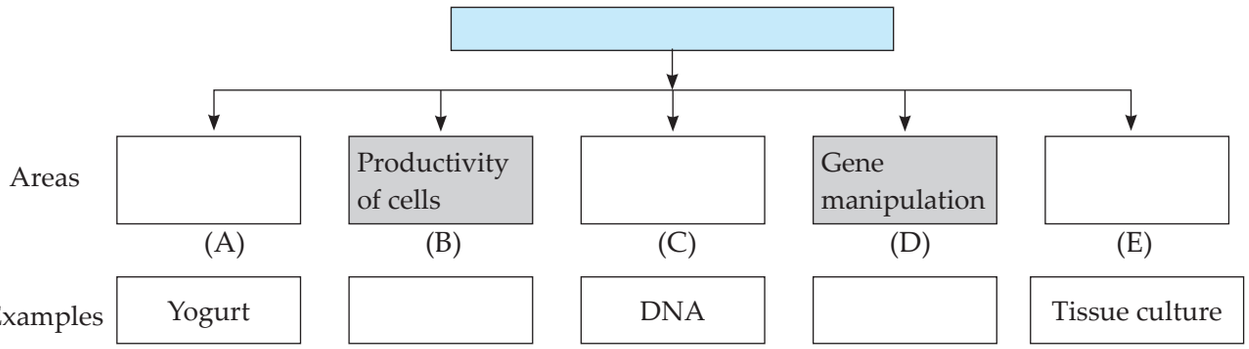
(3) 19 year old Trisha has died after meeting with an accident. Parents are in deep grief and have decided to opt for organ and body donation. What is basic thought process behind the parents action?

Q.3. Answer the following questions: (Any 2) **(6)**

(1) Explain the concept of Genetically Modified Crops.

(2) Explain DNA fingerprinting.

(3) Complete the following tree diagram based on main areas of biotechnology.



Q.4. Solve the following subquestions: (Any 1) **(5)**

(1) Draw a well labelled diagram of Transgenic potatoes and explain it.

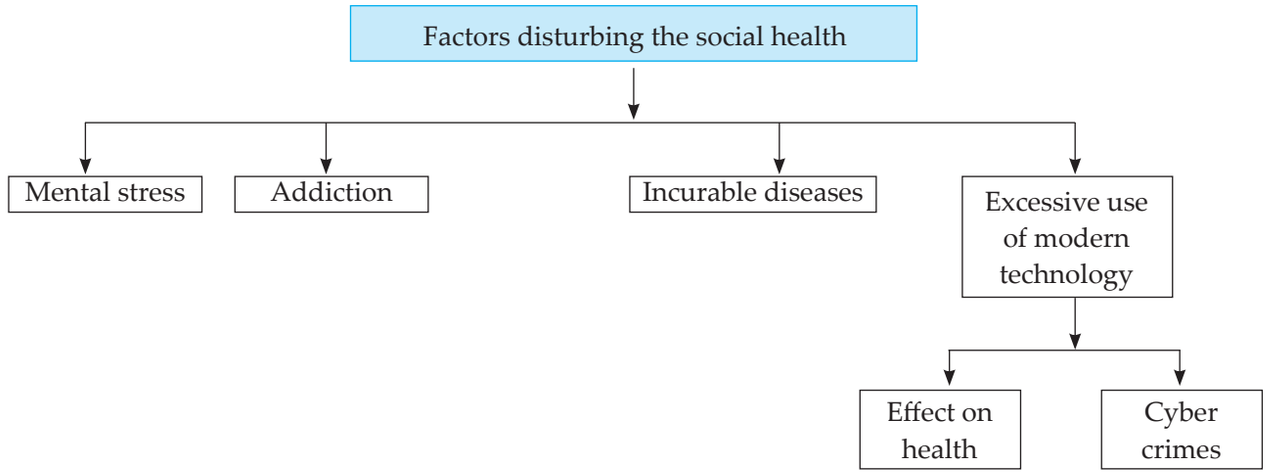
(2) Write a comparative note on usefulness and harmfulness of Biotechnology.

❖ ❖ ❖

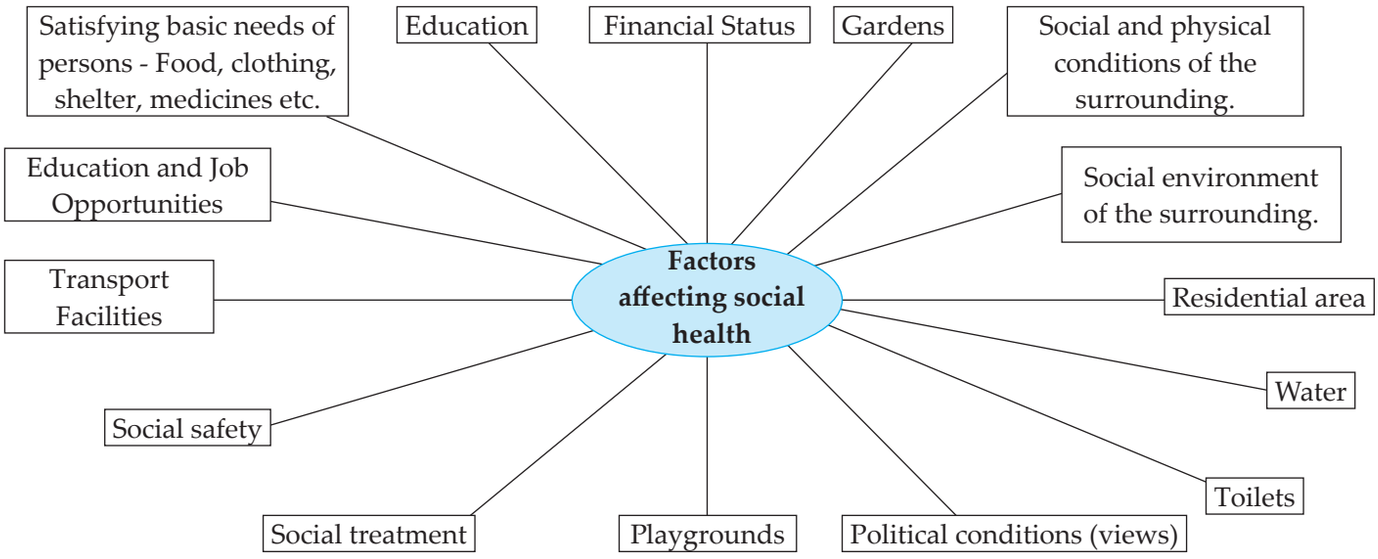
9 Social Health

CONCEPT MAP

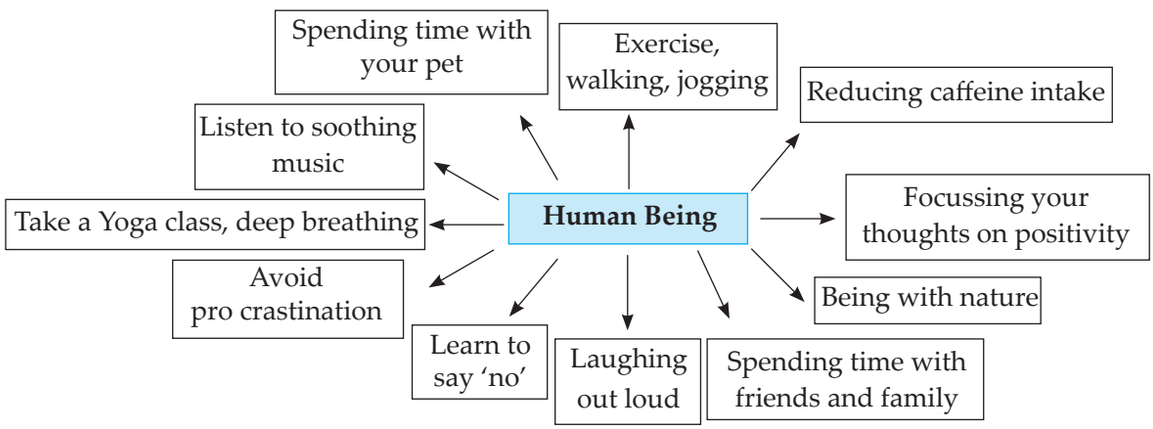
(1)



(2)



(3)



Points to Remember:

- Social health is the ability of a person to establish relationship with other persons.
- **Factors disturbing the social health**
- **Mental stress**
  - Competition has increased in opportunities for education, employment and business due to increase in population.
  - There are many bindings on girls and excessive freedom for boys in some families.
  - In our society, adolescent girls have to unnecessarily face the problems like teasing and molestation.
  - Everyone has to face the stress due to ever increasing disorder, crime and violence.
- **Addiction**
  - Children in early age try upon tobacco, cigarette, gutka, alcoholic drinks, drugs, etc. due to either peer group pressure or symbol of high standard of living or as an imitation of elders.
  - It may lead to addiction to such deadly substances
- **Incurable disease -** Factors like ignorance towards the people with incurable diseases like AIDS, T.B., leprosy and mental disorders as well as old people lead to increase in old age homes.
- **Communication media and excessive use of modern technology**
  - People spend time with cell phones for several hours are usually unaware of their surroundings. This is also a sort of addiction and leads to endangering of social health.
  - Various physical problems like tiredness, headache, insomnia, forgetfulness, tinnitus, joint pains and problems in vision may arise due to radiation of cell phones.
  - Children who watch cartoon films may imitate characters of those films.
  - Huge information available on internet is used for viewing some inappropriate videos too.
  - Person indulging in selfie is not aware about the world around and the risks. This is called as selfiecide.
- **Cyber Crimes**
  - Banking transaction are done using PIN without the knowledge of consumers.
  - Hacking information of the customers, government institutes, companies and misusing them.
  - Crimes like opening a fake account on facebook and displaying false information and thereby, harassing girls also take place.
- **Stress Management**
  - Various ways of expression like establishing communication with friends, peers, cousins, teachers and more importantly parents, noting down our feelings, expressing our feelings with near and dear ones help us to relieve stress.
  - Name of newly popularized concept is laughter club. These people relieve their mental stress by laughing loudly.
  - Fostering the hobbies help us to properly utilize free hours.
  - By diverting energy and mind towards positive thinking, negative thoughts are automatically neutralised.
  - Learning and listening to the music, singing keeps us happy and drives away stress.
  - Regular exercising, massaging, visiting the spa too helps to relieve stress.
  - Medical advice, counselling and psychotherapy are available for persons with serious problems like depression and frustration.
  - Unified movement against Tobacco has been started by various organizations.
  - This movement is active for controlling the tobacco consumption and providing guidance to activists against tobacco.
- **Salaam Mumbai Foundation**
  - This organisation runs programs in various schools in Mumbai to empower the children living in slum area in the field of education, sport, arts and business.
  - Phone number / helpline numbers are published in newspapers to help the children in distress or facing any type of problems. Proper help and guidelines are offered to children.

MASTER KEY QUESTION SET - 9

Q.1. (A) 1. Fill in the blanks and rewrite the statement:

*(1) Laughter club is a remedy to drive away ..... .

*(2) Alcohol consumption mainly affects ..... system.

*(3) The act ..... is to curb the cyber crimes.

(4) Ability to change one's own behaviour according to changing social conditions is an important characteristic of ..... .

(5) ..... girls have to unnecessarily face the problems like teasing and molestation.

(6) ..... has the power of changing the mindset.

(7) ..... is active for controlling the tobacco consumption.

(8) ..... is the ability of a person to establish relationship with other persons.

(9) ..... is produced from alcohol obtained through fermentation of substances.

(10) Persons continuously using the computers and internet develop problems like ..... and ..... .

(11) ..... unit has been newly launched in police department.

(12) ..... is the first state to start a separate cyber crime unit.

(13) ..... encourages children to take education by helping them to improve their health and lifestyle.

(14) Tobacco containing substances have ..... effect on mouth and lungs.

(15) ..... helps to improve concentration in the studies.

Ans. *(1) stress (2) nervous (3) IT ACT-2000 (4) social health (5) Adolescent (6) Music (7) Unified Movement against Tobacco (8) Social health (9) Liquor (10) autism, selfishness (11) Cyber crime (12) Maharashtra (13) Salaam Mumbai foundation (14) carcinogenic (15) meditation*

Q.1. (A) 2. State whether the given statements are True or False. Correct the false statement.

(1) Meditation helps students to improve concentration in their studies.

(2) Addictive person can think rationally.

