2023

QUESTION PAPER

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BIOLOGY PAPER 1
(THEORY)

Maximum Marks: 70

Time Allowed: Three hours

*Candidates are allowed **additional 15 minutes** for **only** reading the paper.*

*They must **NOT** start writing during this time.*

This paper is divided into four sections – A, B, C and D.

*Answer **all** questions.*

***Section – A** consists of **one** question **having sub-parts** of **one** mark / **two** marks each.*

***Section – B** consists of **seven** questions of **two** marks each.*

***Section – C** consists of **seven** questions of **three** marks each, and*

***Section – D** consists of **three** questions of **five** marks each.*

Internal choices have been provided in one question each in Section B, Section C and Section D.

The intended marks for questions or parts of questions are given in brackets [ ].

SECTION A – 20 MARKS

Question 1

Answer the following questions briefly.

(i) Name the source of thermostable DNA polymerase. **[1]**

(ii) Mention the scientific name of protozoan parasite that causes Amoebiasis. **[1]**

(iii) What is *cryopreservation*? **[1]**

(iv) The maternal grandfather of a boy is colourblind, but his maternal grandmother is normal. The father of the boy is also normal. What is the probability of this boy being colourblind? **[1]**

(v) Name the type of antibody that can be transferred through the placenta. **[1]**

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(vi) During which phase of the cell cycle, does DNA replication take place? [1]

(vii) How many sets of primers are required in each cycle of PCR? [1]

(viii) Define *perisperm*. [1]

(ix) Which one of the following enzymes is used to join DNA fragments? [1]

(a) DNA polymerase

(b) Ligase

(c) Primase

(d) Endonuclease

(x) What type of ecological pyramid would be obtained from the following data? [1]
Secondary consumer: 120 gm
Primary consumer: 60 gm
Primary producer: 10 gm

(a) Inverted pyramid of biomass

(b) Pyramid of energy

(c) Upright pyramid of numbers

(d) Upright pyramid of biomass

(xi) **Assertion**: A person who has received a cut from a sharp object and is bleeding, needs to be given an anti-tetanus injection. [1]

Reason: Anti-tetanus injection stimulates the production of antibodies for tetanus.

(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 true, but Reason is false.

(d) Both Assertion and Reason are false.

(xii) Which one of the following factors is responsible for activation of protoxin into active Bt toxin of *Bacillus thuringiensis*? [1]

(a) Body temperature

(b) Moist surface of midgut

(c) Alkaline pH of gut

(d) Acidic pH of stomach

(xiii) Give *one* significant contribution of each of the following scientists: [2]

(a) T.R. Malthus

(b) R. Mishra

(xiv) Give a term for the following: [2]

(a) An ART in which eggs are removed from the ovary of the female, fertilised and then placed in her fallopian tube.

(b) Fusion of male gamete and secondary nucleus in angiosperms.

(xv) Expand the following abbreviations: [2]

(a) NACO

(b) PID

(xvi) Give a reason for each of the following: [2]

(a) Cattle avoid browsing on *Calotropis* plant.

(b) DNA cannot enter directly into the host cell.

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SECTION B – 14 MARKS

Question 2 [2]

Give *one* difference between the following pairs:

(i) Sites of maturation of B – Lymphocytes and T – Lymphocytes

(ii) Sources of Opioids and Cannabinoids

Question 3 [2]

Briefly discuss *any two* methods by which plants avoid self – pollination.

Question 4 [2]

Mention the location and the function of Leydig cells.

Question 5 [2]

(i) What are *vestigial organs*? Give *any one* example of a vestigial organ in human body.

OR

(ii) State Hardy Weinberg's principle. Give a mathematical expression for this principle.

Question 6 [2]

Riya went to the hospital to meet her sister who was undergoing some treatment. The hospital was crowded with patients suffering from various types of allergies, pneumonia and Ascariasis.

