Maharashtra State Board
Class X
Science and Technology – Paper 2
Board Paper 2019

Time: 2 Hours **Maximum Marks: 40**

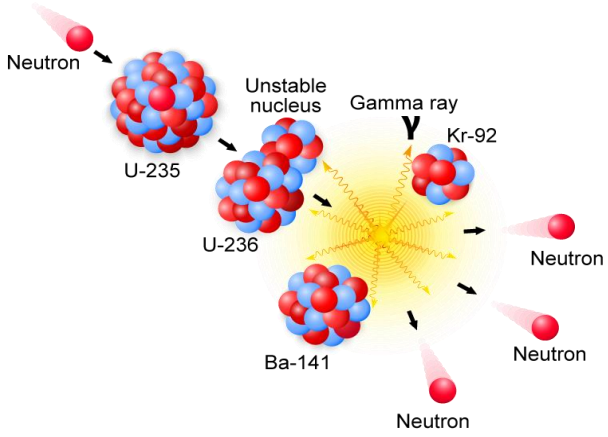
Note:

(i) All questions are compulsory.
(ii) Draw scientifically, technically correct labelled diagrams wherever necessary.
(iii) Start writing each main question on a new page.
(iv) Figures to the right indicate full marks.
(v) For each MCQ (i.e. Q. No. 1-B), evaluation would be done for the first attempt only.
(vi) For each MCQ, the correct answer must be written along with its alphabet.
E.g.: (i) (a) ……., (ii) (b) ….. (iii) (c) …….

---

1. (A) Solve the following questions: **5**

(i) Identify the process shown in the figure and name it. 1



(ii) Pranav and Pritee are twins in your class. They belong to …….. twins' type. 1

(iii) There is an oil layer on the water surface of a river in your area. What will you do? 1

(iv) Fill in the boxes with the help of the given clues: 1
Continuous consumption of alcohol and tobacco material ……

A							O	

(v) Find out the correlation: 1
White revolution: Increase in dairy production :: Green revolution : ……..

(B) Choose the correct alternative and rewrite the statements: **5**

(i) Somatic and stem cells undergo …….. type of division.

(a) meiosis
(b) mitosis
(c) budding
(d) cloning

(ii) Which of the following is a man-made disaster?

(a) Earthquake
(b) Flood
(c) Meteoroid
(d) Leakage of toxic gases

(iii) In a food chain, autotrophic plants are present at the ……. level.

(a) Tertiary nutrition
(b) Secondary nutrition
(c) Producer
(d) Apex

(iv) …….. is a cold-blooded animal.

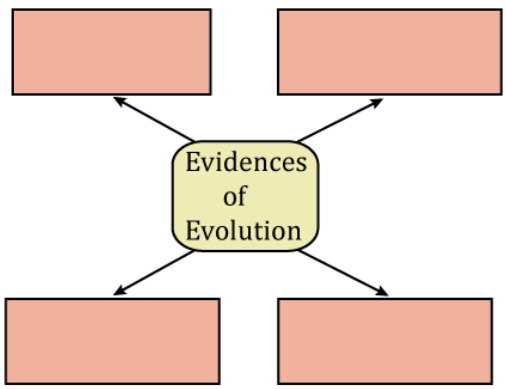
(a) Bat
(b) Snake
(c) Rabbit
(d) Elephant

(v) ……. is a connecting link between annelida and arthropoda.

(a) Duck-billed platypus
(b) Peripatus
(c) Lungfish
(d) Whale

2. Solve any five of the following questions: **10**

(i) Complete the following chart:



(ii) Draw a neat diagram of the structure of chromosome and label the parts:
   (a) Centromere
   (b) p-arm

(iii) What are the advantages of hydroelectric power generation?

(iv) State any four benefits of animal classification.

(v) State any four objectives of disaster management.

(vi) Give scientific reason:
Microbial enzymes are used instead of a chemical catalyst in a chemical industry.