(3) Website, movies and cartoon films inappropriate for children, are banned by the government.

(4) Children are facing problems of loneliness and mental stress due to nuclear family and parents staying outdoors for job.

(5) Brain development in adolescents is hindered due to alcoholism.

(6) Spending time with cell phones for several hours is a sort of addiction.

(7) Radiations of cell phones penetrate the bones of adults more effectively than the bones of children.

(8) Parents threatening or hitting the children is a type of mental illness.

(9) Person indulging in selfie is aware about the world around and the risks.

(10) Banks ask our PAN/Credit card/ debit card number on mobile phones.

(11) Committing cyber crimes is a mental illness.

(12) Yoga is limited to asanas and pranayam.

Ans. *(1) True (2) False : Addictive person cannot think rationally (3) True (4) True (5) True (6) True (7) False : Radiations of cell phones penetrate the bones of children more effectively than the bones of adults. (8) True (9) False. Person indulging in selfie is not aware about the world around and the risks. (10) False. Banks never ask our PAN / Credit Card/ debit card number on mobile phones. (11) True (12) False. Yoga is not just limited to asanas and pranayam but it includes discipline, balanced and good food and meditation also.*

Q.1. (B) Choose and write the correct option:

(1) Which of following mentioned factors are important for good social health?

(a) strong personality

(b) having large number of friends

(c) trust in others (d) all of the above

(2) All of the following are accepted stress management techniques except ..... .

(a) avoiding problem

(b) effective time management

(c) relaxation (d) exercise

Ans. *(1) (d) all of the above (2) (a) avoiding problem*

Q.2.1. Define the following:

(1) Piracy

Ans. Misuse or illegal sale of the written literature, software, photos, videos, music, etc. of others by obtaining it from internet or any other source is called as piracy.

(2) Selfiecide

Ans. Person indulging in selfie, is not aware about the world around and the risks is called as selfiecide.

(3) Social health

Ans. Social health can be defined as the ability of a person to establish good relations with other person.

Q.2.2. Answer the following:

***(1) Do you recall the sudden closing of any cartoon serial of foreign origin being telecast on television.** *(Recall a little; Textbook Page no. 104)*

Ans. Yes, the closing of cartoon named 'Shinchan'.

(2) What is called as hacking of information?

Ans. Confidential information about government, institute and companies, is obtained from internet with the help of computer programs or other ideas and they are misused. This is called as hacking of information.

(3) Which are the various ways that help us to relieve stress?

Ans. Various ways of expression like establishing communication with friends, peers, cousins, teachers and more importantly parents, noting down our feelings, expressing our feelings with near and dear ones help us to relieve stress.

(4) What are laughter clubs?

Ans. It is a newly popularized concept wherein, people come together in public places (park, garden) and laugh loudly for a fixed duration of time to relieve mental stress.

***Q.2.3. What will you do? Why?**

(1) You are spending more time in internet / mobile games, phone, etc.

Ans.

(i) Various physical problems like tiredness, headache, insomnia, forgetfulness, tinnitus, joint pains and problems in vision may arise due to radiations of cell phone.

(ii) These radiations penetrate the bones of children more effectively than the bones of adults.

(iii) Hence, I will make a conscious attempt to not spend more time in internet/mobile phones, games etc. I will cultivate some good hobby or play sports and concentrate on my studies.

(iv) I will even meditate to get rid of internet addiction.

(2) Child of your neighbour is addicted to tobacco chewing.

Ans.

(i) There can be carcinogenic effect of tobacco on mouth and lungs.

(ii) I will explain regarding harmful effects to both, parents and the child.

(iii) This will help their child overcome the addition. I will help him to cultivate some good hobby to divert his mind from tobacco.

(3) Your sister has become uncommunicative. She prefers to remain alone.

Ans.

(i) If my sister has become uncommunicative and prefers to remain alone which is an indication that she must be stressed with some worries.

(ii) As expressing our feelings with near and dear ones help to relieve the stress, I will try to talk to her. To divert the energy and mind towards positive thinking I will advise her to foster her hobby.

(iii) I will do also advise her to take up yoga or meditation.

(iv) I will try to discuss this with my parents also so that they can help her come out of the stress.

(4) You have to use free space around your home for good purpose.

Ans.

(i) I will plant trees, flowering plants and make a beautiful garden. I will also arrange for space for outdoor games.

(ii) I will see to it that it is not littered.

(iii) It will be a place where I can invite my friends and play games.

(5) Your friend has developed the hobby of snapping selfies.

Ans.

(i) Person indulging in selfie is not aware about the world around and the risks.

(ii) I will advise my friend to stop this weird behaviour as practice of taking selfies has led to many deaths.

(iii) I will suggest him that the habit of taking selfies many times a day is disturbing your personal, social and professional life.

(iv) I will recommend him to develop some hobbies like reading books or playing sports to help him get rid of this habit.

(6) Your brother studying in XII has developed stress.

Ans.

(i) Competition has increased in education, employment and business due to increaseing population.

(ii) As expressing feelings helps to relieve stress, I, along with my parents will help my brother to relieve his stress by talking and discussing with him.

(iii) I will also help him by giving him suggestions about ways to cope up with studies and help him with time management.

(iv) I will advise him to go for regular exercise, yoga and meditation to improve his concentration and relieve stress.

(v) I will explain him the importance of balanced diet and good food to relieve stress.

(vi) Also, I will advise him to take regular breaks from studies and nurture a hobby which will help him to relieve stress and concentrate better in studies.

Q.2.4. Give examples of each:

***(1) Hobbies to reduce stress**

Ans. Photography, reading, cooking, drawing, dancing.

***(2) Diseases endangering social health.**

Ans. AIDS, T.B., leprosy and mental disorder.

***(3) Physical problems arising due to excessive use of mobile phones.**

Ans. Tiredness, headache, insomnia, forgetfulness, tinnitus, joint pains and problems in vision.

***(4) Activities under the jurisdiction of cyber crime laws.**

Ans. Hacking of information, video piracy, sending derogatory messages, cyber bullying, introducing computer viruses, sending vulgar pictures, exchange of information and phone number, etc. are activities under the jurisdiction of cyber crime laws.

(5) Things which are addictive.

Ans. Tobacco, alcohol, drugs, taking selfies.

***Q.3.1. Answer the following:**

(1) Which factors affect the social health?

Ans. Following are the factors affecting social health:

(i) Satisfying basic needs of a person. Food, Clothing, Shelter, Medicines

(ii) Education

(iii) Financial status

(iv) Social and physical conditions of the surrounding

(v) Social environment of the surrounding

(vi) Education and job opportunities

(vii) Social safety

(viii) Social treatment

(ix) Political conditions (views)

(x) Residential area

(xi) Water

(xii) Toilets

(xiii) Transport facilities

(xiv) Gardens

(xv) Play grounds

(2) What changes occur in persons an continuous usage of internet and mobile phones?

Ans.

(i) Various physical problems like tiredness, headache, insomnia, forgetfulness, tinnitus, joint pains and problems in vision may arise due to radiations of cell phones.

(ii) These radiations penetrate the bones of children more effectively than the bones of adults.

(iii) Person continuously using the computers and internet becomes solitary.

(iv) Chronic effect of such tendency is that they are not ready to help others in need and hence they also do not get help when in need.

***(3) Explain details on happening about blue whale game.** *(Recall a little; Textbook Page no. 104)*

Ans.

(i) The Blue whale is a killer online game of inflating proportions that nobody has reliably encountered.

(ii) It is a sequence of online dares that participant must progressively engage in to get ahead.

(iii) These include etching a blue whale an your skin and jumping off buildings.

(iv) There have been at least three reported suicides in India of youth who were playing or had searched for the game online.

(4) Write a note on Salam Mumbai Foundation.

Ans.

(i) Salaam Mumbai Foundation runs programs

empower the children living in slum area in the field of education, sports, arts and business.

(ii) This organization encourages the children to take education by helping them to improve their health and lifestyle.

(iii) This trust has made some districts in Maharashtra completely tobacco-free through hard work.

(iv) Since the year 2002, this organization is working with various schools in urban and rural area for making the society tobacco-free.

(v) This programme is being implemented with the help of government in about 200 schools in Mumbai and 14000 schools in the rest of Maharashtra.

(vi) The oath of freedom from tobacco is taken is every school as per the government letter.

*Q.3.2. Answer the following questions:

***(1)** **Whether the incidence shown in the following picture is rational? Express you opinion.** *(Think; Textbook Page no. 103)*

Fig. 9.1 An incidence

Ans.

(i) The incidence shows that a woman is misbehaving with a person who looks old and may be suffering from some incurable or chronic disease.

(ii) Misbehaving with or mistreating such person will add to his/her sufferings.

(iii) So it is not at all rational to behave in this manner rather we should have an approach to help such persons. Taking care, talking with the old person will help him to ease his suffering.

***(2)** **Two caricatures presenting the situations of the year 1998 and 2017 about playing on playground are given below. Observe those caricatures. Express your opinion about arising of such different situations.** *(Observe; Textbook Page no. 103)*

Fig. 9.2 Different Situations

Ans.

(i) For over a period of time, there is a decline in the time which children used to play out door games.

(ii) Children are staying indoors playing computer games or spending time on mobile phones rather than going outside and playing.

(iii) Research shows outdoor play is much more than just fun. It is necessary to help kids be physically and mentally fit and healthy.

(iv) Thus, in the above caricatures it is shown that in 1998 where the kids were spending more time than needed outside playing. So, the mother at that time used to forcibly take them in. But in today's modern times, the mother has to make her kid stay away from the gadgets and force him/her to play outdoor games.

***(3)** **Observe the images. Is it rational? Why?** *(Observe; Textbook Page no. 104)*

Fig. 9.3 Boy using cell phone while eating

Fig. 9.4 Selfie on Road

Ans.

(i) In the first image, the boy is using cell phone while eating. It is wrong as it can affect proper digestion of food. Since the boy is focused on mobile, he will not be chewing the food well before swallowing. He might mistakenly eat something which he should not consume.

(ii) In the second image, there is a person taking selfie on road. It is wrong as it can lead to accidents and the person, may lose his life. For the sake of safety, selfies should not be taken on places like train/bus stop/ railway track, on a roller coaster, with wild animals, busty streets and high ways, high cliffs and near water bodies.

***(4)** **Have you ever seen the persons inebriated with drugs or liquor loitering on dirty places? Whether such a pitiful condition of most intelligent human being is acceptable?** *(Can you tell?; Textbook Page no. 103)*

Ans.

(i) It is a pitiful sight and condition to see any person walking in public places inebriated with drugs or liquor.

(ii) Drugs as well as liquor majorly affects the nervous system and the control over the action of a person is lost.

(iii) Apart from the person being affected, the family and vicinity is caused harm and gets distressed.

(iv) Hence, such a condition of human is not acceptable.

***(5)** **Why is there increase in news of death by drowning in ocean, falling in deep valleys or under trains while taking the cell phone selfie?** *(Question from Textbook Page no. 104)*

Ans.

(i) Person indulging in selfie is not aware about the world around and the risks.

(ii) Some people can go to the extremes to capture the "perfect selfie" ignoring the dangers.

(iii) Young people want to impress others and they don't even care about the dangers.

(iv) Thus, there is increase in news of death by drowning in ocean, falling in deep valley or under trains while taking the cell phone selfie.

***(6)** **There is increasing competition to upload the videos of road accidents instead of helping the victims. What is the mentality of such people?** *(Question from Textbook Page no. 104)*

Ans.

(i) Now a days there is a trend going on between friends that who got many views / likes / comments. To achieve and so they post accident videos.

(ii) People are so engrossed in their virtual life that they are ignoring the humanity.

(iii) Thus, people are getting attached with virtual stuff and are least bothered about, what is going on around them.

***(7)** **Why are the video-clips of parents threatening or hitting the children not studying as per their wish or domestic helpers beating the children are very common on social media nowadays?** *(Question from Textbook Page no. 104)*

Ans.

(i) Domestic violence against children has adverse effect on their physical as well as mental growth.

(ii) If video clips of parents threatening or hitting the children not studying as per their wish or domestic helpers beating the children are uploaded, the people doing such abuse will think twice before doing any such thing.

***(8)** **Why do you wait for periods of music, P.T., drawing in the classroom?** *(Can you tell?; Textbook Page no. 106)*

Ans.

(i) Learning music and drawing, listening to the music, singing keeps us happy and drives away the stress.

(ii) Physical training improves discipline, interaction and tendency of unity. Loneliness is driven away.

