

HIMACHAL PRADESH BOARD OF SCHOOL EDUCATION

Class 12th

Biology (2024-25)

Time: 3 Hours

Maximum Marks: 60

General Instructions:-

1. All questions are compulsory.
2. The question paper consists of four sections: A, B, C, and D.
3. Section A contains 12 multiple-choice questions of 1 mark each.
4. Section B contains 10 very short answer questions of 2 marks each.
5. Section C contains 6 short answer questions of 3 marks each.
6. Section D contains 2 long answer questions of 5 marks each.
7. Draw neat and labelled diagrams wherever necessary.

SECTION A: Multiple Choice Questions

1. A person accidentally cuts his finger with a rusty nail. Within hours, the area becomes red, swollen, and warm. Which component of the innate immune system is primarily responsible for these signs?

- A) Antibodies
B) Memory T cells
C) Inflammatory response
D) Plasma cell (1)

2. What is the role of reverse transcriptase in a retrovirus?

- (a) It synthesises proteins.
(b) It copies DNA to RNA.
(c) It transcribes RNA to DNA.
(d) It replicates RNA. (1)

3. Hormones releasing IUD is

- (a) CuT
(b) Lippes loop
(c) LNG-20
(d) Cu7 (1)

4. For a long time, it was believed that life came out of decaying and rotting matter like straw, mud, etc. This was the theory of

- (a) catastrophism
(b) spontaneous generation
(c) panspermia
(d) chemogeny (1)

5. Angiospermic endosperm is :

- (a) Haploid (b) Diploid (c) Triploid (d) Polyploid (1)

6. If a red-flowered plant (RR) is crossed with a white-flowered plant (WW) under incomplete dominance, what will be the phenotype of the offspring (RW)?

- A) Red B) White C) Pink D) Red and white spotted (1)

7. How many polar bodies are given out in production of one egg during oogenesis?:

- (a) Two (b) Three
(c) One (d) Four (1)

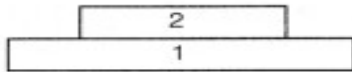
8. From a Sewage treatment plant, three water Samples, the A, B and C are tested for BOD Value and the recorded values of BOD are 6mg/L, 400mg/L and 20 mg/L respectively. What is correct about these samples ?.

- a) Sample A is taken from Untreated sewage
b) Sample B belong to secondary effluent of sewage
c) Sample C is taken from Primary effluent -
d) Sample B is collected from untreated sewage (1)

9. Name the bacterium that yields thermostable DNA polymerase. (1)

- a) *Agrobacterium tumefaciens*. b) *Thermus aquaticus*.
 c) *Azotobacter Sp.* d) *Escherichia coli*

10. The diagram shows a pyramid of biomass.



A sharp decrease is seen in biomass at higher trophic levels in the grassland ecosystem. Choose the correct option for the levels of the ecosystem.

	1	2
a	Carnivor	Herbivore
b	Producers	Herbivore
c	Herbivore	Producers
d	Producers	Carnivor

(1)

Question Nos. 11 & 12 consist of two statements- Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below

- (a) Both Assertion and Reason are true and Reason is the correct explanation of assertion
 (b) Both Assertion and Reason are true, but Reason is not the correct explanation of assertion
 (c) Assertion is false, but Reason is false
 (d) Assertion is false, but Reason is true

11. Assertion (A): Mice is the most preferred mammal for studies on gene transfers.

Reason (R): Mice possesses features like short oestrous cycle and gestation period, relatively short generation time, production of several offspring per pregnancy, etc. (1)

12. Assertion: Monarch butterfly is highly distasteful because of a special chemical present in its body.

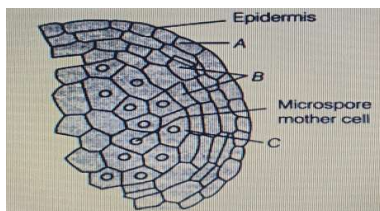
Reason : Animals adopt different strategies to survive in hostile environment. (1)