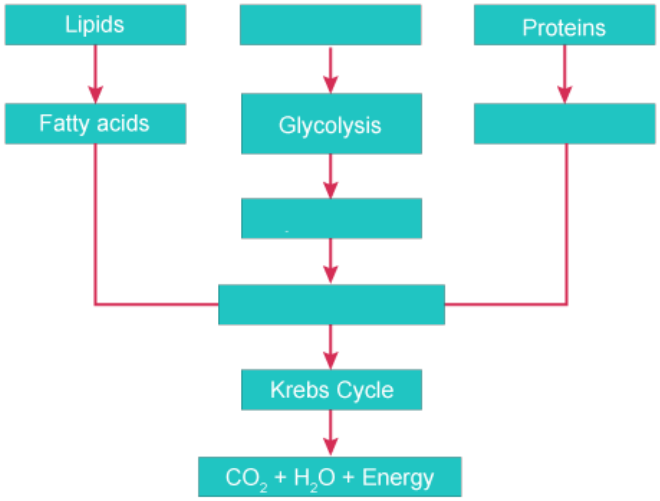
(vii) Read the following extract and answer the questions that follow:
A liberal view behind the concept of organ and body donation is that after death our body should be useful to other needful persons so that their miserable life would become comfortable. Awareness about these concepts is increasing in our country and people are voluntarily donating their bodies.
Life of many people can be saved by organ and body donation. Blinds can regain their vision. Life of many people can be rendered comfortable by donation of organs like liver, kidneys, heart, heart valves, skin etc. Similarly, body can be made available for research in medical studies. Many government and social organisations are working towards increasing the awareness about body donation.

   (a) What is the liberal view behind organ and body donation?
   (b) Name any four organs that can be donated.

3. Solve the following questions (any five): 15

(i) Answer the following questions:
   (a) What do you mean by central dogma?
   (b) What is transcription?
   (c) What is meant by triplet codon?

(ii) Complete the following chart and state which process of energy production it represents:

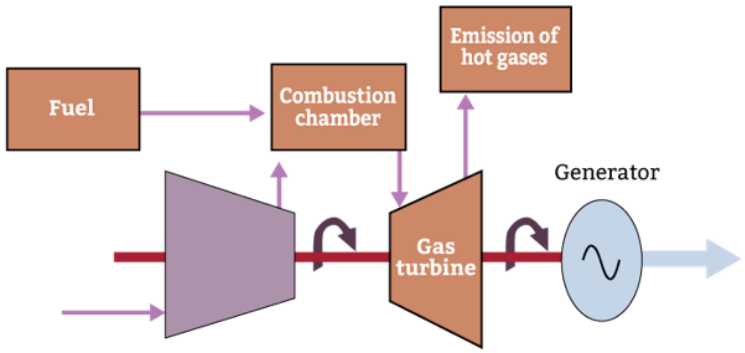


(iii) (a) Playing games on the mobile while eating is right or wrong? Justify.

(b) What do your conclude from the following picture?

(c) Observe the following picture and state what can be the outcome?

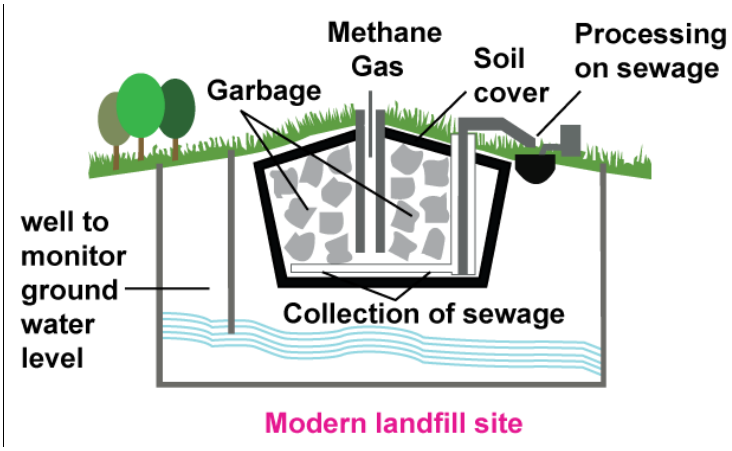
(iv) Observe the diagram and answer the questions:



(a) Which energy is generated from the power plant?
(b) State its source.
(c) Which is more eco-friendly – Power generation from coal or power generation from natural gas? Why?