(iii) Since these periods help us to get a break, drives away stress and loneliness, and keep us fit, we wait for these periods.

***Q.3.3. Solve the following cross words:**

(1) Continuous consumption of alcoholic and tobacco-materials.

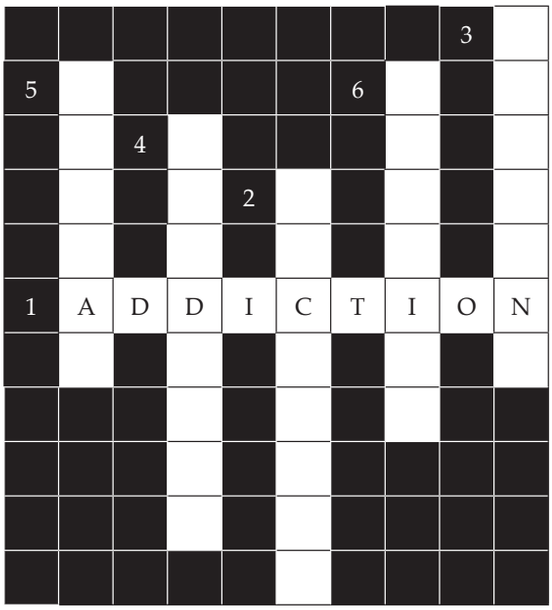
(2) This app may cause cyber crimes.

(3) A remedy to resolve stress.

(4) Requirement for stress free life.

(5) Various factors affect ..... health.

(6) Art of preparing food items.



Ans. *(1) ADDICTION (2) FACEBOOK (3) SINGING (4) GOOD FOOD (5) SOCIAL (6) COOKING*

Q.4. Answer in detail:

(1) Which problems does the common man face due to incidence of cyber crime?

Ans. Following problems are faced by common man due to incidence of cyber crime:

(i) Consumers are deceived by showing superior items on websites but actually selling items of either inferior quality or impaired ones.

(ii) Bank transactions are done using PIN without the knowledge of consumers causing financial loss.

(iii) Confidential information about government institutes and companies is obtained from the internet with the help of computer programs or other ideas and misused. This is called as hacking of information.

(iv) Crimes like opening a fake account on Facebook and displaying false information and thereby teasing the girls or exploiting them financially.

(v) Piracy of written literature, software, photos, videos, music, etc.

(vi) Electronic media is also misused by sending derogatory messages, spreading vulgar pictures and inflammatory statements.

(vii) Our personal information and phone numbers are spread through email, facebook and whatsapp and reaches unwanted persons. This leads to malpractices like incoming of unnecessary messages. Some of such messages either impair or shut down mobiles and computers.

(2) Explain the importance of good communication with others.

Ans.

(i) Communication is the foundation of all human relationships, it plays a vital role in human life.

(ii) Communication helps to spread knowledge and information among people.

(iii) Communicating helps people to express their ideas and feelings, and helps us to understand emotions and thoughts of others.

(iv) Importance of communication cannot be underestimated.

(v) It also helps us to relieve stress.

(vi) We should learn how to communicate effectively to make our lives better.

(3) Which are the various ways to minimize stress?

Ans. Ways to Minimize Stress:

(i) Joining a laughter club.

(ii) Communication with friends, peers, cousins, teachers and parents, noting down our feelings, expressing our feelings with near and dear ones help us to relieve stress.

(iii) Fostering hobbies like material collection, photography, reading, cooking, sculpturing, drawing, rangoli, dancing, etc. helps to divert energy and mind towards positive energy.

(iv) Learning and listening to music, singing helps to change the mindset and keep us happy.

(v) Regular exercising, massaging, visiting the spa also helps to relieve the stress.

(vi) Deep breathing, Yogasanas, Yogic sleep, meditation, balanced and good food also help to impart positivity and relieve stress.

(vii) Time management, planning of our own duties and decision power are also effective ways of stress management.

***(4) What type of changes occurs in a home having chronically ill old person? How will you help to maintain good atmosphere?**

Ans.

(i) The quality of life of family member as well as of chronically ill old person can be hugely reduced in terms of physical, psychological and social problems.

(ii) Family members experience emotions such as worry, frustration and stress.

(iii) The work life of family members is affected.

(iv) The family has to bear with the behavioral disturbances in the patient.

(v) There is financial pressure on the family due to medical expenses.

(vi) Meeting social workers, rehabilitation therapists, and physicians regularly can help the family members to take care of the ill old person.

(vii) Taking care, talking with the old person counselling the family members will not only ease his/her suffering but also help in maintaining good atmosphere at home.

ASSIGNMENT - 9

Time : 1 hr. **Marks : 20**

Q.1. (A) Answer the following: **(3)**

(1) Fill in the blanks:
Laughter club is a remedy to drive away ..... .

(2) State whether True or False:
Persons continuously using internet become solitary.

(3) Give one example: Hobby to reduce stress.

Q.1. (B) Choose and write the correct option: **(2)**

(1) ..... which of the following factors are important for good social health?
(a) Personality (b) Having large number of friends
(c) Trusting other (d) All the above

(2) All of the following are accepted stree management technique except ..... .
(a) avoiding problem (b) effective time management
(c) relaxation (d) exercise

Q.2. Answer the following: (Any 2) **(4)**

(1) What is hacking of information? (2) List the factors which affect social health.

(3) See the picture and answer the following questions.

(a) What do you think is seen in the picture?
(b) Is it an appropriate action ? Why ?

Q.3. Answer the following: (Any 2) **(6)**

(1) What will you do? Why?
Your friend has developed the hobby of snapping selfies.

(2) Is the action shown in the picture a sensible action? Explain.

(3) Write a short note on Salaam Mumbai foundation.

Q.4. Answer the following: (Any 1) **(5)**

(1) Explain the various ways to minimise stress.

(2) Which problems does the common man face due to incidences of cyber crime?

❖ ❖ ❖

10 Disaster Management

CONCEPT MAP

(1)

Types of Disaster

- **Geophysical**
  - **Geological** → eg. Tsunami, earthquake, volcano, landslide, flooding etc.
  - **Atmospheric** → e.g. Hot and Cold waves, snow, storms, floods, draughts, snowfall, hail strom, etc.
- **Biological**
  - **Plant** → e.g. Forest fire, destruction of water by aquatic weeds and destruction of land by common grass, etc.
  - **Animal** → e.g. Infectious bacteria,viruses cause diseases like cholera, malaria, plague hepatitis; bites of poisons animals, etc.
- **Man-made**
  - **Unpredictable** → e.g. Leakage of poisonous gas, radiation of atomic teasts, unplanned accidents, etc.
  - **Intentional** → e.g. War, fire, bomb blast, forced migration, child labour, rape, terrorism, etc.

(2)

Nature and Scope of Disaster

3 Aspects

- **Phase of emergency**
  - (1) Research and reuses
  - (2) Medical
  - (3) First aid
  - (4) Restoring communication services.
  - (5) Removing people from affected area.
- **Transitional Phase**
  - (1) Rehabilitation work
  - (2) Clearing debris
  - (3) Restoring water supply
  - (4) Repairing roads
  - (5) Offering aid.
- **Reconstruction phase**
  - (1) Construction of building
  - (2) Eacilities like road and water supply are restored.
  - (3) Setting life to normalcy

(3)

Phases of disaster

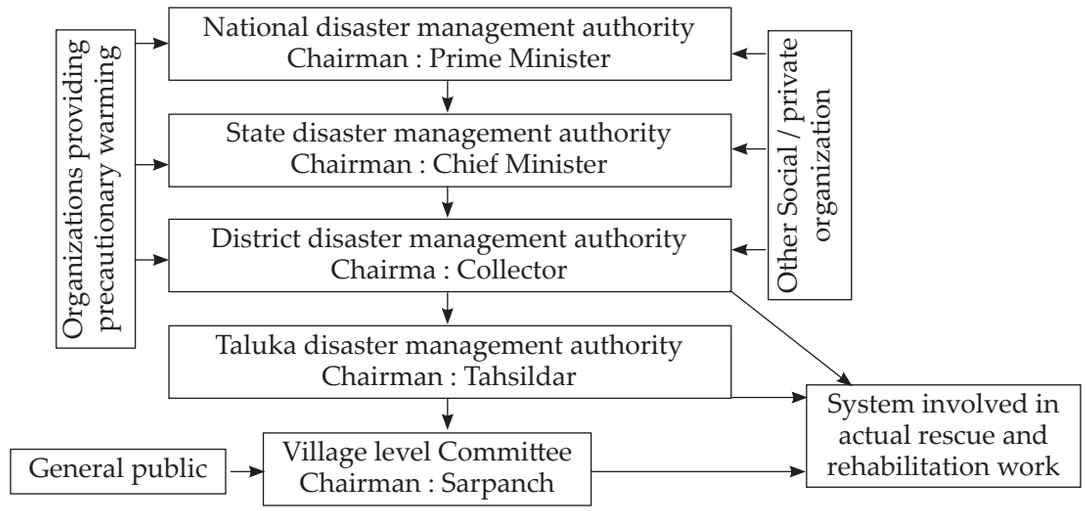
- Emergency phase
- Warning phase
- Rehabilitation phase
- Pre disaster phase
- Recovery phase
- Reconstruction phase

(4)

Disaster Management

- **Pre-disaster management**
  - (1) Identification of pre-disaster areas.
  - (2) Collection, information about the identity of disaster and probable sites of disaster.
  - (3) Getting special training for disaster management
  - (4) Increasing awareness about disaster management
- **Post disaster managment**
  - (1) Providing all types of necessary help to victims of disaster.
  - (2) Participation of preferably local people saved from disaster.
  - (3) Categorization of the help material received from control centre
  - (4) Being prepared for disaster

(5)



Points to Remember:

- Various dangerous events occurring many times in the environment are called as **disasters**.
- United Nations has defined the disaster as '**sudden event that leads to the huge loss of life and property**'.
- As the disasters occur suddenly, they **cannot be predicted**. Hence, precautions are not possible. Reasons behind each disaster are also different.
- Period of each disaster is also not same. Some disasters are **short term** whereas some are **long term**.
- Various areas of life like **economic, social, cultural, political, law and administration** etc. are affected by disaster.
- Disasters making the impact for long duration are those whose after effects are either **severe or severity increases with time.**
- **Cyclones, earthquakes, famines, floods, droughts, etc.** are some of the disasters.
- Disasters are classified into following three types: **(i) Geophysical (ii) Biological (iii) Man-made.**
- Disasters definitely affect the **economy** of the nation.
- An effect of disaster on **social leadership** is that if local leadership is not strong enough, citizens become confused.
- Taking into consideration the scope of disaster, some of the important facts must be thought over, as follows: **• Pre-disaster phase • Warning phase• Emergency phase • Rehabilitation phase • Recovery phase • Reconstruction phase**
- The important aspects of disaster are -

  (i) Phase of emergency (ii) Transitional phase (iii) Reconstruction phase
- There is a great threat to human being in the form of atomic energy plants. The risk of **radiation leakage** is increasing due to carelessness.
- **Disaster management** is either prevention of disasters or making arrangements to face it or at least achieve the abilities to face them. There is a close relationship between **disaster management** and **public participation.**
- Though avoidance of natural disaster is impossible, loss out of it can be **minimized.** However, man-made disasters can be **avoided.**
- **Helping each other** in the crisis of disaster is our **ethical responsibility.**
- **Mock drill** is a practice to check the preparedness of facing the disaster as early as possible within includes the demonstrations like **extinguishing the fire, rescuing the people trapped at higher floors of buildings, rescuing the persons whose clothing have caught fire, etc.**
- The disaster management schemes should be changed with respect to **location, time and nature** of the disaster.

MASTER KEY QUESTION SET - 10

Q.1. (A) 1. Fill in the blank and rewrite the statement:

(1) Spreading of weeds is ..... type of disaster.

(2) At the time of disaster, the ..... leadership plays very important role.

(3) The disaster management act has been established in ..... .

(4) The rehabilitation work starts in ..... phase.

(5) Various dangerous events occur many times in the environment are called ..... .

(6) ..... is arranged on disaster of fire in various schools by the fire fighters.

(7) The helpline number of Disaster Control Unit is ..... .

(8) Collapsing of houses, developing cracks in land are some of the effect of ..... .

(9) Search and rescue operations take place during ..... phase.

(10) Facilities like roads and water supply are restored in ..... phase.

(11) Most of the disasters have occurred in the ..... continent and ..... ocean.