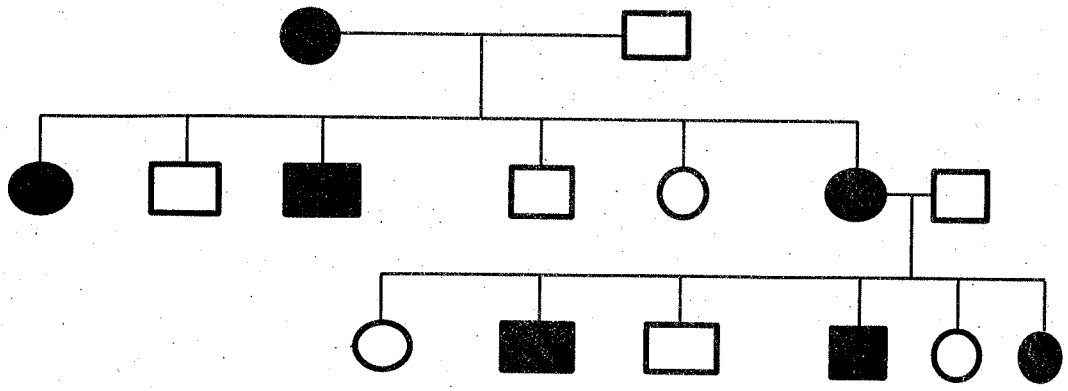
Name the disease that Riya is most likely to get infected with. Give *one* reason for your answer.

Question 7 [2]

State the steps involved in the process of gene therapy for the treatment of ADA – deficiency.

Question 8 [2]

The pedigree chart given below represents the pattern of inheritance of sickle cell anaemia in a family. Study it carefully and answer the questions that follow.



(i) What is the genotype of the father?

(ii) What is the phenotype of the mother?

SECTION C – 21 MARKS

Question 9 [3]

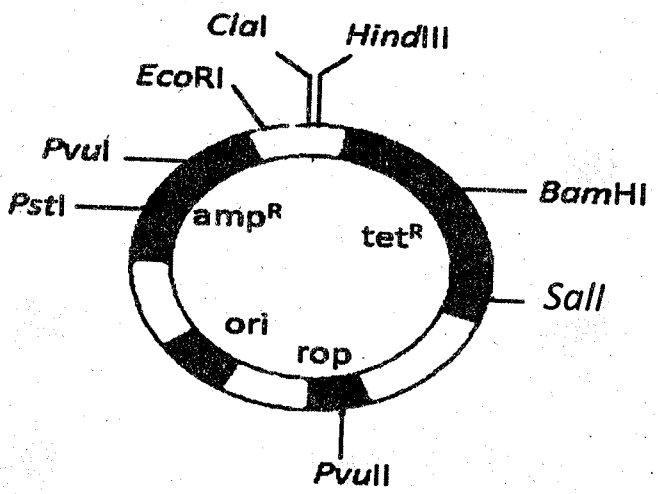
Discuss *any three* major causes of loss of biodiversity.

Question 10 [3]

(i) Name and describe the technique that helps in the separation and isolation of DNA fragments.

OR

(ii) Study the diagram given below and answer the questions that follow.



(a) Name the cloning vector shown above. In which organism is this cloning vector inserted?

(b) Mention *any two* restriction sites shown in the diagram.

(c) Name *any two* selectable markers shown in the diagram.

Question 11

[3]

Draw a neat and well labelled diagram of L.S of an anatropous ovule.

Question 12

[3]

(i) Explain the process of sex - determination in grasshopper.

(ii) What is the genotype of Turner's Syndrome? Mention *any one* symptom of this syndrome.

Question 13

[3]

With the help of neatly labelled diagrams, explain the different types of age pyramids of human population.

Question 14 **[3]**

The scientists from a research institute collected samples of water from sewage pipes of two different cities, A and B. On analysis, the BOD value of the sample from city A was found to be 500 mg / L. The BOD value of the sample from city B was 200 mg / L.

