Sample Question Paper-3

BIOLOGY (044)

Class- XII, Session: 2022-23

SOLVED

Time Allowed : 3 hours **Maximum Marks : 70**

General Instructions :

(i) *All questions are compulsory.*
(ii) *The question paper has five sections and 33 questions. All questions are compulsory.*
(iii) *Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.*
(iv) *There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.*
(v) *Wherever necessary, neat and properly labelled diagrams should be drawn.*

Section - A

1. 'Restriction' in Restriction enzyme refers to:
(A) cleaving of phosphodiester bond in DNA by the enzyme.
(B) cutting of DNA at specific position only.
(C) prevention of the multiplication of bacteriophage in bacteria.
(D) All of the above. [1]

2. The options given below are representing parts of the sperm and its functions. Match the Column A with Column B and choose the correct option.

	Column A		Column B
a	Head	(i)	Enzymes
b	Middle piece	(ii)	Sperm motility
c	Acrosome	(iii)	Energy
d	Tail	(vi)	Genetic material

Options :
(A) a-ii, b-iv, c-i, d-iii
(B) a-iv, B-iii, c-i, d-ii
(C) a-iv, b-i, c-ii, d-iii
(D) a-ii, b-i, c-iii, d-iv

3. Autecology is the [1]
(A) relation of a population to its environment.
(B) relation of an individual to its environment.
(C) relation of a community to its environment.
(D) relation of a biome to its environment.

4. The correct order of step in polymerase chain reaction (PCR) is: [1]
(A) Extension, Denaturation, Annealing
(B) Denaturation, Annealing, Extension
(C) Denaturation, Extension, Annealing
(D) Annealing, Extension, Denaturation.

5. Match the items in Column 'A' with Column 'B' and choose the correct answer. [1]

	Column A		Column B
a	Lady bird	(i)	*Methanobacterium*
b	Mycorrhiza	(ii)	*Trichoderma*
c	Biological control	(iii)	Aphids
d	Biogas	(vi)	*Glomus*

The correct answer is :

(A) a – (ii), b – (iv), c – (iii), d – (i)

(B) a – (iii), b – (iv), c – (ii), d – (i)

(C) a –'(iv), b – (i), c – (ii), d – (iii)

(D) a – (iii), b – (ii), c – (i), d – (iv) [1]

6. The term 'Health' is defined in many ways. The most accurate definition of the health would be

(A) health is the state of body and mind in a balanced condition.

(B) health is the reflection of a smiling face.

(C) health is a state of complete physical, mental, and social well-being.

(D) health is the symbol of economic prosperity. [1]

7. Identify the odd one from the following.

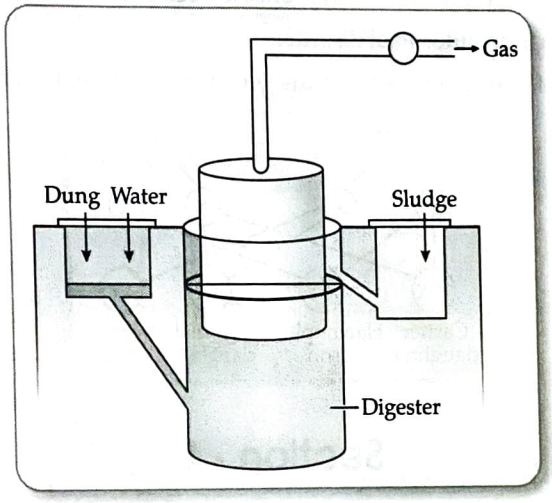
(A) Labia minora

(B) Fimbriae

(C) Infundibulum

(D) Isthmus [1]

8. Which gases are produced in anaerobic sludge digesters ?



(A) Methane and CO_2 only

(B) Methane, hydrogen sulphide and CO_2

(C) Methane, hydrogen sulphide and O_2

(D) Hydrogen Sulphide and CO_2 [1]

9. Biosphere is

(A) a component in the ecosystem.

(B) composed of the plants present in the soil.

(C) life in the outer space.