(12) Radiation leakage occured after a blast in atomic energy plant at ..... in Russia.

(13) ..... in the Chairman of the State disaster management authority.

(14) ..... in the Chairman of the District disaster management authority.

(15) It is necessary to have material for ..... with us.

(16) Cyclone is a ..... type of disaster.

(17) The headquarter of the National Disaster Response Force is located in ..... .

Ans. *(1) biological (2) local (3) 2005 (4) transitional (5) disasters (6) Mock drills (7) 108 (8) earthquake (9) emergency (10) reconstruction (11) Asian, Pacific (12) Chernobyl (13) Chief Minister (14) Collector (15) first aid (16) Natural (17) Delhi*

Q.1. (A) 2. Find the odd one out:

(1) Volcano, earthquake, land-slides, cyclones.

Ans. Cyclones - Others are geological disasters whereas cyclone is an atmospheric disaster.

(2) Atomic tests, snow fall, war, bomb blast.

Ans. Snow fall - Others are man made disasters whereas snowfall is a geophysical disaster.

(3) Terrorism - earthquake, cyclones, flooding.

Ans. Terrorism - Others are geophysical disasters whereas terrorism is a man-made disaster.

(4) Hand gloves, shampoo, soap, medicated cotton.

Ans. Shampoo - Others are tools of first aid kit.

(5) Transitional phase, reconstruction phase, phase of emergency, disaster management.

Ans. Disaster management - Others are aspects of disaster.

(6) Tahsildar, general public, collector, chief minister.

Ans. General public - Others are disaster management authority

(7) Resurgence, restoration, redemption, repetition.

Ans. Repetition - Others are main aspects of disaster management cycle.

(8) Earthquake, forest fire, fungal disease, weed.

Ans. Earthquake - Others are biological disorders whereas earthquake is a geophysical disorder.

(9) 100, 101, 201, 108.

Ans. 201 - Others are helpline numbers.

(10) Search operations, first aid, migration, regulating water supply.

Ans. Regulating water supply - Others are actions of phase of emergency whereas restoring water supply is an action of transitional phase

(11) Bomb blast, tsunami, cyclone, flood.

Ans. Bomb blast - Others are natural disaster and Bomb blast in man-made.

(12) Cotton, antiseptic, petroleum jelly, antigens.

Ans. Antigens - Others are materials in the first aid kit antigen is not.

Q.1. (A) 3. Complete the analogy:

(1) Cyclones : Atmospheric :: Earthquake : .....

Ans. Geophysical

(2) Volcano : Geological :: Bomb blast : .....

Ans. Man-made

(3) Tsunami : Geological :: Hail storm : .....

Ans. *Atmospheric*

(4) Pests : Animals :: Weeds : .....

Ans. Plants

(5) Chief Minister : State authority : : Prime Minister : .....

Ans. National authority

(6) Search and response operations : Phase of emergency :: Clearing of debris : .....

Ans. Transitional phase

(7) 101 : Fire fighting force :: Disaster control unit : .....

Ans. 108

(8) Bhopal Tragedy : 1984 :: Landslide in village Malin : .....

Ans. 2014

(9) Japan : Hiroshima :: Russia : .....

Ans. Chernobyl

Q.1. (A) 4. Write the difference in one sentence.

(1) Transitional phase and Reconstruction phase.

Ans. Transitional phase:- Rehabilitation work starts after the subsidence of any type of disaster.

Reconstruction phase:- People reconstruct their buildings and facilities like roads and water supply are restored.

(2) Pre-disaster management and Post-disaster management.

Ans. Pre-disaster management:- This includes the complete preparation and planning to prevent any type of disaster.

Post-disaster management:- Providing all types of necessary help to victims of disasters.

(3) Redemption and Restoration.

Ans. Redemption:- Plan for minimizing the damage to the society and country.

Restoration:- This is an important link between measures after disaster and national development.

(4) Response and Resurgence.

Ans. Response:- Response to the disaster is to be given immediately after the incidence.

Resurgence:- Resurgence is an important link between emergency measures and national progress.

(5) Phase of emergency and Reconstruction phase.

Ans. Phase of emergency:- Important character of this phase is that maximum lives can be saved by quick actions.

Reconstruction phase:- People construct their buildings and facilities like roads and water supply are restored.

Q.1. (A) 5. Match the columns:

(1)

Column 'A'	Column 'B'
(1) Redemption	(a) Link between emergency measures and national progress
(2) Restoration	(b) Plan for minimizing the damage.
(3) Resurgence	(c) Plan is prepared to minimize destruction.
(4) Preparation	(d) Link between measures after disaster and national development.

Ans. *(1 - b); (2 - d); (3 - a); (4 - c)*

(2)

Column 'A'	Column 'B'
(1) War	(a) Atmospheric disaster
(2) Volcano	(b) Biological disaster
(3) Cyclones	(c) Geological disaster
(4) Infectious virus	(d) Man-made disaster

Ans. *(1 - d); (2 - c); (3 - a) (4 - b)*

(3)

Column 'A'	Column 'B'
(1) 102	(a) Fire fighting force
(2) 101	(b) Police
(3) 108	(c) Ambulance
(4) 100	(d) Disaster Control Unit

Ans. *(1-c); (2-a); (3-d); (4-b)*

(4)

Column 'A'	Column 'B'
(1) Tahsildar	(a) District disaster management
(2) Prime Minister	(b) Village level committee
(3) Sarpanch	(c) State disaster management
(4) Collector	(d) National disaster management
	(e) Taluka disaster management

Ans. *(1-e); (2-d); (3-b); (4-a)*

(5)

Column 'A'	Column 'B'
(1) Phase of emergency	(a) Takes long time
(2) Reconstruction phase	(b) After the subsidence of any disaster.
(3) Transitional phase	(c) Search and rescue operations
	(d) Measures before disaster

Ans. *(1-c); (2-a); (3-b)*

Q.1. (A) 6. State whether the following statements are true or false. Correct the false statement:

(1) Disaster leads to huge loss of life and property.

(2) Worker's strike is a natural disaster.

(3) Bomb blast is a geophysical disaster.

(4) Disaster Management Act was passed in our country in 2005.

(5) At the district level, Tahsildar is responsible for disaster management.

(6) Reconstruction phase takes very long time for proper reconstruction.

(7) Radiation leakage occurred after a blast in Malin.

(8) We should not touch any unclaimed object.

(9) Mock drill creates fear among people.

(10) Gravity of disaster can be estimated in the phase of emergency.

(11) Earthquake, volcano, tsunami are atmospheric disorders.

(12) Maximum lives can be saved by quick actions during phase of emergency.

(13) Gravity of the disaster can be estimated in reconstruction phase.

(14) Rehabilitation of the victims is an important aspect of reconstruction phase.

(15) Disasters have been increased after World War-II.

(16) Production and use of harmful chemicals is common in developed countries.

(17) It is possible to avoid natural disaster.

Ans. *(1) True (2) False. It is man-made disaster. (3) False. It is man-made disaster. (4) True (5) False. At the district level collector is responsible for disaster management while Tahsildar at Taluka level. (6) True (7) False. Radiation leakage blast occured in Cherobyl while a huge landslide resulted in a disaster in Malin. (8) True (9) False. Mock drill helps to check the efficiency of the system. (10) True (11) False. Earthquake, volcano, tsunami are geological disorders. (12) True (13) False. Gravity of the disaster can be estimated in phase of emergency. (14) False. Rehabilitation of the victims is an important aspect of transitional phase. (15) True (16) False. Production and use of harmful chemicals is banned in developed countries. (17) False. It is impossible to avoid natural disaster.*

Q.1. (A) 7. Answer the following in one sentence:

*(1) What is a disaster? *(Can you recall; Textbook Page No. 109)*

Ans. A disaster is a sudden event that leads to huge loss of life and property.

*(2) Which are the two main types of disasters? *(Can you tell; Textbook Page No. 109)*

Ans. The two main types of disasters are natural and man-made disasters.

*(3) What is first aid?

(Can you tell; Textbook Page No. 116)

Ans. First aid is emergency care or treatment given to a sick or injured person until proper medical treatment is available.

*(4) What are effects produced on health due to disasters?

Ans. Effects on the health are

(i) injuries (ii) emotional and mental stress (iii) outbreak of epidemics (iv) mortality of victims.

(5) List down reasons due to which conditions of instability in the country arise.

Following are the reasons due to which instability in the country arises:

Ans. (i) economy inequality (ii) social and religious differences (iii) terroristic and social difference etc.

(6) Which disaster occured in village Malin in 2014?

Ans. In 2014, village Malin is Tal, people faced a huge landside in district Pune.

Q.1. (B) Choose and write the correct option:

(1) Wild animal attack is ..... type of disaster.

(a) atmosphere (b) migration
(c) geological (d) biological

(2) The chairman of village level committee is ..... .

(a) Sarpanch (b) Chief Minister
(c) Collector (d) Prime Minister

(3) Tsunami is a ..... type of disaster.

(a) biological (b) man-made
(c) geological (d) plants

(4) The important link between measures after disaster and national development comes under ..... .

(a) preparation (b) restoration
(c) resurgence (d) impact of disaster

(5) The disaster management act passed in our country in ..... .

(a) 2004 (b) 2007 (c) 1998 (d) 2005

(6) In 2014, there had been a huge ..... in the village Malin.

(a) cyclone (b) volcano eruption
(c) landslide (d) bomb blast

(7) Disasters definitely affect the ..... of the nation.

(a) economy (b) geography
(c) health (d) pollution

(8) The disaster management schemes should be changed with respect to ..... of the disaster.

(a) nature (b) culture (c) depth (d) day

(9) In Maharashtra ..... is in action through State Reserve Force.

(a) WHO (b) NDRF (c) NCC (d) MCC

(10) Radiation leakage occurred after a blast in atomic energy plant of ..... in Russia.

(a) Moscow (b) Hiroshima
(c) Syberia (d) Chernobyl

Ans. *(1) (d) biological (2) (a) Sarpanch (3) (c) geological (4) (b) restoration (5) (d) 2005 (6) (c) landslide (7) (a) economy (8) (a) nature (9) (b) NDRF (10) (d) Chernobyl.*

Q.2.1. Write short notes:

***(1) Disaster Management Authority.**

Ans.

(i) In case of disaster management, there should be an attempt to minimize the losses.

(ii) Authority has been established at the level of the Government.

(iii) Disaster Management Act, 2005 has been passed in our country.

(iv) At the district level, district collector is responsible for disaster management and implementation of rehabilitation schemes.

(v) Collector is responsible for planning, co-ordinating and controlling the implementation of rehabilitation programme, gives out necessary instructions and reviews the entire system.

(vi) District collector is also responsible for designing the schemes for each district, separately for each type of disaster and getting those sanctioned from state level authorities.

(vii) District control unit is established immediately either after the impact of disaster or getting intimation about it. It receives information about various aspects of disaster, keeps continuous contact with various agencies.

***(2) Nature and Scope of disaster Management.**

Ans.

(i) Taking into consideration the nature and scope of disaster, three aspects of disaster are important for common citizens.

(a) **Phase of emergency** : Important character of this phase is that maximum lives can be saved by quick actions during this phase only. Various actions like search and rescue operations, medical assistance, first aid, restoring communication services, removing the people from affected area are expected in this phase. Gravity of disaster can be estimated in this phase only.

(b) **Transitional phase** : Rehabilitation work starts in this phase, after subsidence of any type of disaster. It includes clearing of debris, restoring water supply, repairing roads etc. so that it helps to bring normalcy in public life.

(c) **Reconstruction phase:** People reconstruct their buildings and facilities like roads and water supply are restored. Farming practices are restarted. However, it takes a long time for reconstruction.

***(3) Mock Drill**

OR

Mock Drill is useful - Give reason.

Ans.

(i) Mock Drill is a practice to check the preparedness of facing the disaster as early as possible.

(ii) Virtual or apparent situation of disaster is created to check the reaction time for any type of disaster.

(iii) Mock drill helps to check the efficiency of the system prepared for disaster redressal.

(iv) Mock Drill is observed and performed under trained personnel who check execution of plan designed for disaster redressal.

(v) It is arranged in various schools by the fire fighters to create awareness during fire.

(vi) It includes demonstrations like extinguishing fire, rescuing the people trapped at higher floors of buildings, rescuing the persons whose clothing have caught fire, etc.

(vii) Such activities are also organised by police force and voluntary organizations.

