



INDIAN SCHOOL SOHAR  
TERM I EXAMINATION (2022-23)

CLASS: XII  
DATE: 24/09/22

BIOLOGY

MAX.MARKS:70  
DURATION: 3HOURS

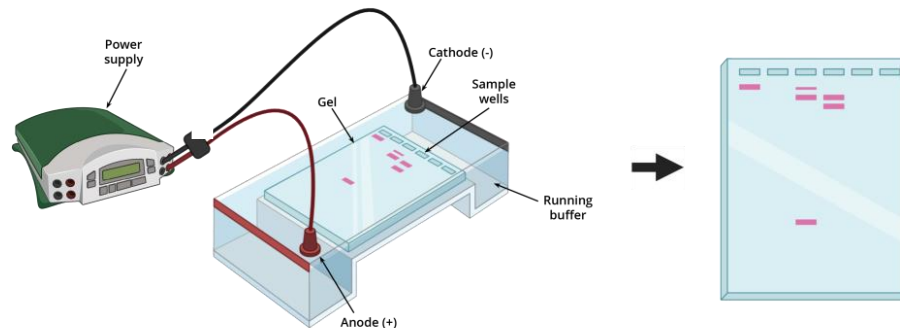
**General Instructions:**

- There are a total of 33 questions and five sections in the question paper. All questions are compulsory.
- Section A contains, question numbers 1 to 17, objective type questions of one mark each.
- Section B contains, question number 18 to 21, competency based case study questions.
- Section C contains, question numbers 22 to 26, short answer type questions of two marks each.
- Section D contains, question numbers 27 to 31, long answer type I questions of three marks each.
- Section E contains, question numbers 32 and 33, long answer type II questions of five marks each.
- 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.

**SECTION A**

Answer the following questions in one word or one sentence.

- How many sperms will be produced from 100 primary spermatocytes and how many eggs will be produced from 100 primary oocytes? 1
- How do histones acquire a positive charge? 1
- How is a cancer cell different from a normal cell? 1
- Name the technique depicted in the figure given below and write the purpose of this technique. 1



- Why do the sons of a haemophilic father never suffer from this trait? 1
- Mention the role of SAT chromosomes in DNA fingerprinting. 1

**OR**

Mention the contribution of gene map in human genome project

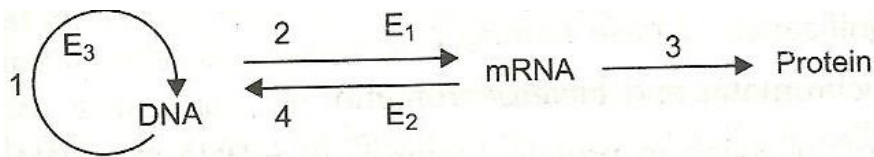
7. A couple has five daughters. The man blames the woman for giving birth to daughters. His wife is pregnant for the sixth time, as they want at least one son. 1
- What is the probability of the couple getting a son this time?
  - How will you make the man understand that it is not his wife who is responsible for the birth of daughters?
8. List the methods by which the rDNA gets introduced into the host cell to transform the latter. 1

**OR**

rDNA is formed of DNA from two sources. Give reason

9. In human beings, where genotype AABCC represents dark skin colour, aabbcc represents light skin colour and AaBbCc represents intermediate skin colour. Name the pattern of genetic inheritance of skin colour in human. 1
10. Give one point of difference between endonuclease and exonuclease. 1
- Read the following questions carefully to choose the best suitable answer.

11. Complete the parts labeled 1 to 4 in the central dogma of molecular basis of inheritance. 1



a.	1. Replication	2. Transcription	3. Translation	4. Reverse transcription
b.	1. Transcription	2. Replication	3. Reverse transcription	4. Translation
c.	1. Translation	2. Transcription	3. Replication	4. Reverse transcription
d.	1. Reverse transcription	2. Translation	3. Replication	4. Transcription

12. The pyramid of number is upright for all ecosystems except ..... 1
- Forest ecosystem
  - Pond ecosystem
  - Tree ecosystem
  - Aquatic ecosystem
13. Which one is not correct for standing crop? 1
- dry weight of living organic matter in a particular area
  - total amount of biomass at particular trophic level of food chain
  - dry weight of dead organic matter in particular area
  - amount of storage energy of particular trophic level of food chain

Question No. 14 to 17 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- Both A and R are true and R is the correct explanation of A
- Both A and R are true and R is not the correct explanation of A
- A is true but R is false
- A is False but R is true

14. **Assertion:** Interferons are the type of antibodies produced by body cells infected by bacteria. 1

**Reason:** They are cytokine barriers.

15. **Assertion:** To diagnose presence of a specific DNA segment in a mixture, complementary pairing between nucleotides is exploited.

