



**BIOLOGY**

**Class 12 - Biology**

**Time Allowed: 3 hours**

**Maximum Marks: 70**

**General Instructions:**

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. 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.
4. 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.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

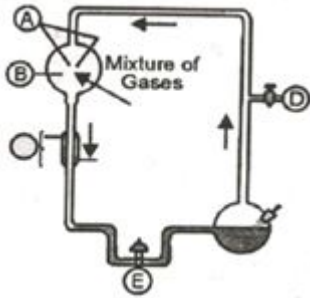
**Section A**

1. In a pond ecosystem, benthos means: [1]  
a) Virus  
b) Bacteria  
c) Zooplanktons in water surface.  
d) Primary consumers in the depth of a pond.
2. Which of the following sterilization method is used in human males? [1]  
a) Tubectomy  
b) Both Tubectomy and Vasectomy  
c) Laparotomy  
d) Vasectomy
3. Androgenic haploids are used for: [1]  
a) Knowing effect of all genes.  
b) Preparation of homozygous diploids.  
c) Induction of mutations.  
d) Raising stock for micropropagation.
4. Cu-T prevents pregnancy by preventing: [1]  
a) Non-fertilization  
b) Implantation of fertilized egg  
c) Fertilization  
d) Ovulation
5. Rice is important food grains grown in India for thousands of years. Estimated varieties of rice present in India are: [1]  
a) 500,000  
b) 100,000  
c) 200,000  
d) 300,000
6. Which one of the following is not used in organic farming? [1]  
a) Snail  
b) Oscillatoria

- c) Earthworm d) Glomus

7. In human beings, if ovum fertilizes with a sperm carrying X-chromosome the zygote develops into \_\_\_\_\_. [1]  
 a) Sterile b) Female  
 c) Male d) No fertilization

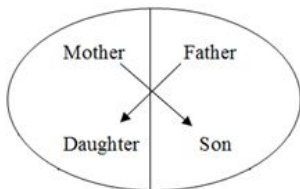
8. What was the mixture of gases used in chamber marked A? [1]



- a) Oxygen  $O_2$ , ammonia ( $NH_3$ ), hydrogen  $H_2$ , and water  $H_2O$  b) Methane ( $CH_4$ ), ammonia ( $NH_3$ ), hydrogen  $H_2$  and water  $H_2O$   
 c) Oxygen  $O_2$ , ozone  $O_3$ , hydrogen  $H_2$ , and water  $H_2O$  d) Oxygen  $O_2$ , ozone  $O_3$ , hydrogen  $H_2$

9. Biomagnification is due to: [1]  
 a) Minerals b) DDT  
 c) Both Mercury and DDT d) Mercury

10. Represented below is the inheritance pattern of a certain type of trait in humans. Which one of the following conditions could be an example of this pattern? [1]

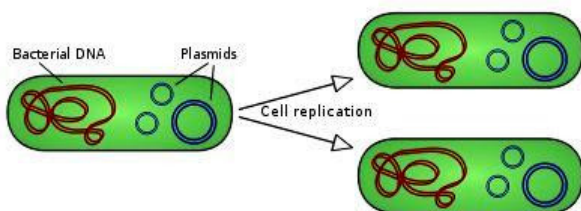


- a) Thalassemia b) Haemophilia  
 c) Sickle Cell anemia d) Phenyl ketonuria

11. Which among these are produced by distillation of fermented broth? [1]  
 (i) Whisky (ii) Wine (iii) Beer (iv) Rum (v) Brandy

- a) (iii) and (v) alone b) (i) and (ii) alone  
 c) (i), (iv) and (v) alone d) (ii) and (iii)

12. Which of the following is true for a Plasmid - [1]



- a) It can be replicate independently b) It cannot replicate  
 c) It lies together with chromosomes d) It shows independent assortment

13. **Assertion (A):** Subcutaneous implants (Norplants) involve the implantation of synthetic progesterone under the skin. [1]

**Reason (R):** Norplants block ovulation and thickens the cervical mucus to prevent sperm transport.

- a) Both A and R are true and 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.

14. **Assertion (A):** Anabaena is commonly called a symbiotic biofertilizer. [1]

**Reason (R):** Anabaena is found as endosymbiont in the thallus of Anthoceros.

- a) Both A and R are true and 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.

15. **Assertion (A):** Members of biotic community interact with one another and are said to be interdependent. [1]

**Reason (R):** Their interactions are important for the survival of the community as a group.

- a) Both A and R are true and 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.

16. **Assertion:** There was no atmosphere on the early earth. [1]

**Reason:** Water vapour, methane, carbon dioxide, and ammonia released from molten mass covered the surface.

- a) Assertion and reason both are correct statements and reason is correct explanation for assertion.      b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.  
c) Assertion is correct statement but reason is wrong statement.      d) Assertion is wrong statement but reason is correct statement.