(4) Objectives of Mock Drill

Ans. Following are the objectives of Mock Drill.

(i) Evaluating the response to the disaster.

(ii) Improving the co-ordination between various departments of disaster control.

(iii) Identification of own abilities.

(iv) Checking the competency of the planned actions.

(v) Improving the ability of quick response.

(vi) Identifying the possible errors and risks.

***(5) Disaster Management Act: 2005**

Ans.

(i) National Disaster Response Force has been established as per the Disaster Management Act 2005.

(ii) Divisions of these forces are working in the army.

(iii) Overall 12 divisions are working in the country.

(iv) Its headquarter is in Delhi and it is in action all over the country with the help of army.

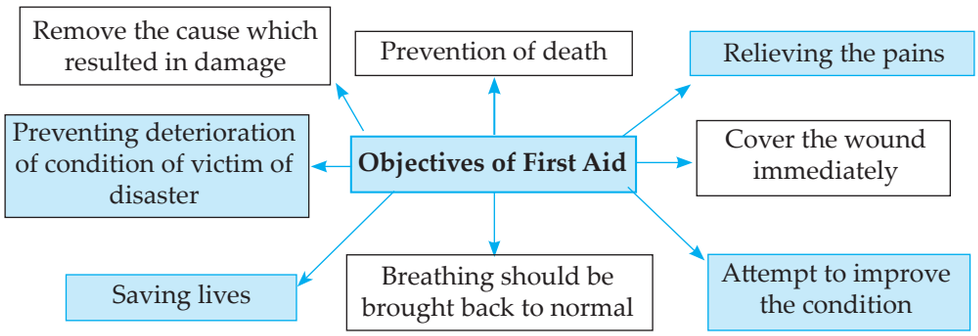
(v) In Maharashtra, National Disaster Response Force is in action through State Reserve Police Force.

(vi) Personnel of this force have substantial contribution in rescue work in disasters like cyclones, cliff-sliding, building collapse, etc.

Q.2.2. Complete the flow chart:

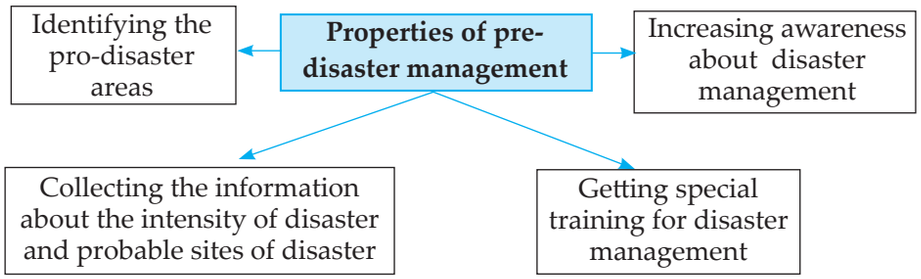
***(1) Complete the chart as per the objectives of first aid.** *(Complete the chart; Textbook Page No. 117)*

Ans.



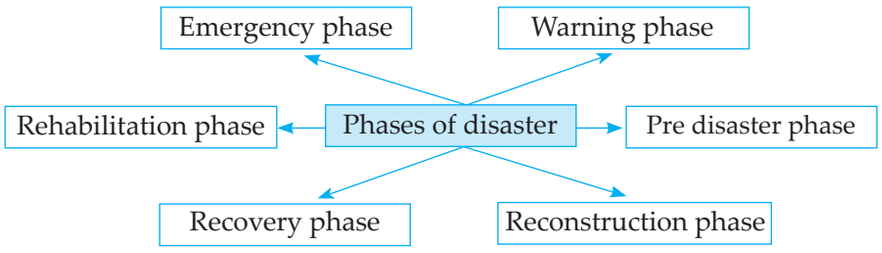
(2) Complete the following chart with reference to pre-disaster management.

Ans.



(3) Complete the following concept map for phases of disaster.

Ans.



Q.2.3. Distinguish between:

(1) Pre-disaster management and Post-disaster management

Ans.

Pre-disaster management	Post-disaster management
(i) Identifying the pre-disaster areas.	(i) Providing all types of necessary help to victims of disaster.
(ii) Collecting the information about the intensity of disaster.	(ii) Participation of preferably local people saved from disaster.
(iii) Getting special training for disaster management.	(iii) Categorization of the help material received from control centre.
(iv) Increasing awareness about disaster management.	(iv) Performing rescue operations and restorations.

Q.2.4. Answer the following:

***(1) Identify the type of disaster.**
(a) Terrorism (b) Soil erosion (c) Hepatitis (d) Forest fire (e) Famine (f) Theft

Ans.

(i) Terrorism and theft are man-made disasters.
(ii) Hepatitis and forest fires are biological disasters.
(iii) Famine and soil erosion are geophysical disasters.

***(2) Which disasters have you experienced in your area?** *(Can you recall, Page No. 109)*

Ans. I have experienced disasters like flood, theft, motor accident, fire due to electric short circuit, electric shock, injuries during fighting in my area.

***(3) What are the effects of that disaster on local and surrounding conditions?**
(Can you recall, Textbook Page No. 109)

Ans.

(i) It causes loss of life and property.
(ii) Spread of epidemics.
(iii) Various areas of life like economic, social, cultural, political, law and order, administration etc. are affected by it.

***(4) Which are the destructive effects of flood?** *(Can you recall, Page No. 110)*

Ans.

(i) Villages get submerged in water.
(ii) Loss of life and property.
(iii) Roads, bridges, farms, automobiles are destroyed.
(iv) Animals are killed and more insects infest the affected area leading to imbalance of ecosystem.
(v) Chemicals and hazardous substances get mixed with water, polluting the whole area.

***(5) What will be the effect on yourself and surrounding, if any accident-like disaster occurs during the sports on playground or in school?** *(Lets Think; Textbook Page no. 111)*

Ans.

(i) All the students including me will be under mental stress and anxiety.
(ii) Teachers will be under stress.
(iii) School functioning and education will be temporarily disrupted.
(iv) Anger of people against School Management, if the disaster is not handled properly.
(v) Analysis by school management on the cause of the accident in playground in school.
(vi) It will affect children's ability to perform well in exams.

***(6) Depending upon above information, explain the various effects of the disaster of railway accident.** *(Use your brain power; Textbook Page no. 111)*

Ans.

(i) Injuries or death of victims.
(ii) Possible environmental damage - chemical spillages, spillage of flammable substances.
(iii) Destruction of public property.
(iv) Financial losses.
(v) Collapse of communication system.
(vi) Disruption of rail traffic.
(vii) Transport of commodities collapses.
(viii) Shortage of beds in hospital.
(ix) Emotional and mental stress to victims and relatives.

***(7) Which are the effects of dry famine?** *(Can you recall; Textbook Page no. 110)*

Ans.

(i) Scarcity of water.
(ii) No agricultural production.
(iii) No water for drinking.
(iv) Scarcity of food and other useful commodities.
(v) Biodiversity will be in danger.

***(8) Which are the destructive effects of Earthquake?** *(Can you recall; Textbook Page no. 110)*

Ans.

(i) Collapse of houses,
(ii) Loss to life and property.
(iii) Debris and victims under the debris.
(iv) Hampered communication.
(v) Spread of epidemics.
(vi) Economy is affected.

***(9) What is forest fire? What is its effect on environment?**
(Can you recall; Textbook Page no. 110)

Ans. It is a natural disaster found in some forests where due to rise in temperature suddenly dry plant matter catches fire.

Effects:-

(i) Trees get burnt.
(ii) Plants and animals die.
(iii) Adjacent agriculture practices are affected.
(iv) Loss of bio-diversity.
(v) Creates environmental hazards like pollution.

Q.3.1. Answer the following:

***(1) Effective disaster management makes us well prepared for future. Explain why it is said like that.**

Ans.

(i) Disaster Management is achieving or time to time improving the ability to face the disasters through scientific and careful observations and analysis of data.

(ii) It involves collecting the information about intensity of disaster and probable sites of disaster through predictive intensity maps and hazard maps respectively.

(iii) It also includes getting special training for disaster management.

(iv) Preparedness is a plan chalked out so as to get the quick response from general public and administration.

***(2) On the basis of structure of disaster - management authority, form the same for your school.**

Ans.

School Trust disaster management authority chairman: Secretory of the management

↓

School disaster management authority chairman: Principal

↓

School section disaster management authority chairman: Vice Principal/Supervisor

↓

Class disaster management authority chairman : Class teacher/Subject teachers/ Class monitor

(3) Which different aspects of disaster management would you check for your school? Why?

Ans. Following are the things that can be checked:

(i) First aid box to provide first aid to victims of injuries.

(ii) Fire extinguisher to extinguish fire in case of emergency.

(iii) Source of pure water for drinking if people are stuck up.

(iv) Stretcher and Wheel chair to carry children to hospital.

(v) Emergency exits are clear for evacuation in case of any disaster.

(vi) Practice of Mock Drills at regular intervals.

(vii) Emergency numbers to be on every floor and easily visible.

(4) State precautions taken for insect bite.

Ans. Insect bite generally causes the following symptoms:

(i) Swelling, itchiness, blistering, redness.

(ii) If there is an allergic reaction or dizziness then, the doctor should be consulted immediately.

(iii) Otherwise, wash the affected area with soap and apply cold compress.

(5) How does stampede happen?

Ans.

(i) Stampede is an uncontrolled running as an act of mass impulse by a crowd of people who think that they are in danger.

(ii) People run over others in the crowd to save themselves in a panic.

(iii) Mock drills can be very useful in teaching people of how to react and evacuate in such situation without harming others.

(6) How to treat fires caused due to short circuits?

Ans.

(i) Do not use water for such fires, instead use fire extinguishers or fire blankets.

(ii) Electric power should be turned off and fire brigade should be called immediately.

(iii) Now-a-days, fires have become very common in high rise building in cities.

(iv) Regular wiring check by electrician should be done.

(7) How can we prevent the spread of an epidemic at an individual level?

Ans.

(i) Wash your hands often

(ii) Get vaccinated

(iii) Disinfect your home

(iv) Avoid junk street food and boil your drinking water.

(v) Do not share your personal belongings with others.

(vi) Consult your family doctor / physician if you note any signs / symptoms of disease.

Q.3.2. Suggest measures for the following:

***(1) Write down the reasons, effects and remedial measures taken for any two disasters experienced by you.**

Ans. **(1) Disaster :** Bus fell from the overbridge into the flowing river.

Causes:

(i) The bridge had become weak.

(ii) The bridge was not repaired earlier despite of threat of falling down.

(iii) The driver was driving bus at a reckless speed and so he lost control over it.

Effects :

(i) Some passengers died, drowned and some of them were severely injured.

(ii) The wall of the bridge got damaged.

Remedial Measures :

(i) Villages residing near the river rushed for help.

(ii) Survivors were given first aid immediately and were rushed to near-by hospitals.

(iii) The Collector, social organizations came to the accident spot and provided help.

(2) Disaster : Accident of a four wheeler on the road.

Causes:

(i) Overspeeding of the vehicle.

(ii) Driver was talking on his cellphone while driving and suddenly lost control over the vehicle.

Effects :

(i) Persons in the vehicle got severely hurt.

(ii) Driver died on the spot.

(iii) Passengers did not use seat-belt, hence the injuries were severe.

(iv) Vehicle caught fire after banging on the nearby shop.

Remedial Measures :

(i) Victims were immediately taken in an ambulance to nearby hospital after providing first aid.

(ii) Police were informed.

(2) Under the diagram and explain the concept.

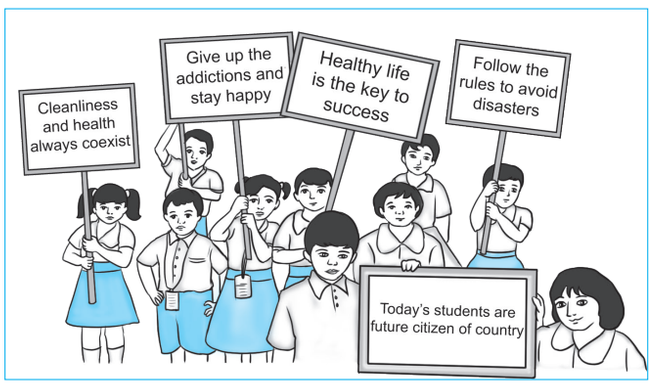


Fig 10.1

Ans.

(i) In the given diagram, 'the students of the school today are the future citizens of the country' is the theme and the awareness program is carried out to develop and nurture good habits.