1

**Reason:** DNA probes having radioactive isotopes help to detect DNA by autoradiography.

16. **Assertion:** Parturition is induced by a complex neuro endocrine mechanism. 1

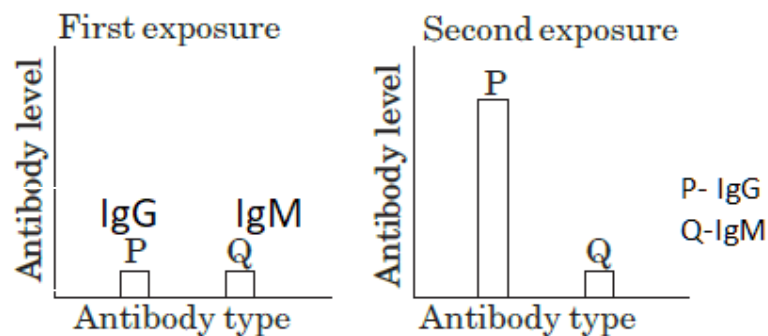
**Reason:** At the end of gestation period, the maternal pituitary releases prolactin which causes uterine contractions.

17. **Assertion:** In a monohybrid cross, F1 generation indicate dominant characters.

**Reason :** Dominance occurs only in heterozygous state. 1

### SECTION B

18. In a study to test a new vaccine against a viral disease, mouse model testing is done. In this process, mice are vaccinated and their blood samples were tested. Mice developed mild disease symptom. After few days those mice were again infected with the virus. This time they do not show any disease symptoms. Their blood samples were tested. Two graphs show antibody concentration for the first and second infection in mice blood. 4



Based on the above information, answer the following questions.

i. Which form of pathogen is used in vaccination?

- Activated and strong pathogenic antigens
- Inactivated and weakened pathogenic antigens
- Hyperactive and strong pathogen
- Preformed antibodies

ii. How does vaccination work?

- The immune system produces antibodies which stay in the blood.
- Memory lymphocytes remain in the body to fight off any future infection with the same pathogen.
- Antigenic proteins of pathogens generate primary immune response and the memory B and T cells.
- All of these.

iii. Read the given statements and select the correct option.

Statement A: Mice do not show any disease symptoms during second exposure to the pathogenic virus.

Statement B: The antibody production is accelerated and more intense during secondary

immune response.

- a. Both statements A and B are true.
- b. Statement A is false but statement B is true.
- c. Statement A is true but statement B is false.
- d. Both statements A and B are false.

iv .Which among the following viral vaccine is produced from yeast by rDNA technology

- a. Hepatitis A
- b. Hepatitis B
- c. Chicken pox
- d. Rabies

19. Earthworms are known as farmers' best friends because of the multitude of services they provide that improve soil health and consequently plant health. The density of earthworms in the soil is considered to be a good indicator of a healthy soil because they improve many soil attributes like structure, water holding capacity, moisture content etc., and also increase nutrient availability and degrade pesticide residues. As scientists understand these 'ecosystem services' provided by earthworms, they discover that this earthworm-farmer friendship is a lot deeper than previously imagined!

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i. Breakdown of detritus into small particles by earthworm is called....

- a. Humification
- b. Mineralization
- c. fragmentation
- d. catabolism

ii. .... is required in large quantities for the process of decomposition

- a. Oxygen
- b. Phosphorous
- c. Zinc
- d. Nitrogen

iii. The rate of decomposition is controlled by chemical composition of detritus. Which of the following component slower the rate of decomposition of fallen log in nature.