(D) composed of all living organisms present on earth which interact with the physical environment. [1]

10. Use of bio-resources by multinational companies and organisations without authorisation from the concerned country and its people is called

(A) Bio-infringement

(B) Bioexploitation

(C) Biodegradation

(D) Biopiracy [1]

11. Match the items in Column 'A' and Column 'B' and choose the correct answer.

	Recombinant Proteins		Therapeutic uses
a	Insulin	(i)	For treating haemophilia A
b	DNAase-I	(ii)	For the treatment of diabetes mellitus
c	Factor VIII	(iii)	For treatment of cystic fibrosis
d	Bovine growth hormone	(iv)	For increasing milk yield

The correct answer is :

(A) a – (i), b – (ii), c – (iii), d – (iv)

(B) a – (ii), b – (iii), c – (i), d – (iv)

(C) a – (iii), b – (iv), c – (ii), d – (i)

(D) a – (iv), b – (ii), c – (i), d – (iii) [1]

12. Marijuana is extracted from

(A) Dried leaves and flowers of hemp plant

(B) Ergot fungus

(C) Roots of hemp plant

(D) Cocoa plant. [1]

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(A) Both (A) and (R) are true (R) is the correct explanation of (A).

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(C) (A) is true but (R) is false.

(D) (A) is false but (R) is true.

13. **Assertion (A):** *Thermus aquaticus* is used in PCR technique.

Reason (R): It is a heat-stable DNA polymerase. [1]

14. **Assertion (A):** Bt-toxins are released as inactive crystals in the bacterial body.

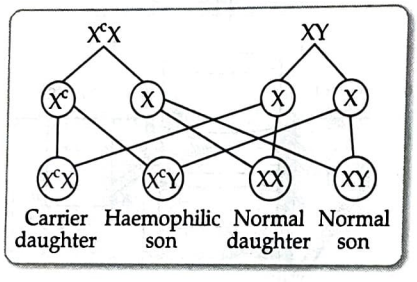
Reason (R): It is converted into an active protein (due to alkaline pH of the gut of the bollworm). A I [1]

15. **Assertion (A):** 'Saheli' is considered as an improved form of contraceptive for human females.

Reason (R): It is a non-steroidal preparation and is once a week pill. [1]

16. **Assertion (A):** Haemophilia is an autosomal disorder.

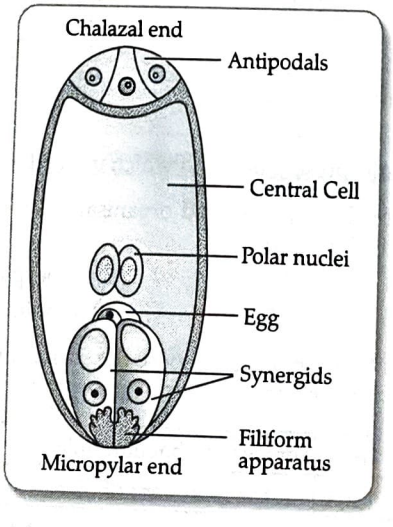
Reason (R): A haemophilic father can never pass the gene for haemophilia to his son. [1]



Section - B

17. **(a)** From which end does the pollen grain enters into the embryo sac?

(b) Which of the cells in the embryo sac will fertilise with male gamete to form zygote? [2]



18. Describe the structure of a nucleosome.

19. Discuss the role the enzyme DNA ligase plays during DNA replication. [2]

OR [2]

(a) Explain the cause responsible in a human to have sex chromosomes as 'XXY' instead of 'XX' or 'XY'.

(b) List any two ways such individuals are different from the normal being.

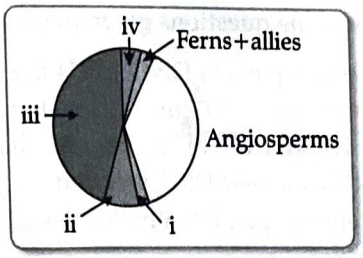
20. **(a)** Explain with the help of a suitable example the naming of a restriction endonuclease. [2]

(b) Name the source organism of Taq polymerase. Explain the specific role of this enzyme in PCR. A I

21. The pie-chart given below represents the biodiversity of plants slowing their proportionate number of species of major taxa. Based on this information,

(a) Identify the areas labelled (i) and (ii).

(b) Identify the areas labelled (iii) and (iv). [2]



OR

(a) What is common to *Lantana, Eicchornia* and African catfish?