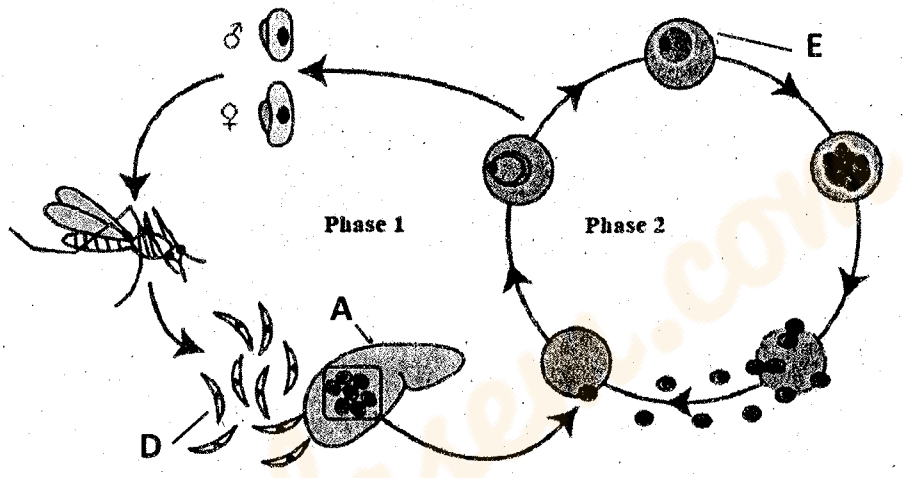
(i) Which one of the two cities needs a sewage treatment plant?

(ii) Briefly discuss the steps involved in the treatment of sewage.

(iii) What will be the effect of sewage treatment on the value of BOD?

Question 15 **[3]**

The diagram given below shows the life cycle of a malarial parasite. Study it carefully and answer the questions that follow:



(i) Name the hosts in which the asexual phase and sexual phase of the life cycle take place.

(ii) Identify the infective stage labelled 'D'.

(iii) Name the structures labelled 'A' and 'E'.

(iv) Give *any one* symptom of malaria.

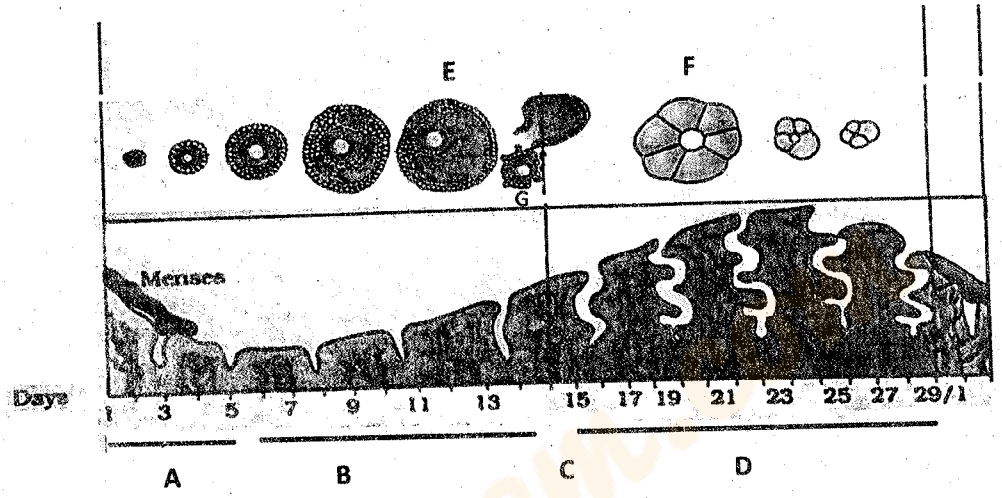
SECTION D – 15 MARKS

Question 16 [5]

Explain the components of the structural genes in the *Lac operon* system in E. coli. How does the operon function in the presence of lactose?

Question 17 [5]

(i) Given below is the diagram depicting the menstrual cycle in human beings. Study it carefully and answer the questions that follow.



(a) Which phases are indicated by 'C' and 'D'?

(b) Name the structure labelled 'F'? What is its role?

(c) Explain the changes in the level of progesterone during phases 'C' and 'D'.

(d) Which hormone present in the urine confirms pregnancy in human beings?

(e) Identify the structure labelled 'E'. Name the hormone released by it.

OR

(ii) According to a survey conducted by the Government of India in the year 1950, the population of the country was 350 million. In the next survey conducted in the year 2010, the population had reached above 1000 million.

(a) List *any two* reasons for this rise in the population.

(b) Suggest *any two* steps which should be taken by the Government to control this rise.

(c) How does the population explosion affect the growth of a country?

(d) What is the difference between the *natural* and *artificial contraceptive methods*? Give *one* example of each method.

Question 18 **[5]**

Describe the mechanism of decomposition by explaining the various processes involved in it.

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