(v) Identify my class/phylum and give one example of it:
(a) I have mammary glands and exoskeleton in the form of hair.
(b) We form the highest number of animals on the planet. We have bilateral symmetry and our exoskeleton is in the form of chitin.
(c) I live in your small intestine, my body is long and thread-like and pseudocoelomate.

(vi) Observe the following figure and answer the questions:



Modern landfill site

(a) Identify the process shown in the figure.
(b) Explain the process in short.

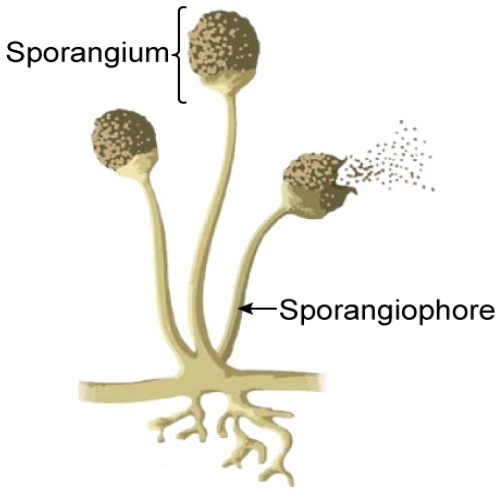
(vii) (a) What is biotechnology?
(b) Explain any two commercial applications of it.

4. Solve any one of the following questions: **5**

(i) (a) Identify the following symbols and state their significance: 2

(b) How can biodiversity be conserved? 3

(ii) Answer the following questions:
(a) 'Gender of a child is determined by the male partner of a couple'.
Draw a diagram explaining the above statement. 2
(b) Prepare a slogan for the campaign against female foeticide. 1
(c) In the following figure, explain how new fungal colonies of mucor are formed. 1



(d) Identify and state the type of reproduction represented in the above figure. 1

Maharashtra State Board
Class X Science and Technology Paper 2
Board Paper – 2019 Solution

1.

(A)

(i) The process shown is nuclear fission or chain reaction.

(ii) Pranav and Pritee are twins in the class. They belong to **dizygotic** twins' type.

(iii) If there is an oil layer on the water surface of a river, then we will use hydrocarbonoclastic bacteria like *Pseudomonas* to clean up the spill.

(iv) Continuous consumption of alcohol and tobacco material ……

A	**D**	**D**	**I**	**C**	**T**	**I**	**O**	**N**

(v) White revolution : Increase in dairy production :: Green revolution : **Increase in agriculture production or crop yield**

(B)

(1) (b)mitosis
Somatic and stem cells undergo mitosis type of division.

(2) (d)Leakage of toxic gases
Leakage of toxic gases is a man-made disaster.

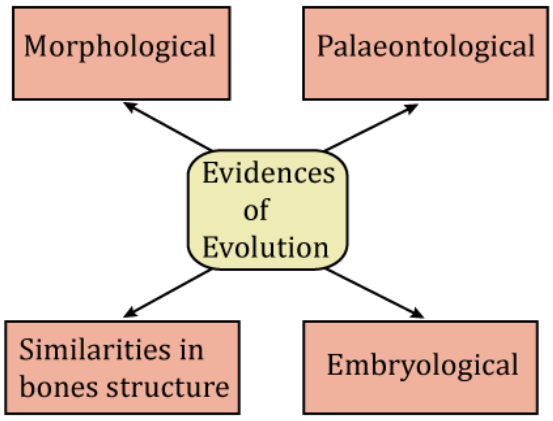
(3) (c)Producer
In a food chain, autotrophic plants are present at the producer level.