(ii) Students carrying banners with slogans will encourage them to follow good habits.

(iii) Through this campaign students and community are oriented with awareness about their behaviour and role in the society.

(iv) 'Cleanliness and health always co-exist.' This banner wants to tell them the importance of cleanliness for their healthy life.

(v) 'Give up the addiction and stay happy'. This banner intends the students to be aware of addictions that people face and advise us to give up bad habits for good life.

(vi) We should follows strict traffic rules if we need to avoid accidents on roads.

(3) Some symbols are given below. Explain those symbol. Which disasters may occur if those symbols are ignored?

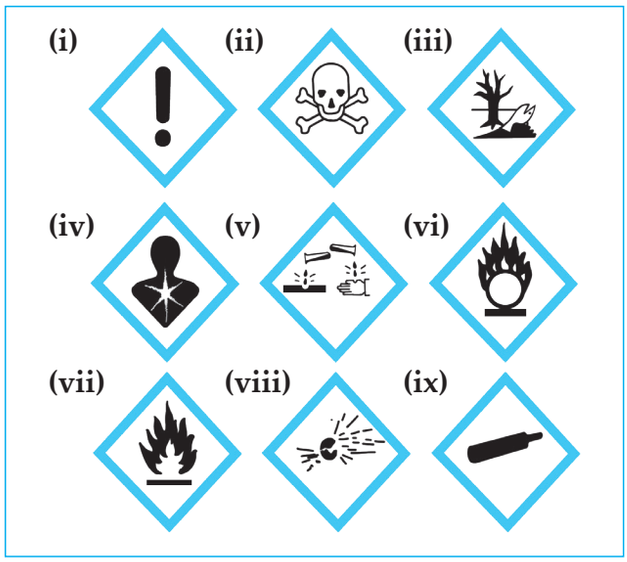


Fig. 10.2

Ans.

(i) **Toxic or irritant** : If toxic or harmful chemical or gas is carried through cylinders.

If ignored can cause leakage and lead to severe damage.

(ii) **Danger**: If there is a danger to life, this symbol is used. If ignored, can cause loss of life.

(iii) **Harmful for aquatic life**: Chemical effluents if left in water can cause loss of aquatic life.

(iv) **Dangerous for health**: Specially for tabacco and alcohol. If ignored, can cause cancer.

(v) **Material causing skin corrosion / burns:** Corrosive to metals. If ignored can cause skin corrosion.

(vi) **Oxidiser :** Contact can cause damage to metals.

(vii) **Inflammable:** If any highly inflammable material is carried through a vehicle, then this tag is used. If ignored, can cause fire.

(viii) **Explosive material:** If a vehicle is carrying explosive material then this symbol is used. If ignored, can cause explosion.

(ix) **Gas is stored under pressure**. If ignored can cause gas leakage and damage.

***(4)** **Following are the pictures of some disasters. how will be your pre and post-disaster management in case you face any of those disasters?**

(a)

Fig 10.3

Ans.

(i) The disaster is a leakage of cooking cylinder gas.

(ii) This may cause suffocation, difficulty in breathing and can lead to fire.

(iii) Open the door and windows, switch off electric supply and close the cylinder knob.

(b)

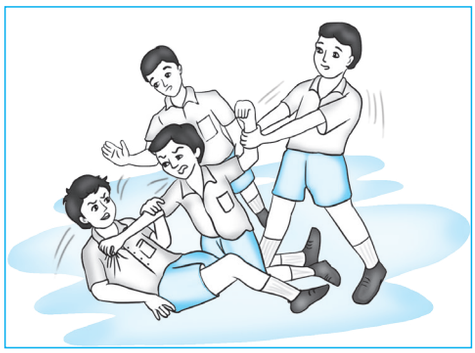


Fig 10.4

Ans.

(i) Here the disaster is fighting between children.

(ii) There may be abusive language used and can lead to noise pollution. Also, it can lead to serious injuries.

(iii) We will stop them immediately and separate them.

(iv) Understand the root cause of quarrel and guide them accordingly.

(v) We will try to explain to them the importance of friendship.

(vi) If anybody is hurt first aid should be provided.

(c)

Fig 10.5

Ans.

(i) The disaster here is heavy rains and flooding.

(ii) To prevent water logging we should keep man-holes open for drainage.

(iii) Rescuing people from the water logged areas by using ropes, boats etc.

(iv) Temporary shelter should be given to effected people. Essential commodities should be provided.

(v) Electric supply should be restored at the earliest.

(d)

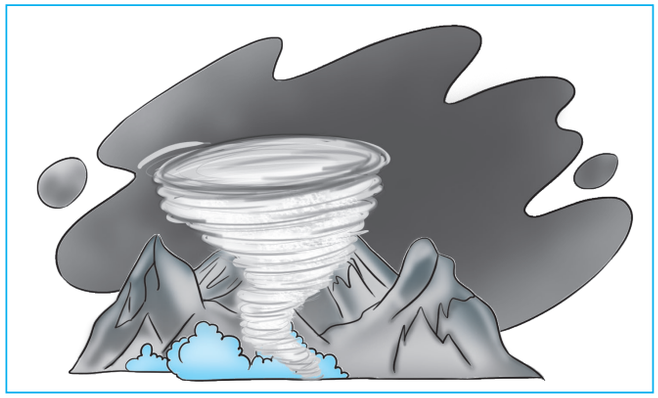


Fig 10.6

Ans.

(i) The disaster is a 'Cyclone'

(ii) Forcast of the approaching cyclone can be helpful in evacuating the main areas of the disaster.

(iii) There may be incidence of uprootment of trees, building collapse etc.

(iv) Rescue operation for the victims should be immediately arranged.

(v) Temporary shelters should be given to the victims.

(5) Following are some pictures of disasters. Which precautions would you take during those disasters?

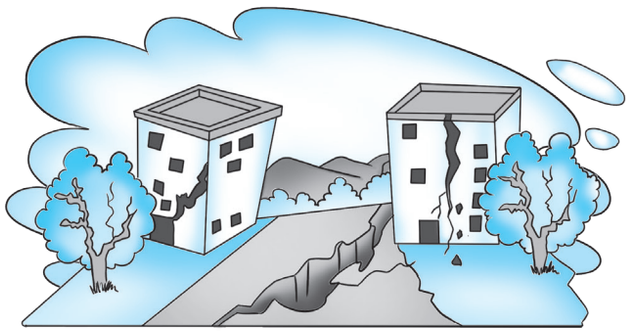


Fig. 10.7 (a)

Fig. 10.7 (b)

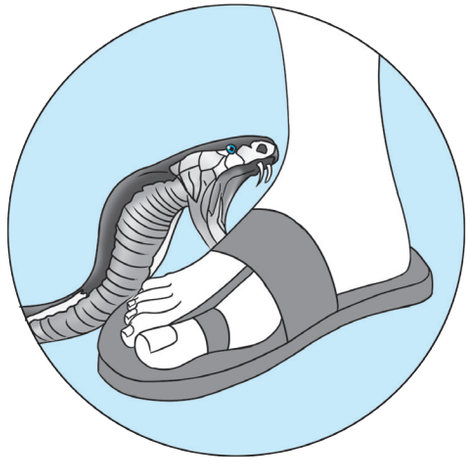


Fig. 10.7 (c)

Ans.

Fig. (a) is disaster of earthquake.

Precautions during earthquake:

(i) Do not panic. Take shelter under a table to protect yourself.

(ii) Stay from bookcase or furniture that can fall on you.

(iii) Stay away from windows.

(iv) If you are in bed, hold on and stay there, protecting your head with a pillow.

(v) If you are outdoors, find a clear spot away from buildings, trees, electric poles and wires.

(vi) If you are in a car, slow down and drive to a clear place. Stay in the car until the shaking stops.

Fig. (b) is disaster of fire.

Precautions during fire:

(i) Remain calm

(ii) Feel if the door handle is hot, before exiting.

(iii) Close the door behind you to keep the fire from spreading.

(iv) If your clothes catch fire: stop, drop and roll.

(v) Cover yourself with a woollen blanket.

(vi) Do not use elevators to come down from a building.

(vii) Immediately pull the nearest fire alarm.

(viii) If there is smoke in the air, stay close to the ground to reduce inhalation.

(ix) Help to evacuate persons with special needs.

(x) Once clear and away from danger, call Fire Fighting Force on number 101.

Fig. (c) is disaster of Snake bite.

Precautions during Snake-bite:

(i) Move the person beyond striking distance of the snake.

(ii) Have the persons lie down with wound levelled below the heart.

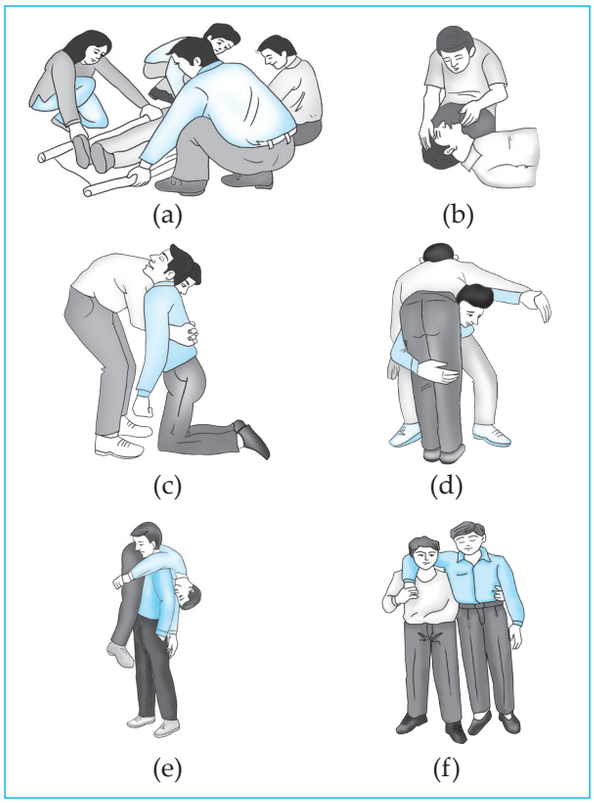
(iii) Keep the person calm and at rest, remaining as still as possible to keep venom from spreading.

(iv) Cover the wound with loose, sterile bandage.

(v) Tightly wrap a bandage two to four inches above the bite to reduce the flow of venom.

(vi) Call for medical help immediately.

***(6) Give the reference of following pictures and explain importance of each of those in disaster management. Which are other such activities?**



Ans.

(a) - Use of stretcher for transport of victim.

In an emergency, if a conventional stretcher is not available, then a temporary stretcher can be made using bamboos, blanket etc.

(b) Artificial breathing: If the victim has difficulty breathing, the head should be held in a backward sloping position or the chin should be raised so that the respiratory passage remains open.

If breathing has stopped, the victim should be given artificial ventilation by mouth to mouth resuscitation.

(c), (d), (e) Method used by the fire-brigade to transport the victim on shoulder.

(f) Human crutch method.

If one of the legs is injured, the victim should be supported with minimum load on the injured leg.