Section B (Very Short Answers)

13. Identify the sex of organism as male or female in which the sex chromosome are found as :

- (i) ZW in bird.
 (ii) XY in Drosophila
 (iii) ZZ in birds.
 (iv) XO in grasshopper (2)

14. Given below is a view of a microsporangium of a mature anther



- (i) Name A, B and C wall layers.
 (ii) Mention the characteristics and function of the cells forming wall layer C. (2)

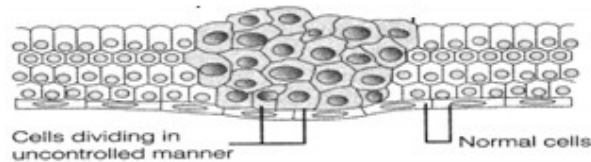
15. Given below are the pathogens and the diseases caused by them. Which out of these pairs is not correct matching pair and why?

- (b) *Microsporium* - Ringworm
- (c) *Salmonella* - Common Cold
- (d) *Plasmodium* – Malaria

OR

What are allergens? How do they cause inflammatory response inside human body? (2)

16. The figure given below indicates the uncontrolled growth of cells which results in tumour. These can be either benign (stay in fix spot) or malignant (can move to other parts of the body) and can cause cancer.



Based on the above figure, answer the following questions.

(i) Cancer is one of the most dreaded diseases. Explain contact inhibition with respect to the disease.

(ii) Cancer patients are often given α -interferon as a part of the treatment. Give a reason. (2)

17. An orchid plant is growing on the branch of mango tree. How do you describe this interaction between the orchid & the mango tree?

OR

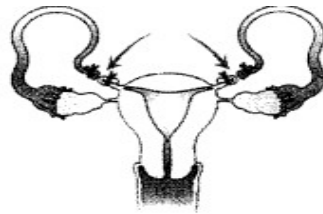
Name the bind of interaction present between the following :

- i) Indian Nightingale & crow
- ii) Nodulated roots & rhizobium
- iii) Plasmodium & man
- iv) Sea anemone and Clown fish (2)

18. .Mention any two applications of Biotechnology in the field of Agriculture. (2)

19. Biodiversity must be conserved as it plays an important role in many ecosystem services that nature provides. Explain any two services of the ecosystem. (2)

20. The figure given below is related to the control of pregnancy. Study the figure and answer the questions that follow.



(i) Name the process that is shown in the above figure.

(ii) Explain how this process helps to control pregnancy. (1+1)

21 Draw a labelled diagram of a nucleosome. Where is it found in a Cell? (2)

22 In the activated sludge process, what is the role of the aeration tank, and why is it important to maintain adequate oxygen levels in this tank?. (2)

SECTION C(Short Answer)

23. Consider a eukaryotic cell where the transcription of a gene is initiated by RNA polymerase binding to the promoter region. The gene sequence on the DNA template strand is 3'-

Question:

Based on the scenario provided:

(a) Identify the mRNA sequence that would be synthesised from the given DNA template strand. Explain the role of the promoter region in the initiation of transcription.

(b) List two key modifications that occur to the primary RNA transcript in eukaryotic cells to form mature mRNA. (3)

24. Explain the structure of an anatropous ovule with a neat and well labeled diagram?

OR

How dose pollination takes place in Yucca plant .List any three adaptations required for such type of pollination. (3)

25 Describe how nematode – resistant transgenic plants have been obtained?

OR

What are Cry proteins? Name an organism that produces it. How has man exploited this protein for his benefit .

26. Who were the two scientists that conducted an experiment to synthesise organic molecule abiotically ? How did they provide the probable condition of the primitive earth in this experiment?

27. A forest ecosystem is observed where fallen leaves from various trees have accumulated on the forest floor. Over time, the leaves start to decompose, and the nutrient-rich humus forms in the soil. Explain the role of decomposers in this process and discuss how the decomposition of leaf litter contributes to the nutrient cycling and overall health of the forest ecosystem. (3)

28. A cross between a normal couple resulted in a son , who was haemophilic and a normal daughter. In course of time when the daughter was married to a normal man, their son was also haemophilic.