(4) (b) Snake
Snake is a cold-blooded animal.

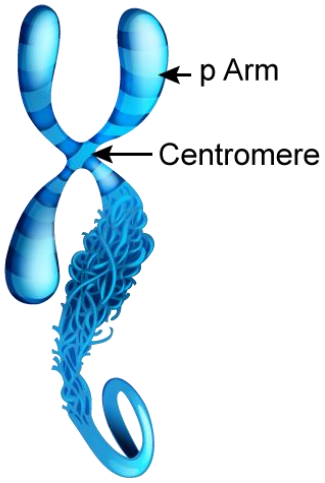
(5) (b) Peripatus
Peripatus is a connecting link between annelida and arthropoda.

2.

(i)



(ii) Diagrams:



(iii) Advantages of hydroelectric power generation:

- No pollution results from combustion of fuels because no fuel is burnt in hydroelectric power generation.
- If there is sufficient water storage in the dam, it is possible to generate electricity as and when necessary.
- Although a water reservoir is used for power generation, it can be replenished during the rainy season leading to uninterrupted power generation.

(iv) Benefits of animal classification:

- Study of few animals from a group helps to understand about that entire animal group.
- Animals can easily be identified with great accuracy.
- Study of animals becomes convenient.
- It gives an idea about animal evolution.
- It helps to understand various adaptations shown by animals.

- It helps to understand the habitat of each animal and its exact role in nature.
- It helps to understand the relationship of animals with other living organisms.

(v) Objectives of disaster management:
- To save human life by moving them away from the place of the disaster
- To supply essential commodities to the affected people to reduce the effect of the disaster
- To restore human life in the disaster region
- To rehabilitate the affected and displaced victims of the disaster
- To consider preventive measures to reduce the intensity of future disasters

(vi) Microbial enzymes are used instead of a chemical catalyst in a chemical industry because
- Microbial enzymes are active at low temperature, pH and pressure.
- Energy is saved and erosion-proof instruments are not necessary.
- Elimination and decomposition of waste material are avoided.
- Enzymes carry out specific processes; hence, unnecessary byproducts are not formed.
- Expenses on purification are minimised.
- These enzymes are eco-friendly, and they can be reused.

(vii)

(a) A person in need can receive a vital organ so that his/her miserable life becomes comfortable.

(b) Organs like kidneys, heart, eyes, liver and skin can be donated.

3.

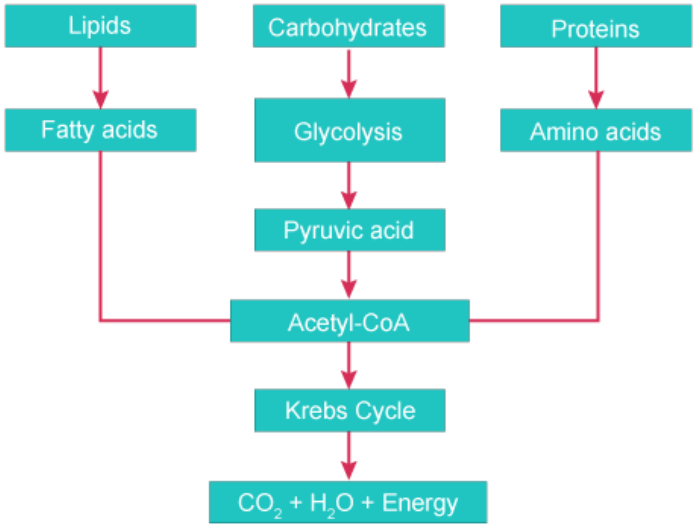
(i)

(a) Synthesis of appropriate proteins by DNA through RNA is called the central dogma.

(b) The process of RNA synthesis complementary to the DNA strand is called transcription.

(c) The code for each amino acid consists of three nucleotides. It is called a ‘triplet codon’.

(ii)



(iii)

(a) Playing games on the mobile while eating is wrong.
We should respect food while eating. We should eat food in a disciplined way.

