Class – XII
SUB – BIOLOGY

General Instruction:

1. **All the questions are compulsory.**
2. **There are 26 questions in total. Questions 1 to 5 carry one marks each, Question 6 to 10 carry two marks each, Question 11 to 22 carry three marks and 23to 25carry five marks each and Question 26 carry 4 marks.**
3. **Wherever necessary, labelled diagrams should be drawn.**

SECTION A

1. Write the aim of Joint Forest Movement.

2. How amplification of gene of interest is carried out?

3. What is the difference in the production of wine and whisky?

4. Give an example of floral reward.

5. Who proposed Chromosomal Theory of Inheritance?

SECTION B

6. What is allergy? Name the antibody responsible for it. Also mention two chemicals released from the mast cells during an allergic reaction?

7. Why is using tobacco in any form injurious to health? Explain

8. What is linkage? What is its significance?

OR

Write 2 aims of human genome project?

9. What are the latest methods of detection of cancer?

10. What are primary and secondary lymphoid organs? Identify one of each category from the list- bone marrow, stomach, spleen and kidney.

SECTION C

11. What are Mendelian disorders? Give examples and identify the type of analysis done to prevent such disorders. Which traits can be studied by this type of analysis?

12. What are the important measures to control malaria?

13. Hemophilia victims are mostly men. Very rarely women are affected by it. Explain.

14. How does transmission of each of the following diseases take place?
a) Amoebiasis
b) Ascariasis
c) Pneumonia

15. What is DNA fingerprinting? Mention its applications.

16. State in what ways Stanley Miller simulated the conditions of:
a) Primitive atmosphere on earth
b) Energy source at the time of origin of life and
c) Formation of organic molecules of life to prove the theory of chemical evolution.

17. a) State Hardy-Weinberg principle. Name any two factors which affect it.
b) Draw a graph to show that natural selection leads to directional change.

18. What are with drawl symptoms? List the common with drawl symptoms of drug abuse.

19. Write short notes on ecological pyramids.

20. Define–
a) Convergent evolution,
b) Divergent evolution,
c) Progressive evolution

21. What is pedigree analysis? Why pedigree analysis is done in humans to detect genetic diseases?

22. a) Mention the benefits of using CNG over petrol and diesel.
b) Define metastasis

OR

a) Expand BOD.
b) At a particular segment of a river near a sugar factory, the BOD is much higher than the normal level. What is it indicative of ? What will happen to the living organisms in this part of the river?

SECTION D

23. Give reasons for-
a) Both strands of DNA are not copied during transcription
b) Transcription and translation in bacteria can be coupled
c) Differentiate between process of transcription in prokaryotes and eukaryotes.

OR

One chromosome contains one molecule of DNA. In eukaryotes the length of the DNA molecule is enormously large. Explain how such a long molecule fits into the tiny chromosomes at Metaphase.

24. Name the genes that constitute an operon. How does lac operon get switched on in the presence of lactose?

OR

What is a genetic code? What are its main properties?

25. Explain the following-
a) Elephantiasis
b) Ringworm

OR

What are the evidences of evolution? Categorize them and explain briefly with examples. Explain how natural selection and branching with descent are involved in evolution?

SECTION E

26. Neelam went to a fair. After a day she was unwell, when she went to the doctor it was diagnosed to be Typhoid.
a) What is Typhoid?
b) How it is transmitted?
c) What are its symptoms?

(Answers)
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SECTION A

1. To work closely with the local communities for protecting and managing forests.

2. By the technique known as Polymerase Chain Reaction

3. Wine is produced by distillation of the fermented broth while whisky is produced by distillation of the fermented broth.

4. Plants offer rewards in the form of pollen and nectar for pollinators and juicy and nutritious fruits for seed dispersers.

5. Sutton and Boveri

SECTION B

6. The exaggerated response of the immune system to certain antigens present in the environment is allergy. IgE. Histamine and serotonin.

7. Tobacco contains nicotine which raises blood pressure and increase heart rate.

8. Tendency of two or more genes to remain together during the process of inheritance is linkage. Essential for maintenance of parental characteristics generations after generations in a population of species.

OR

To identify all the genes present in the human genome and To transfer technologies developed during the project to others sectors like industry, agriculture and forestry

9. Latest methods for detection of cancer are MRI (Magnetic Resonance Imaging), CT (Computed Tomography) scan, Mammography and Pap test.

10. Primary lymphoid organs are those organs where B-lymphocytes and T- lymphocytes are formed, mature and acquire antigen –specific receptors. Bone marrow
Secondary lymphoid organs are organs where lymphocytes reside after maturation. Spleen.