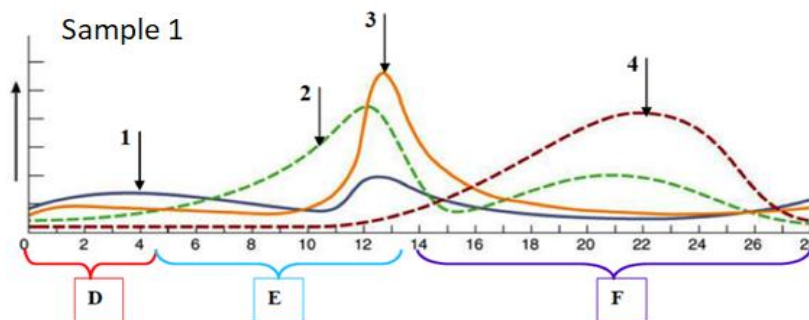
- a. poor nitrogen content
- b. low moisture content
- c. low carbon and cellulose content
- d. anaerobic environment

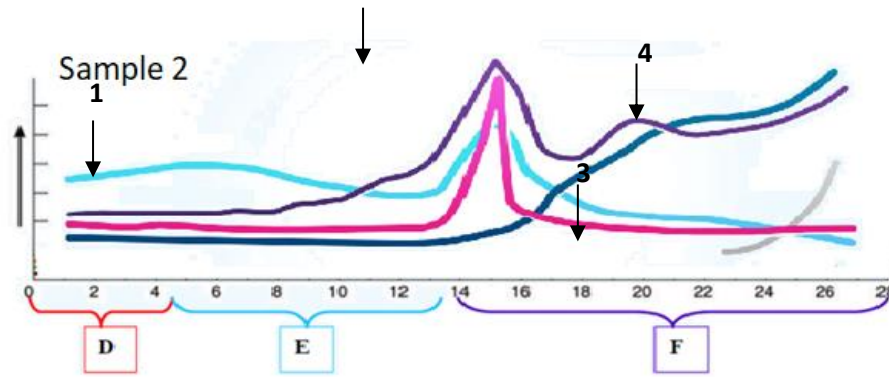
iv. An earthworm eating dead organic matter are considered as

- a. First link of food chain known as primary producers
- b. Second link of food chain and are primary consumers
- c. End of food chain and are known as detritivores
- d. First trophic level of food chain and are known as decomposers.

20. Study the graph given below showing different levels of pituitary and ovarian hormones in samples selected from two different individuals.

5





- Name the hormones labeled 1 to 4.
- The hormone labeled 3 is at its peak in both the samples nearly at the same time. Comment.
- Explain the possible reason/reasons for following conditions?
  - Increasing in level of hormone 4 in sample 2 at stage F
  - Increasing level of hormone 1 in sample 1 and decreasing level in sample 2 during luteal phase

21. DNA extraction and polymerase chain reaction (PCR) are the basic techniques employed in the molecular laboratory. This short overview covers various physical and chemical methods used for DNA extraction so as to obtain a good-quality DNA in sufficient quantity. DNA extraction is a method to purify DNA by using physical and/or chemical methods from a sample separating DNA from cell membranes, proteins, and other cellular components. Friedrich Miescher in 1869 did DNA isolation for the first time. The use of DNA isolation technique should lead to efficient extraction with good quantity and quality of DNA, which is pure and is devoid of contaminants, such as RNA and proteins. 5

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6425773>

- Name the enzymes used to break open the cell envelopes of following cells during isolation of genetic material.
  - Bacteria
  - Fungus
- The enzymes used for extraction of pure DNA from its contaminants were used by scientists in their experiments to prove the biochemical nature of molecules responsible for transforming principles. Explain the experiment.
- Name the bacteria studied by Griffith in his experiment to prove DNA is the genetic material. What did he conclude from his experiment?

### SECTION C

- If a patient is advised anti-retroviral drug, which infection is he suffering from? 2
  - Many microbial pathogens enter the gut of humans along with food. Name the physiological barrier that protects the body from such pathogens.
  - How do vaccines prevent subsequent microbial infections?