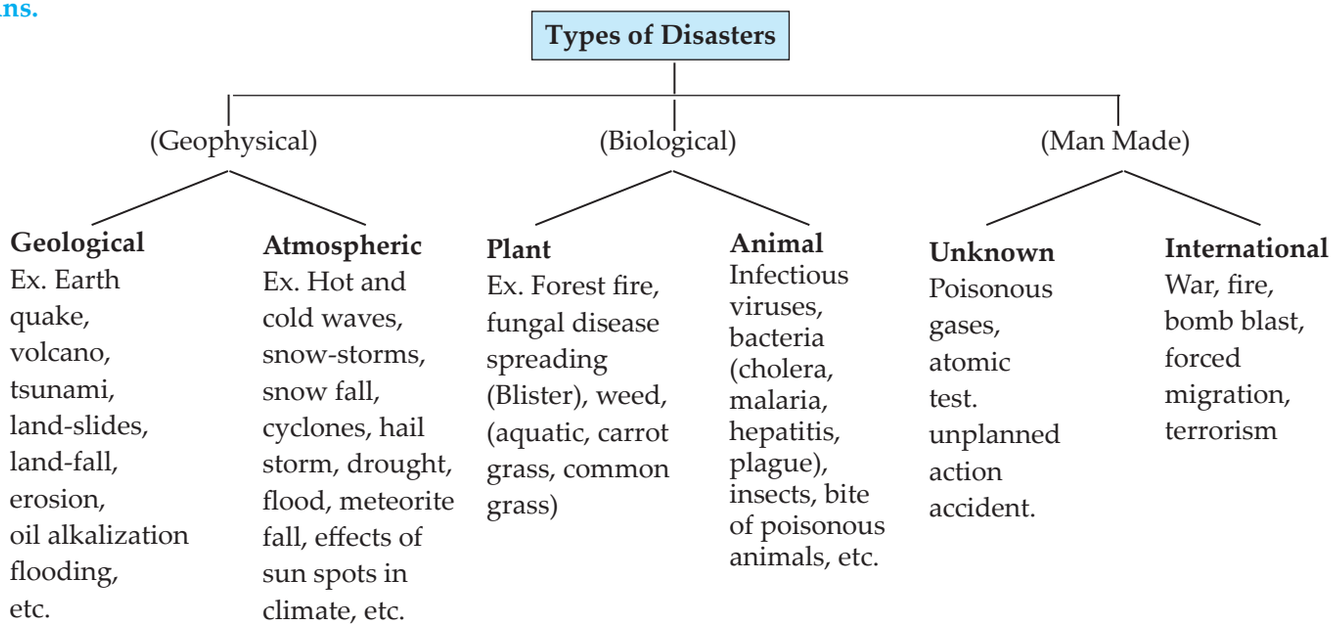
Other activities:

(i) Other methods of transport like cradle method, carrying piggy back, pulling or lifting method, carrying on four-hand chair or two-hand chair can be used to transport victims of any disaster.

(ii) If the victim is unconscious, then after giving mouth to mouth respiration twice, the heart should be pressed down hard by pressing the chest with both the palms. These two actions should be repeated alternately about 15 times. This is called cardio pulmonary resuscitation (CPR). It helps to bring circulation back to normal.

***(7) How can disasters be classified depending upon various criteria?** *(Can you tell; Textbook Page no. 110)*

Ans.



***Q.3.3. (1) Write the symptoms, effect and remedial measures.**

Disaster	Symptoms	Effects	Remedial measures
(1) **Motor accident**	(i) Damage to vehicle	(i) Injured passengers	(i) Speed Maintenance
	(ii) Travellers are hurt	(ii) Damage to vehicle	(ii) Avoid overtaking
	(iii) Death of a driver or passenger		(iii) Not to drink and drive, (iv) Wear seat-belts,
(2) **Land-slide**	(i) Soil erosion	(i) Roads blocked	(i) Fencing and putting nets
	(ii) Land-slide	(ii) Loss and damage to vehicles	(ii) Construction to prevent landslide
		(iii) People may die or get injured	(iii) Cement coating
(3) **Forest Fire**	(i) Rise in temperature	(i) Trees are burnt	(i) Try to extinguish fire as early as possible.
	(ii) Fire may spread across	(ii) Loss of agricultural crops	
(4) **Theft**	(i) Cash and articles loss	(i) Monetary loss	(i) Take care of belongings
	(ii) Faulty bank transaction	(ii) Psychological effect	(ii) Preserve the material
	(iii) Piracy		(iii) Proper security measures
(5) **Riots**	(i) Mob	(i) Noise pollution	(i) Establish root cause of riots
	(ii) Shouting slogans	(ii) Loss of property	(ii) Establish communication
	(iii) Stone pelting (iv) Fires	(iii) People get injured	(iii) Curfew (iv) Resolve the problem
(6) **War**	(i) Encroachment	(i) Life gets disturbed	(i) Prohibit encroachment
	(ii) Crossing LOC (iii) Firing	(ii) Loss of young soldiers (iii) Economic loss	(ii) World wide efforts
(7) **Epidemic**	(i) Economic loss (ii) Disrupted work schedules (iii) Diseases	(i) People fall victim (ii) Diseases spread	(i) Destroy vectors (ii) Maintain cleanliness (iii) Timely treatment
(8) **Water shortage**	(i) Reduced pressure (ii) Alternate days supply of water (iii) Turbid water supply	(i) Pure water not available (ii) Shortage of water (iii) Spread of disease due to turbid water	(i) Save water (ii) Use water safely (iii) Recycle water (iv) Rain water harvesting
(9) **Pest**	(i) Crop gets destroyed (ii) Plantation get spoilt	(i) Economic loss for the farmers (ii) Price of fruits, vegetables, grains increase	(i) Spray suitable insecticide and pesticide
(10) **Flood**	(i) Heavy rains (ii) Drainage blocked	(i) Heavy rains at the time of high tide (ii) Traffic disturbed (iii) Causes accidents	(i) Clean and clear blockage in drains (ii) Rescue people

(11)	**Famine Drought**	(i)	No rains	(i)	Cracks in the land	(i)	Rain water storage
		(ii)	Excessive rains	(ii)	Spread of diseases	(ii)	Clean all nallahas
						(iii)	Vaccination programme
						(iv)	Provide necessary help for victims.

Q.3.4. Observe the pictures of various disasters given below and write a few lines about their causes, consequences and helpful measures.

Ans.

(1) Drought

Ans.

Causes : No rains for a long period of time

Consequences:

(i) No growth of vegetation.

(ii) Spread of disease like acute respiratory and gastrointestinal illnesses as well as other infectious diseases.

Helpful measures:

(i) Water supply to be planned by government in order to avoid recurrence of drought like conditions

(ii) Storage and sanitation facilities to be provided including dams, rain water harvesting or better irrigation techniques.

(iii) Vaccination programme to be implemented.

(2) Flood

Ans.

Causes :

(i) Water logging due to heavy rains, broken down, overflowing rivers, blockage of drainage basins etc.

Consequences:

(i) Widespread damage to crops, livestock, infrastructure etc.

(ii) Cultural, environmental and ecological damage.

Helpful measures:

(ii) Man holes should be kept open for drainage.

(iii) People should avoid use of plastic.

(iv) Rescuing people from the water logged areas.

(v) Providing with temporary shelter and essential commodities people.

(3) Forest Fire.

Ans.

Causes:

(i) Increase in atmospheric temperature, lightening, human activities, etc.

Consequences :

(i) Rapid burning of trees increases the temperature.

(ii) Loss of forest area.

(iii) Huge loss of flora and fauna

Helpful measures :

(i) Avoiding any flammable substances to be carried or spilling near forest area.

(ii) Quick contact to emergency services.

(4) Road Accidents

Ans.

Causes :

(i) It is usually caused due to over speeding and inefficient driving.

Consequences :

(i) Victim may be hurt severely with fractures and wounds. Sometimes it may be fatal.

(ii) Victims should given proper medical aid.

(iii) Police to be informed.

(5) Earthquake

Ans.

Causes:

(i) Tectonic movements is the Earth's crust.

Consequences:

(i) Destruction of many buildings, hospitals, schools, etc.

(ii) Loss of money and property.

(iii) Injuries and death of plants, animals and humans.

Helpful measures :

(i) People should not panic, they should try to take shelter under a table or bed.

(ii) They should stay away from windows, protect then heads with pillows.

(iii) If they are outdoors they should find a clear place away from building, wires, etc.

(6) Rail / Accident :

Causes:

(i) Negligence of train drivers or from the control room.

(ii) Infrastructural causes like collapse of bridge etc.

(iii) Track defects, Train collision, signal errors etc.

Consequences:

(i) Loss of lives and injuries to many people.

Helpful measures:

(i) Rescue operations by government authorities is necessary and exact cause of the accident to be found out.

(ii) Immediate medical treatment to all by making rescue camps in the vicinity is required.

(iii) Local people should help in these times to help the less injured.

Q.4. Answer the following in brief.

***(1) What are the objectives of disaster management?**

Ans. Objectives of disaster managements are as follows:

(i) To minimise the loss of life caused during the disaster and to save people from those disaster.

(ii) To supply essential commodities to the affected people to reduce the impact of disaster.

(iii) To rehabilitate the affected people to get back to their normal life.

(iv) To take precautionary measures to avoid the future occurrence of the disaster.

***(2) Why is the essential to get training of first aid?**

Ans.

(i) The first-aid training is extremely necessary for every citizen.

(ii) Use of this knowledge is useful for offering help to the people around facing any disaster and injury.

(iii) The first-aid measures differ from person to person according to the type and intensity of disaster.

(iv) Victims of disaster need to be offered some primary help before actual medical treatment. First aid is useful in such circumstances.

(v) First aid training can help in saving life in actual disaster time.

(vi) First aid training helps people to face disaster with courage, maintain their moral and give psychological support, which can be provided to them by the people trained in first aid.

***(3) Which different methods are used for transportation of patients? Why?**

Ans.

Cradle method: Useful for children and under-weight victims

Carrying piggy back: Useful for carrying patients who are unconscious.

Human crutch method : If one of the legs is injured, the victim should be supported with minimum load on the other eg.

Pulling or lifting method : This is used for carrying an unconscious patient, through a short distance.

Carrying on four-hand chair: This is useful when support is needed for the part below the waist

Carrying on two-hand chair: Useful for those patients who cannot use their hands but can hold their body upright.

Methods used by the fire-brigade

Stretcher : In an emergency, if a conventional stretcher is not available, then a temporary stretcher can be made using bamboos, blanket, etc.

***(4) Explain the role of district disaster control unit after occurrence of any disaster.**

Ans.

(i) At the district level, the district collector is responsible for disaster management and implementation of rehabilitation schemes.

(ii) District control unit is established immediately either after the impact of disaster or getting information about it.

(iii) It reviews about various aspects of disaster, keeps continuous contact with various agencies like army,

airforce, navy, telecommunication department, paramilitary forces etc. for getting help.

(iv) It is also responsible for co-ordinating with various voluntary organizations for their help in disaster management.

(v) It tries to establish the normal condition and proper rehabilitation as early as possible.

***(5) Give the reasons for increase in human disasters after the World War - II.**

Ans.

(i) Planet Earth has experienced many natural disasters.

(ii) Most of the disasters are unpredictable situations that have occurred in the Asian continent and the regions of Pacific ocean.

(iii) In reality, previous problems of several years have been fierce.

(iv) Due to population explosion, the basic needs is increased after the World War -II.

(v) Condition of instability arises in the country due to various reasons like economic inequality, racial and religious differences etc.

(vi) Incidences like terrorism, abduction, social differences have been a routine now.

(vii) Nuclear testing is being done by many countries and use of Nuclear energy has increased resulting in climatic changes.

***(6) Whether there had been mock drill by fire fighters under the disaster management scheme in your school? Which techniques did you see during the drill?**

(Can you tell; Textbook Page no. 118)

Ans. We observe very interesting and informative things during the drills at our school. We learnt the following things from the fire fighters.

(i) How to rescue ourselves and others if there is any emergency in the classroom.

(ii) Switch off the mains if there is fire.

(iii) As we get any signal from smoke detectors, we must run out of closed places.

(iv) Classroom should have sand bags.

(v) If there is fire, contact fire brigade immediately.

(vi) We came to know about what action should be taken if clothes catch fire.

(vii) We also came to know, how to rescue people or students stuck up at some height.

***(7) How can we offer first aid to victims of any disaster?**

Ans. Life and Rescucitation - ABC

(i) **Airway :** If the victim has difficulty breathing, the head should be held in a backward sloping position or the chin should be raised so that the respiratory passage remains open.

(ii) **Breathing :** If breathing has stopped, the victim should be given artificial ventilation by mouth to mouth rescucitation.

(iii) **Circulation :** If the victim is unconscious, then after giving mouth to mouth respiration twice, the heart should by pressed down hard by pressing the chest with both the palms. These two actions should be repeated alternately about 15 times. This is called cardio-pulmonary rescucitation (CPR). It helps to bring the circulation back to normal.

***(8) Explain the nature and scope of disaster of flood with the help of points given beside.** *(Lets think; Textbook Page no. 112)*

Ans. Taking into consideration the scope of disaster, following are some of the important facts which must be thought once as follows:

(i) **Pre-disaster phase**- People are made aware through various media about the weather report. Radio, television, internet can be used for sending information.

(ii) **Warning phase**- Fishermen, water transport authority and people near the bank of river are warned not to get into water.

(iii) **Emergency phase**- People should be immediately rescued and taken to the safer places. People who are trapped in flood water should be rescued on war level.

(iv) **Rehabilitation phase**- Rescued and migrated people should be given the basic facilities required for life.

Transit camp should be built up and established which can provide necessary basic needs.

(v) **Recovery phase**- Try to recover the situation. Search for those who are missing.