(b) What is the reason for the extinction of passenger pigeon? [2]

Section - C

22. Explain the functions of the following structures of the human sperm.

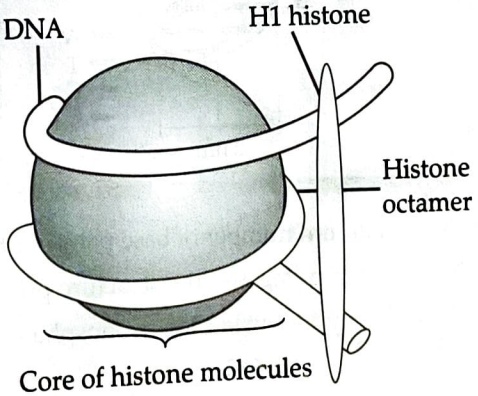
(a) Mitochondria

(b) Hydrolytic enzymes

(c) Tail [3]

23. Highlight the differences and a similarity between the following population interactions: competition, predation and parasitism. [3]

24. How are the following formed and involved in DNA packaging in a nucleus of a cell?



(a) Histone octamer

(b) Nucleosome

(c) Chromatin [3]

25. (a) What is genetic biodiversity? [3]

(b) Name and describe any three causes of biodiversity losses.

26. (a) DNA separated from one cell, when introduced into another cell is able to bestow some of the properties of former to the latter. What is this change called in technical terms?

(b) Describe the experimental evidences which led to the discovery of the above phenomenon. [3]

OR

Differentiate between the pattern of inheritance in humans of the blood diseases, haemophilia and thalassemia.

27. (a) It is generally observed that the children who had suffered from chicken - pox in their childhood may not contract the same disease in their adulthood. Explain giving reasons, the basis of such an immunity in an individual. Name this kind of immunity.

(b) What are interferons? Mention their role. [3]

28. (a) Explain the menstrual cycle in human females.

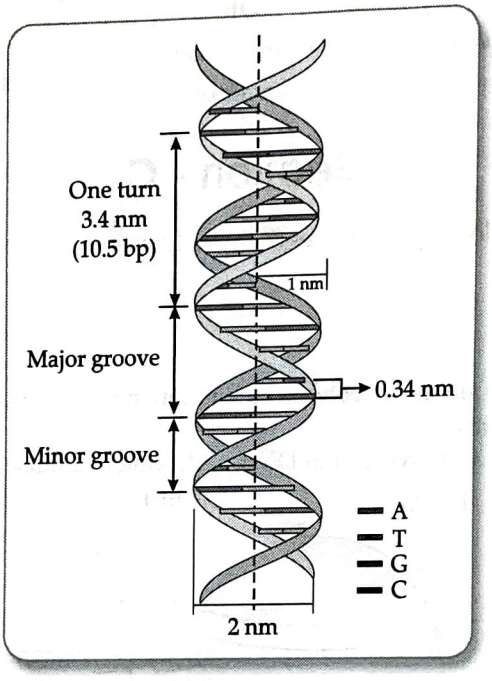
(b) How can the scientific understanding of the menstrual cycle of human females help as contraceptive measures? [3]

Section - D

Q. no 29 and 30 are case based questions. Each question has sub-parts with internal choice in one subpart.

29. Read the following passage and answer the questions given below:

The distance between two consecutive base pairs in DNA is 0.34 m i.e., (0.34×10^{-9} m). Thus, the length of DNA for a human diploid cell is 6.6×10^{9} bp $\times$ 0.34×10^{-9} m = 2.2 metres. This length of DNA is far greater than the dimension of a typical nucleus which is about 10^{-6} m. This shows that the long sized DNA can accommodate in small area through packaging. In prokaryotic cells DNA is found in cytoplasm in coiled stage. In eukaryotes, the organisation is very complex. Negatively charged DNA molecules adhere to the positively charged proteins and they form complexes called nucleosomes.