SECTION C

11. Mendelian disorders are genetic diseases showing Mendelian pattern of inheritance caused by mutations in their genes. Examples are Sickle cell anaemia, Haemophilia. Pedigree analysis since control crosses cannot be performed in humans due to intermixing of characters.

12. i) Malaria can be prevented through administration of drugs like primaquine, chloroquine etc.

ii) Fitting doors and windows with wire nets and sleeping inside mosquito nets.
iii) Use of mosquito repellants at night
iv) Taking small doses of some antimalarial drug at weekly intervals during malarial season.
v) Spraying residential areas with insecticides such as DDT, BHC etc.
vi) Introduction of blue green algae and *Bacillus sphaericus*in the water bodies which kills mosquito larvae.

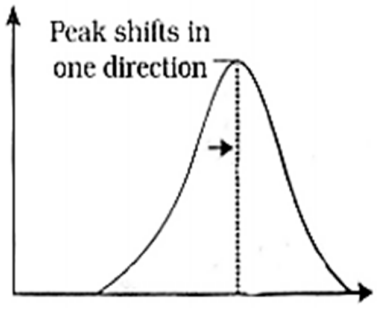
13. It is a sex linked recessive disorder in which human females are generally carrier of this disorder and remain normal throughout their life. If double recessive condition appears in a female, the same dies before birth. Human males suffer from this disorder because of the hemizygous nature of most sex linked traits. The defective males are either given blood transfusion or required clotting factor for leading a healthy life.

14. a) Amoebiasis is transmitted through the cysts present in the stool of the infected person. Some animals like cat, dog carry the infection also. Faulty disposal of faeces causes pollution of water and eatables through the agency of houseflies.
b) Ascariasis is spread through improper disposal of human stool containing roundworm eggs. Dirty hands may spread the disease directly. Children get the infection from ingestion of contaminated soil. c) Pneumonia is transmitted through droplets, used tissues or handkerchief of infected person, sharing needles and utensils.

15. DNA fingerprinting is the technique that is used for detection of nucleotide sequences in certain areas of DNA that are unique to every individual. DNA fingerprinting is used in the following cases-
Identification of criminals involved in crimes.
To solve disputes relating to paternity-maternity disputes.
To establish the closeness of relation of an intending immigrant.
To gather information regarding human lineage and relationship with other apes.

16. a) In a closed flask containing NH_3, CH_4, H_2 and Water Vapour to simulate primitive atmosphere
b) Electric discharge to simulate on primitive earth
c) Formation of compounds like amino acids from simple molecules like NH_3, CH_4, H_2.

17. a) Hardy-Weinberg principle states that "Allele frequencies in a population are stable and is constant from generation to generation".
b)



18. If regular dose of alcohol/drug is withdrawn, the side effects (characteristic and unpleasant) observed in the body of the addict is known as with drawl symptoms. These include anxiety, shakiness, nausea and sweating. In some cases with drawl symptoms is severe and even life threatening.

19. The graphical relationship between the different biotic components of an ecosystem are known as ecological pyramids. The base of a pyramid is broad and it narrows down at the apex. The base of each pyramid represents the producers or first trophic level while the apex represents the top level consumers. Ecological pyramids are of three types- Pyramid of number, Pyramid of biomass and Pyramid of energy. Pyramid of number takes into account the number of organisms at each trophic level while pyramid of energy depicts the energy flow at different trophic levels.

20. a) Divergent evolution in that evolution in which same structure developed along different directions due to adaptations to different needs.
b) Convergent evolution in that evolution in which different structures evolve for same functions and hence shoe similarity.
c) Progressive evolution is moving forward in a particular direction showing specialization of structures already in existence.

21. An analysis of traits in several generations of a family is called pedigree analysis. Here the inheritance of a particular trait is represented in the family tree over generations. Due to complexity of genes and huge structure of the human genome, control crosses are not possible in human, so pedigree analysis is the only alternative for detecting genetic disorders.

22. a) Advantages of using CNG over petrol and diesel are
i) It is cheaper.
ii) Burns very efficiently to completion and hardly any residue is left behind.
iii) CNG cannot be siphoned off by thieves.
iv) It cannot be adulterated and very few pollutants can be released.
b) Malignant tumors are dislodged from their original places and migrate through blood and lymph and tissue fluid to reach and infect newer organs of the body. This phenomenon is called metastasis.

OR

a) Biological/Biochemical Oxygen Demand
b) It is indicative of water pollution at that concerned place due to discharge of wastes from sugar factory directly into the river bodies. This will deplete the dissolved oxygen content of water leading to mortality of fish and other aquatic organisms.