(vi) **Reconstruction phase**- Roads, water supply, agricultural practices should be brought back to normal.

❖ ❖ ❖

ASSIGNMENT - 10

Time : 1 hour **Marks : 20**

Q.1.(A) Answer the following: **(3)**

(1) Fill in the blank:

Earthquake is ..... type of disaster.

(2) Find the odd one out : Volcano, earthquake, land-slides, cyclones.

(3) Complete the analogy : Tsunami : Geological : : Hail storm : .....

Q.1(B) Choose and write the correct options: **(2)**

(1) The Chairman of District disaster management is ..... .

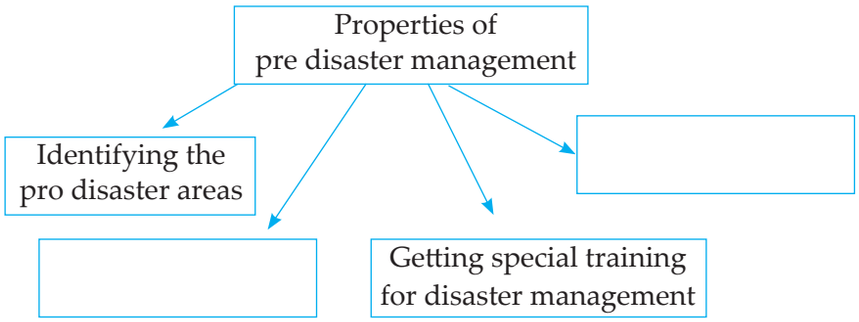
(a) Prime Minister (b) Collector (c) Sarpanch (d) Chief Minister

(2) National Disaster Response Force has been established as per the Disaster Management Act ..... . (a) 2005 (b) 2015 (c) 1995 (d) 2007

Q.2. Answer the following (Any 2) **(4)**

(1) Distinguish between : Pre-disaster management and Post-disaster management.

(2) Complete the concept map.



(3) Write short note on Importance of Mock Drill.

Q.3. Answer the following (Any 2) **(6)**

(1) Identify the picture and state its effects.

(2) What is forest fire? What is its effects on environment?

(3) What are the objectives of disaster management?

Q.4. Answer in detail (Any 1) **(5)**

(1) Explain the main aspects of disaster management cycle.

(2) Explain the structure of Disaster Management Authority.

❖ ❖ ❖

MODEL ACTIVITY SHEET

Time : 2 hrs **Marks : 40**

Q.1 (A) Solve the following questions **(5)**

(1) Complete the following table

Local name of plant	Name of active ingredient	Uses
(a) _____	Vasicine present in the leaves	_____

(2) Which of the following is different from the others? Why ?
Solar electricity, wind electricity, atomic electricity, hydro electricity

(3) Is the given statement true or false? Why?
But a single person, if determined, can established a new forest.

(4) Give full form of $NADH_2$.

(5) Complete the table.
(Motor accident, land sliding, forest fire, theft, riot, war, epidermic, drought, locust attack, financial crisis, food famine)

Disaster	Symptoms	Effect	Remedy

Q.1 (B) Choose the correct alternative and rewrite the statement. **(5)**

(1) Role of glutamic acid obtained by microbial processing is
(a) To impart acidity (b) Protein binding
(c) Essence (d) Artificial sweetner

(2) Which special cells are present in the body of sponges (Porifera)?
(a) Collar cells (b) Cnidoblasts
(c) Germ cells (d) Ectodermal cells

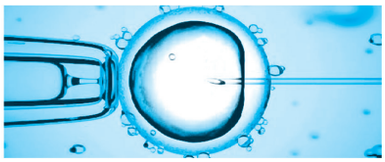
(3) In a flower, the male whorl is .....
(a) corrolla (b) calyx
(c) androecium (d) gynecium

(4) Which of the following factors are distributing the social health?
(a) mental stress (b) addiction
(c) incurable disease (d) all of the above

(5) Nuclear membrane disappears completely in the phase called ..... of Karyokinesis.
(a) prophase (b) metaphase
(c) anaphase (d) meta and anaphase

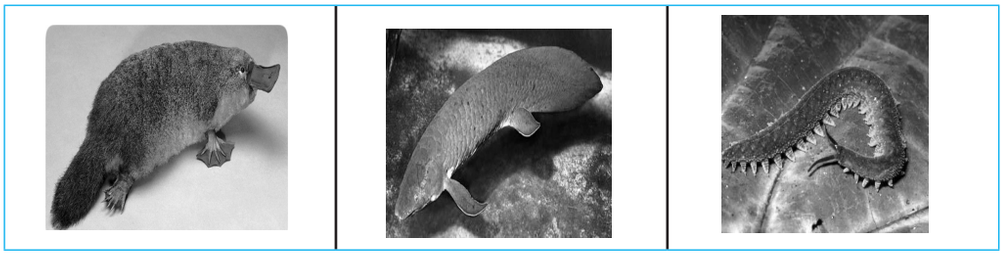
Q. 2. Solve the following questions (any 5) **(10)**

(1) Observe the following figure and explain.



(2) Give your opinion about whether hydroelectric plants are environment friendly or not?

(3) Identify the animal in the following diagram. How can this be an evidence regarding evolution?



(4) Which factors affect the social health?

(5) Complete the following chart.

Body cavity	Germ layer	Phylum
Absent	_____	Porifera
Absent	Triploblastic	_____
Pseudocoleom	_____	Aschelminthes
Present	_____	Arthropoda

(6) Why is it asked to segregate wet and dry waste in each home?

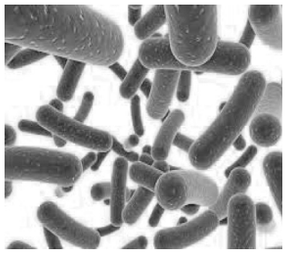
(7) (i) What does the process in the following flowchart indicate?

(ii) What type of problems are faced?

Chemical energy in coal → Thermal energy → Kinetic energy in steam → Kinetic energy in turbine → Electrical energy

Q. 3. Solve the following questions (any 5) **(15)**

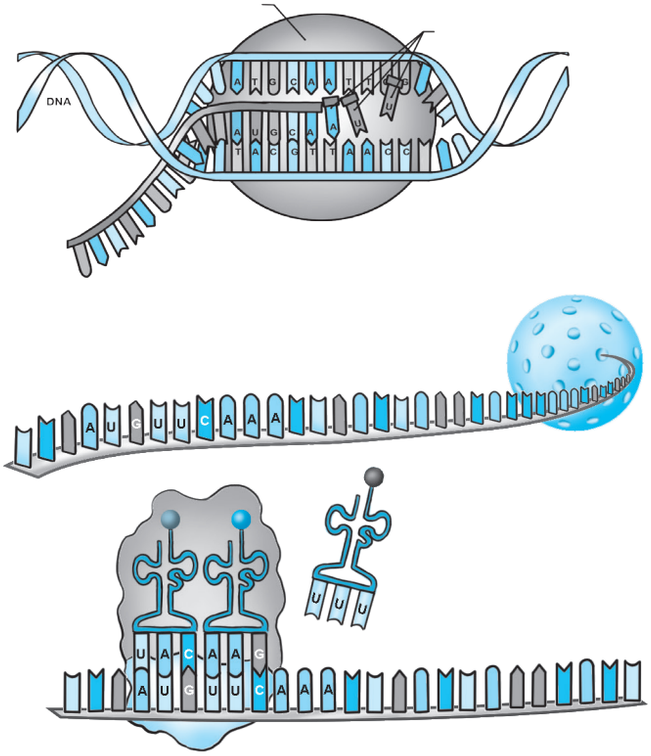
(1) Answer the question with reference to the following figures.



(a) What is probiotic food famous for?

(b) Why have the probiotic food have developed much importance in recent days?

(2) Observe the following figures and answer the question

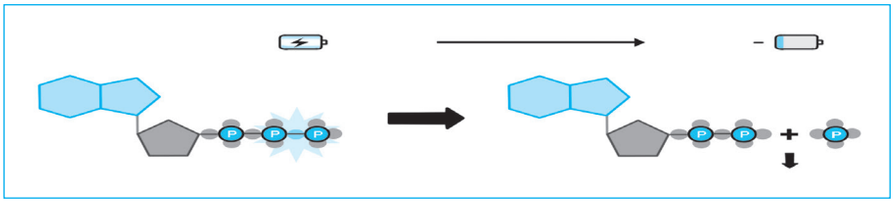


(a) Which process are shown in the figures above? Explain both the process.

(b) Why some characters are transmitted from parents to their offsprings.

(3) Explain with suitable diagrams the process of mitosis in detail.

(4) Identify the following chemical reaction and answer the questions.



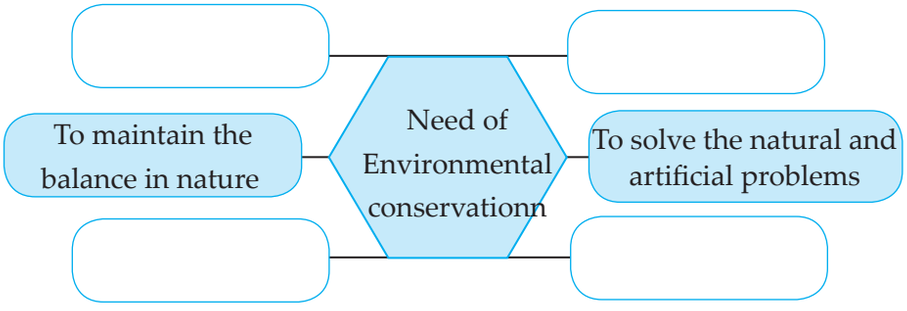
(a) What is this chemical reaction related to?

(b) What is brought about in this reaction?

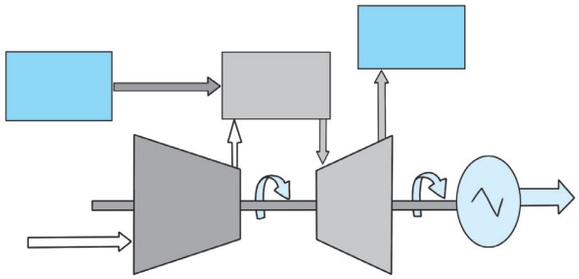
(5) (a) Complete the following chart.

(b) Why is conservation of environment the need of hour?

(c) Which role will you carry out as a student?



(6) Observe the following figure and answer the following questions.



(a) Which energy is produced?

(b) What is this Power Plant based on?

(c) Is this energy generation eco-friendly? Why?

(7) Observe the following pictures of animals, classify them and write their classification.

(a) Wall Lizard	(b) Pigeon
	

Q. 4. Solve the following question (Any 1) **(5)**

(1) Observe the figure and answer the following.

(a) What is the figure related to?

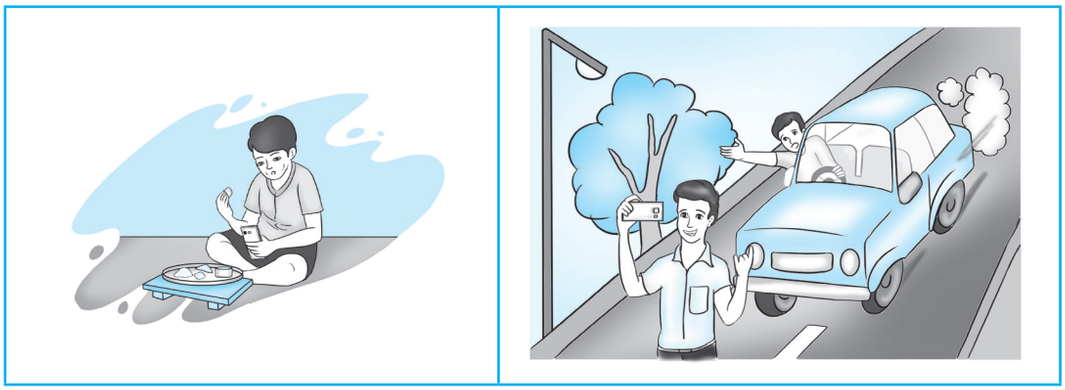
(b) What is the process of production of fuel?

(c) Why is the process shown in figure important?

(d) Which fuels are obtained from this process?

(e) Write a paragraph on 'Saving fuel is need of the hour'.

(2)



(a) Observe the above images. Is it rational? Why?

What solution will you give for the above mentioned issues?

(b) Make two categories as time spent on your health and time spent on other responsibilities and compare both the categories.

❖ ❖ ❖