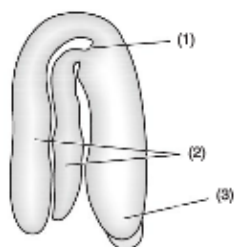
### Section B

17. RNA interference has been used to produce transgenic tobacco plants to protect them from the infestation by specific nematodes. Explain the novel strategy exploited by the biotechnologists. [2]

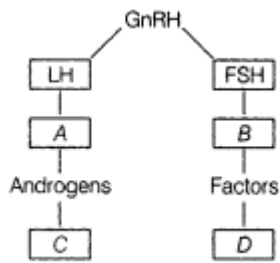
18. Examine the diagram of mRNA given below. Mark the 5' and 3' ends of the mRNA by giving reasons. [2]



19. In the given figure of a typical dicot embryo, label the parts (1), (2) and (3). State the function of each of the labeled part. [2]



20. Identify A, B, C and D with reference to gametogenesis in humans, in the flow chart given below. [2]



21. Give two examples of natural predators of insect-pests. [2]

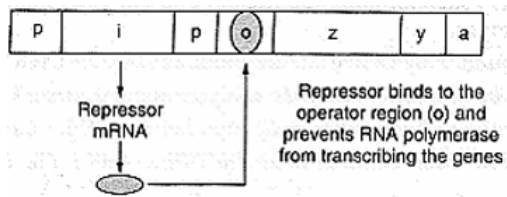
OR

Arrange the following in the decreasing order (most important first) of their importance, for the welfare of human society. Give reasons for your answer.

Biogas, Citric acid, Penicillin and curd

**Section C**

22. Look at the figure below depicting lac operon of E.coli. [3]



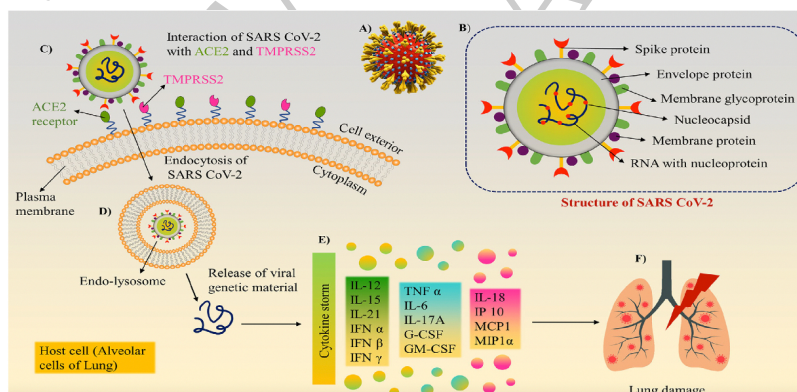
- i. What could be the series of events when an inducer is present in the medium in which E.coli is growing?
- ii. Name the inducer.

23. The Biology teacher asked the students to verify the experiment on Transformation principle in bacteria to establish DNA as genetic material. The class was divided into two groups. The teacher asked them to submit the reports. Group 2 did not use the mouse and did not repeat Griffith's experiment. The teacher praised them. [3]

- i. What values did the Group 2 exhibit?
- ii. Which experiment did they perform? Explain in brief.

24. Explain the difference between commensalism and mutualism types of interactions, with the help of a suitable example of each. [3]

25. This image shows how lungs are damaged by SARS CoV-2 and how molecular diagnostic techniques help to diagnose it. [3]



- i. List the three molecular diagnostic techniques that help to detect pathogens from suspected patients.
- ii. Mention one advantage of these techniques over conventional methods.

26. Write the importance of species diversity to the ecosystem. Support your answer with the finding of Tilman. [3]

OR

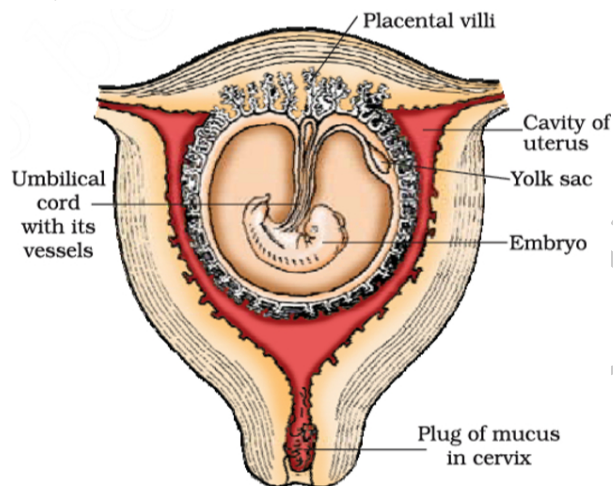
Among the ecosystem services are control of floods and soil erosion. How is this achieved by the biotic components of the ecosystem?