(b) Always stay away from addictions such as smoking, drugs, alcohol etc. The picture shows a message of control of addictions.

(c) A selfie taken in the middle of the road may result in an accident.

(iv)

(a) Electricity is generated from a power plant.

(b) Energy is generated from natural gas.

(c) Power generation from natural gas is more eco-friendly, because burning of natural gas does not produce sulphur dioxide which causes pollution.
Efficiency of power generation by natural gas is high.

(v)

(a) Class: Mammalia
Examples: Cat, dog, man

(b) Phylum: Arthropoda
Examples: Prawn, crab

(c) Aschelminthes
Examples: Filarial worm, Ascaris

(vi)

(a) The process shown is a modern landfill site.

(b) Modern landfilling site:

- Degradable waste accumulated in urban areas is used for this purpose.
- Large pits are dug in open spaces far away from the residential area.
- These pits are lined with plastic sheets as a precaution against pollution of

soil due to leaching of toxic and harmful materials.

- Compressed waste is dumped in the pit.

It is covered with layers of soil, saw dust, leafy waste and specific biochemicals.

- Bioreactors are mixed at some places.
  Microbes present in the soil and other top layers decompose the waste.
- The completely filled pit is sealed with soil slurry.
- Best quality compost is formed after a few days. Such landfilling sites can be reused after removal of compost.

(vii)

(a) Biotechnology is the technology which brings about artificial genetic changes and hybridisation in organisms for human welfare.

(b) Commercial applications of biotechnology:

- **Crop biotechnology:** Biotechnology is used in the agricultural field to improve yield and variety.
  Genetically modified crops, hybrid seeds and herbicide-tolerant plants are some of the areas where a lot of research is being conducted.
- **Biofertilisers:** Due to the use of biofertilisers instead of chemical fertilisers, nitrogen fixation and phosphate solubilisation abilities of plants are improved.

4.

(i)

(a)

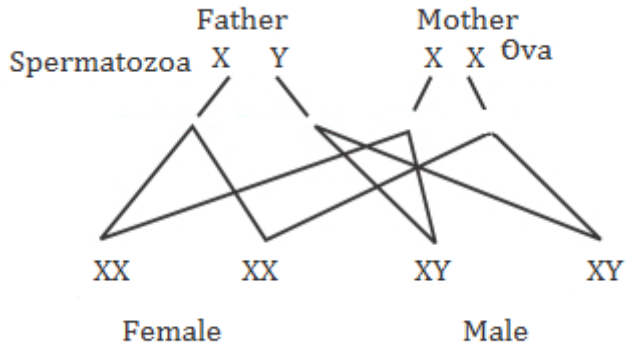
I. The symbol gives the message 'Save Water'.
II. The symbol suggests the 'Use of Bicycle'. It is the best eco-friendly non-polluting vehicle.

(b) Biodiversity can be conserved in the following ways:

- Protecting the rare species of organisms
- Declaring some regions as 'bioreserves'
- Establishing national parks and sanctuaries
- Conserving all plants and animals
- Observing acts and rules
- Projects for conservation of special species
- Maintaining a record of traditional knowledge

(ii)

(a) Diagram:



From the diagram, it is seen that there are two types of sperms produced by males.

- One sperm has an X chromosome, while the other has a Y chromosome.
  The mother has all X-bearing oocytes.
  Thus, the sperm which fertilises the oocyte decides the sex of the child.
- If an X-bearing sperm fertilises the oocyte, a daughter is born. If a Y-bearing sperm fertilises the oocyte, a son is born.

Hence, the gender of the child is determined by the male partner of a couple.

(b) Daughters give a lot of joy; it is not only the boy!
Save the girl child.

(c) Mucor has a filamentous body. It has sporangia.
Once the spores are formed, sporangia burst and spores are released.
Spores germinate in moist and warm places, and a new fungal colony is formed.

(d) It is an asexual type of reproduction.