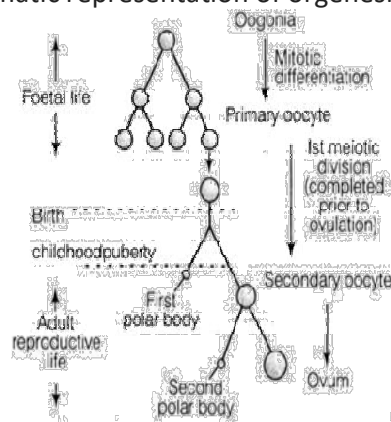
(a) Represent this cross in the form of a punnett square.

(b) Give the genotypes of the daughter and her husband.

(c) Write the conclusion you draw of the inheritance pattern of this disease.? (3)

SECTION D LONG ANSWERS

29. Observe the schematic representation of orgenesis given below.



(i) Explain and illustrate the phases in oogenesis.

(ii) After the formation of a secondary oocyte, if sperm does not fertilise the egg, what will happen then? Explain. (2+3)

OR

(a) Draw T.S. of mammalian testis revealing seminiferous tubules show different types of cell.

(b) Name the two types of cells of germinal epithelium.

(c) Name the hormones produced by the cells scattered in connective tissue and lying between seminiferous tubules. (3+1+1)

30 (a) In recombinant DNA technology, vectors are used to transfer a gene of interest in the host cells. Mention any three features of vectors that are most suitable for this purpose.

(b) A selectable marker is used in the selection of recombinants on the basis of their ability to produce colour in presence of chromogenic substrate.

(i) Mention the name of mechanism involved.

(ii) Which enzyme is involved in production of colour?

(3+2)

OR

(a) Why are restriction endonucleases, so called?

(b) What is a palindromic nucleotide sequence? How do restriction endonucleases act on palindromic sites, to create sticky ends?

(c) Name the material used as matrix in gel electrophoresis.

(2+2+1)

CHAPTER WISE MARKS DISTRIBUTION

S No	Name of Chapter	1 Mark MCQ	2 Marks Questions	3 Marks Questions	5 Marks Questions	TOTAL MARKS
1	Sexual Reproduction in Flowering Plants	01 01Mark	01 02 Marks	01 03 Marks	_____	06 Marks
2	Human Reproduction	01 01 Mark	-----	_____	01 05 Marks	06 Marks
3	Reproductive Health	01 01 Mark	01 02 Marks	-----	_____	03 Marks
4	Principles of Inheritance and Variations	01 01Mark	01 02 Marks	01 03 Marks	_____	06 Marks
5	Molecular Basis Of Inheritance	01 01Mark	01 02 Marks	01 03 Marks	_____	06 Marks
6	Evolution	01 01Mark	-----	01 03 Marks	_____	04 Marks
7	Human Health and Disease	01 01Mark	02 04 Marks	-----	---	05 Marks
8	Microbes in Human Welfare	01 01Mark	01 02 Marks	_____	-----	03 Marks
9	Biotechnology: Principles & Processes	01 01Mark	_____	_____	01 05 Marks	06 Marks
10	Biotechnology : Applications	01 01Mark	01 02 Marks	01 03 Marks		06 Marks
11	Organisms and Populations	01 01Mark	01 02 Marks	-----		03 Marks
12	Ecosystem	01 01Mark	-----	01 03 Marks		04 Marks
13	Biodiversity and Conservation	-----	01 02 Marks		_____	02 Marks

BLUEPRINT FOR MCQs

Sr. No.	Name of Unit	Number of Questions
1	Concept Based/Direct Questions	4
2	Understanding & Knowledge Based	3
3	High Difficulty Level	3
4	Assertion & Reason	2
	Total	12