(a) Name the DNA form which has maximum number of base pairs per turn? [1]

(b) Name the protein involved in DNA packaging and the structure present in core particle of nucleosome? [1]

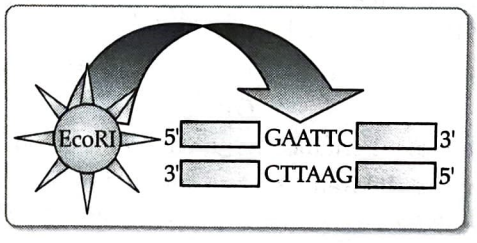
(c) Write the dual purpose served by Deoxyribonucleoside triphosphates in polymerisation. [2]

OR

Write the role of histone protein in packaging of DNA in eukaryotes. [2]

30. Read the following passage and answer the questions given below:

Restriction endonuclease was isolated for the first time by W. Aber in 1962 in bacteria. Restriction endonucleases cut the DNA duplex at specific points therefore they are also called as molecular scissors or biological scissors. Three types of restriction endonucleases are Type I, Type II and Type III. Restriction endonuclease EcoRI recognises the base sequence GAATTC in DNA duplex and cut strands between G and A.



(a) What is the reason that only type II restriction enzymes are used in gene manipulation? [1]

(b) Restriction endonuclease was isolated for the first time from which cell? [1]

(c) Why Restriction endonucleases are also called as molecular or biological scissors ? [2]

OR

Which type of restriction endonuclease is used mostly in genetic engineering? [2]

Section - E

31. Arrange the terms given below in their order of occurrence describing their structure and function in the early development of the human embryo: Implantation; cleavage; inner cells mass; trophoblast; blastomeres; endometrium; morula; blastocyst. [5]

OR

(a) Geitonogamy and xenogamy, both require pollinating agents, yet they are very different from each other. Explain how.

(b) Describe the characteristics of flowers that are pollinated by wind.

32. **(a)** Name the stage in the cell cycle where DNA replication occurs.

(b) Explain the mechanism of DNA replication. Highlight the role of enzymes in the process.

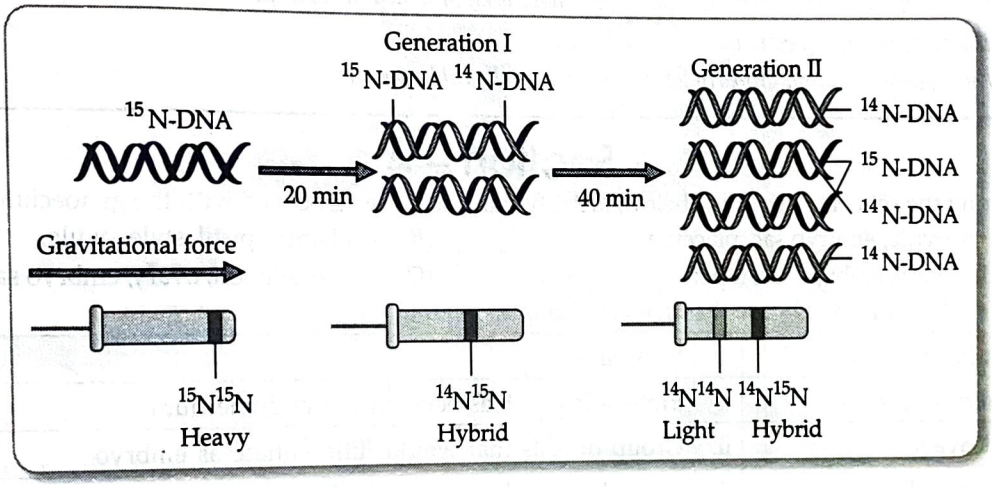
(c) Why is DNA replication said to be semi-conservative? [5]

OR

Observe the given diagram and answer the following questions:

(a) Describe the experiment shown in the below diagram?

(b) Write the conclusion which arrived after this experiment. [5]



33. In malarial patient, the rupture of RBCs is associated with the release of a toxic substance, haemozoin which is responsible for the chill and high fever recurring every three to four days.

(a) Give the scientific name of the parasite that causes malignant malaria in humans.

(b) At what stage does the parasite enter the human body?

(c) Trace its life cycle in human body. [5]

OR

Recombinant DNA technology is a technique that alters the phenotype of an entity (host) when a genetically modified vector is introduced and incorporated into the genome of the host. Thus, the process entails introducing a foreign fragment of DNA into the genome containing the desired gene. Unless the vector and source DNA are cut, fragments separated and joined, the desired recombinant vector molecule cannot be created.

(a) How the desirable DNA sequence is cut? 1½

(b) Explain the technique used to separate the cut fragments. 2

(c) How are the resultant fragments joined to the vector DNA molecule? 1½

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