SECTION D

23. a) Because that would produce complementary RNAs with a tendency to form double stranded structure which would not be functional. Even if both RNA strands are functional, they would produce two kinds of proteins with opposite sequence of amine acids. Only of the proteins will be functional.
b) This is because in bacterial cells there is no compartmentalization between nucleus and cytoplasm so mRNA after formation need not be transported out of the nuclear region. The genome in bacterial cell is also polycistronic.
c)

Prokaryotic Transcription	Eukaryotic Transcription
It occurs in the cytoplasm	It occurs inside the nucleus and other semi-autonomous organelles.
Only one polymerase is involved	Three types of polymerases are involved
Splicing is not required	Splicing is required.

OR

In eukaryotes DNA is packaged with the help of a set of positively charged basic proteins called histones which are rich in basic amino acids, lysine and arginine. Therefore they carry positive charges on their side chains. Histones and DNA are organized to form nucleosomes. Nucleosomes are formed of 4 pairs of histone molecules which contain positive charge. They attract negatively charged DNA. DNA of about 200 bp makes 1.75 turns over the octamer to form a Nucleosome. Nucleosome-DNA appearance is like a beaded string under the electron microscope.

24. An operon consists of minimum four types of genes-regulator, promoter, operator and structural.

In the presence of inducer, lactose the lac operon remains functionally active. The inducer binds to the repressor and makes it inactive changing its shape. Due to inactivity of the repressor the operator gene becomes active and allows the RNA polymerase to pass over the promoter and reach the structural genes for transcription. Consequently the products of the structural genes are formed.

OR

Genetic code is the genetic information present in the nucleotide sequences of DNA with three consecutive nucleotides functioning as a codon in anon-overlapping fashion.

Characteristics include-

a) Genetic code is triplet code where three adjacent nitrogenous bases specify one amino acid.
b) Three successive nitrogenous bases code for only one amino acid. None of these becomes part of any other codon.
c) Same codon specifies the same amino acid from bacteria to human beings with exceptions in viral and mitochondrial genes.
d) The total codons are 64. Most of them specify amino acids with some functioning as start and stop codons.
e) Out of 64 codons only 3 are stop codons. Rest specifies amino acids.

25. **Elephantiasis** is a helminthic disease where the parasite lives inside lymph nodes or connective tissues but the young ones migrate to blood vessels for being picked up by mosquito to turn them into infective form. It is due to a nematode *Wuchereria bancrofti.* The pathogen is spread from one huma being to another through mosquitoes like *Culex* and to a less extent by *Anopheles* and *Aedes.* Symptoms include increase eosinophils, enlarged lymph nodes, filarial fever followed by permanent swelling of feet. Thighs, genitals etc. This disease can be cured by drugs like hetrazan, diethyl carbamazine etc.

Ringworm are fungal infection caused by species of *Microsporum*, *Trichophyton* and *Epidermophyton.* There are dry scaly lesions on skin, nails and scalp that causes itching. Heat and moisture promote growth of these fungi especially in skin folds. Common source of infection are soil and towels, clothes, combs of infected person.

OR

The different evidences of evolution are Paleontological evidences, Evidences from Morphology and Anatomy, Embryological evidences, Cytological evidences and Biochemical evidences.

Paleontological evidences mainly deals with fossils and fossil impressions and is the study of past life. Fossils are of several types like impressions, compressions etc.

Morphological and anatomical evidences deal with homologous organs, analogous organs, vestigial organs etc. These organs provide us information about convergent or divergent evolution by comparing the structure and functions of different organs.

Embryology is the development of embryo from zygote till it becomes an offspring. Embryology provides a number of evidences in support of evolution.

Cytological evidences such as cellular nature, organelle structure, methods of cell division etc. provides evidences of evolution of various forms from common ancestors.

Biochemical evidences deals with comparative studies of metabolic processes, enzymes, hormones, blood and various other biomolecules which show a close similarity amongst various organisms.

Two key concepts of Darwin's theory of Evolution are branching descent (adaptive radiation) and natural selection (convergent evolution). Natural selection operates through interaction between environment and variability found in populations naturally. Formation of new species in the same or different geographical aread is not so straight. Environment does not remain stable. It shows so many vageries that many individuals perish and a new set of variations become established. It changes the path of evolution forming newer species of same or different kind within the same geographical area.

SECTION E

26. i) It is an acute infectious disease caused by a bacterium known as *Salmonella typhi.*

ii) Typhoid spreads through milk, food and water contaminated with intestinal discharges and urine either directly or through flies and faulty personal and public hygiene.

iii) Sustained high fever, loss of appetite, stomach pain, constipation, headache and weakness are some of the common symptoms of typhoid.