**OR**

- If the frequency of a parental form is higher than 25 percent in a dihybrid test cross, what does that indicate about the two genes involved? 2
- Give one function each of histone and non histone chromosomal protein in a eukaryotic nucleus. 2

**OR**

DNA is considered to be a better genetic material than RNA. Comment

- State the role of DNA polymerase isolated from *Thermus aquaticus*. 2

26. A recombinant vector with a gene of interest inserted within the gene of alpha –galactosidase enzyme is introduced into a bacterium. Explain how this method that would help in the selection of recombinants from non-recombinant ones. 2

**SECTION D**

27. How does gain or loss of chromosome(s) takes place in humans? Describe one example each of chromosomal disorder along with the symptoms involving an autosome and a sex chromosome. 3

28.a. Complete the given table:-

Disease	Causative agent	Symptom
i) -----	<i>Entamoeba histolytica</i>	ii) -----
Filariasis	iii) -----	Chronic inflammation of lymphatic vessels
Typhoid	iv) -----	Sustained high fever, weakness, loss of appetite.

- b. How and at what stage does *Plasmodium* enter into (i) a human body (ii) a female mosquito? 3

**OR**

Explain why ecological succession will be faster in a forest devastated by fire than on a bare rock? Also, compare succession in an abandoned land after floods with that on bare rock.

29. A small stretch of DNA that codes for a polypeptide is given below

TAC CAT AGA TGA AAC----- 5'

3'-----CAT

a. Which type of mutation could have occurred in each type resulting in the following mistakes during replication of the above original sequence?

- i. 3`... .. ...CAT TAC CAT AGA TGA ATC... .. 5'      ii. 3`... .. ...CAT TAC ATA GAT GAA ACT AAG ATC5`

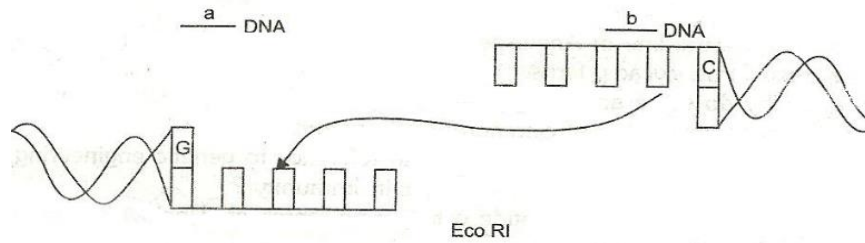
- b. How many amino acids will be translated in each of the above two cases? 3

30. Write the ploidy of embryo sac, Zygote and endosperm in an angiosperm. Justify it by giving reasons for each stage. 3

**OR**

Explain the development of an ovum from an oogonium in a human female.

31. The following figure depicts the linking of DNA fragments to form a recombinant DNA:



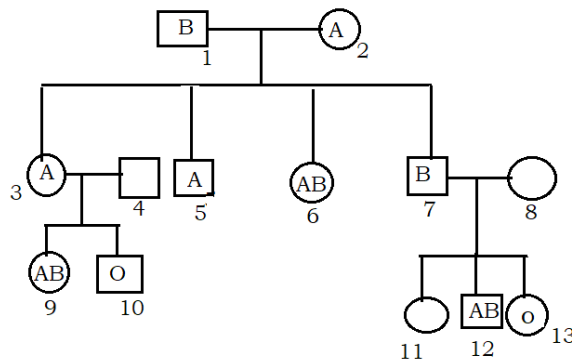
- Name 'a' and 'b' in the above figure.
- Name the group of enzymes that can recognize such a sequence and can link the two DNA fragments.
- Complete the palindromes which are recognized by EcoRI. 3

### SECTION E

32. Who proposed that DNA replication is semi conservative? Who proved it experimentally and how?

OR

- Provide genetic explanation for the observation in which the flower colour in F1 generation of snapdragon did not resemble either of two parents. However parental characters reappeared when F1 progenies were selfed.
- Study the pedigree given below, showing inheritance of blood groups in a family and answer following questions



- Which antigen/antigens will be present on the plasma membrane of RBCs of individuals 6 and 8?
- Give possible genotypes of individual 1 and 2 5

33 a. Explain how geitonogamy functionally similar to cross pollination and genetically similar to autogamy.

- Can an unfertilized apomictic embryo sac give rise to a diploid embryo? If yes, then how?
- Why does self-pollination not lead to seed formation in self-incompatible species?

OR

- Explain the development of a fertilized egg upto a mature embryo in a dicot plant. Draw, a labelled diagram of L.S of an embryo of grass.
- Describe the endosperm development in coconut.
- Why is tender coconut considered a healthy source of nutrition? 5

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