27. List the two main propositions of Oparin and Haldane. [3]
28. Anand a 14yr old boy thinks smoking makes him more energetic and feel like adult and thus more responsible citizen. He tries to smoke when he is with his peer group. As a friend you have to educate him: [3]
- Why he feels more energetic while smoking?
  - Effects of CO in smoke
  - Other ill effects on body

### Section D

29. Read the following text carefully and answer the questions that follow: [4]

After implantation, finger-like projections appear on the trophoblast called chorionic villi which are surrounded by the uterine tissue and maternal blood. The chorionic villi and uterine tissue become interdigitated with each other and jointly form a structural and functional unit between the developing embryo (foetus) and the maternal body.



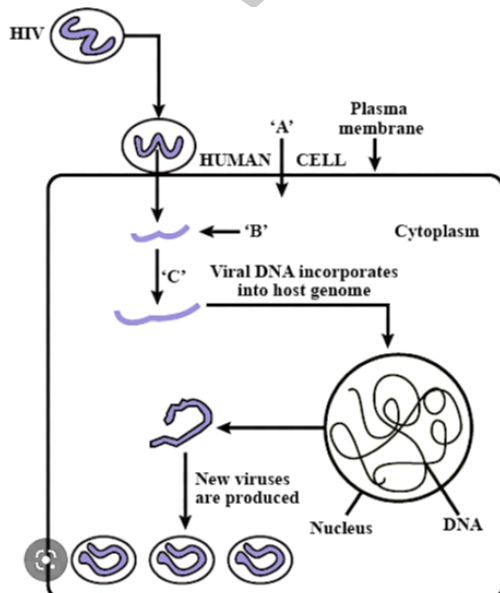
- Name the hormone crucial in parturition. Does the parturition signal originate from the mother or the fetus? (1)
- When and where do chorionic villi appear in humans? (1)
- Woman has conceived and implantation has occurred. Discuss the impact of progesterone and estrogen. (2)

**OR**

Fetal ejection reflex leads to parturition. Justify (2)

30. Read the following text carefully and answer the questions that follow: [4]

Study the diagram showing the entry of HIV into the human body and the processes that are followed:



- i. Why macrophages only being infected by HIV at first? (1)
- ii. Mention the genetic material 'B' HIV releases into the cell. (1)
- iii. Identify enzyme 'C'. Suggest preventive measure of the infection. (2)

**OR**

What are the symptoms and how are mild pathogen become virulent in human being? (2)

**Section E**

31.
  - i. Describe the process of megasporogenesis, in an angiosperm. [5]
  - ii. Draw a diagram of a mature embryo sac of angiosperm, label its any six parts.

**OR**

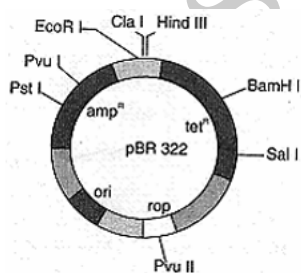
- a. Explain the process of syngamy and triple fusion in angiosperms.
  - b. Trace the development of the product of syngamy upto its mature stage in a dicot plant.
  - c. Draw and label three important parts of a mature dicot embryo.
32. What is DNA fingerprinting? Mention its application. [5]

**OR**

Study the schematic representation of the genes involved in the lac operon given below and answer the questions that follow:

p	i	p	o	z	y	a
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- a. Identify and name the regulatory gene in this operon. Explain its role in **switching off** the operon.
  - b. Why is the lac operon's regulation referred to as negative regulation?
  - c. Name the inducer molecule and the products of the genes **z** and **y** of the operon. Write the functions of these gene products.
33. The plasmid pBR322 was one of the first EK2 multipurpose cloning vectors to be designed and constructed (ten [5] years ago) for the efficient cloning and selection of recombinant DNA molecules in Escherichia coli. This 4363-bp DNA molecule has been extensively used as a cloning vehicle because of its simplicity and the availability of its nucleotide sequence. The widespread use of pBR322 has prompted numerous studies into its molecular structure and function. These studies revealed two features that detract from the plasmid's effectiveness as a cloning vector: plasmid instability in the absence of selection and, the lack of a direct selection scheme for recombinant DNA molecules.



- i. Name the organism in which the vector shown is inserted to get the copies of the desired gene.
- ii. Mention the area labelled in the vector responsible for controlling the copy number of the inserted gene.
- iii. Name and explain the role of a selectable marker in the vector shown.

**OR**

How is the desired DNA for biotechnology experiments first fragmented and later separated by gel-electrophoresis? Explain.