Please check that this question paper contains 11 printed pages.

Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

Please check that this question paper contains 27 questions.

Please write down the Serial Number of the question before attempting it.

15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.
General Instructions:

(i) There are a total of 27 questions and four sections in the question paper. All questions are compulsory.

(ii) Section A contains questions number 1 to 5, very short-answer type questions of 1 mark each.

(iii) Section B contains questions number 6 to 12, short-answer type I questions of 2 marks each.

(iv) Section C contains questions number 13 to 24, short-answer type II questions of 3 marks each.

(v) Section D contains questions number 25 to 27, long-answer type questions of 5 marks each.

(vi) There is no overall choice in the question paper, however, an internal choice is provided in two questions of 1 mark, two questions of 2 marks, four questions of 3 marks and all the three questions of 5 marks. In these questions, an examinee is to attempt any one of the two given alternatives.

(vii) Wherever necessary, the diagram drawn should be neat and properly labelled.
SECTION A

1. Why are no variations seen in clones? State two reasons.

2. Differentiate between a DNA and a RNA nucleotide.

3. What is ‘Saltation’ according to de Vries?

4. Write the scientific name of the organism Alexander Fleming worked on and discovered the first antibiotic. Was the organism he worked on a fungus or a bacterium?

OR

Suggest a method to overcome excessive inbreeding depression.

5. Name the pollutant attributed to be the cause of ‘ozone-hole’ over the Antarctica region.

OR

List the greenhouse gases other than carbon dioxide.
SECTION B

6. (a) List any two characteristic features of wheat flowers that make it a good example of wind pollination.

(b) It is observed that plant breeders carrying out wheat hybridisation often take pollen grains from the ‘pollen banks’. Do you agree? Give one reason in support of your answer.

7. Differentiate between Turner’s syndrome and Down’s syndrome.

8. Explain the relationship between B-lymphocytes and T-lymphocytes in developing an immune response.

9. Why has the Indian Government set up the organisation named GEAC? Give any two reasons.

OR

Give a schematic representation of the transformation of a pro-insulin into insulin.
10. ‘Ori’ क्या है? संवाहक की क्लोनिंग में इसका महत्व लिखिए।

अथवा
एक उचित उदाहरण की सहायता से ‘वर्णयोग चिह्न’ के महत्व की व्याख्या कीजिए।
What is ‘Ori’? State its importance during cloning of a vector.
OR
Explain the importance of ‘selectable marker’, with the help of a suitable example.

11. किसी आवास में एक जाति की ‘पोषण क्षमता’ क्या है? संभार-तंत्र (लॉजिस्टिक) वृद्धि मॉडल को अधिक सन्दर्भीय क्या माना जाता है?
What is ‘carrying capacity’ of a species in a habitat? Why is logistic growth model considered more realistic?

12. “ऊर्जा का पिरीमिड सदैव ऊर्ध्वाधर (खड़ी) अवस्था में होता है तथा कभी अधोमुखी नहीं हो सकता!” कथन की न्यायसंगतता सिद्ध कीजिए।
Justify the statement, “Pyramid of energy is always upright, and can never be inverted.”

खण्ड स

SECTION C

13. अपने शहरों में अति गंभीर वायु प्रदूषण की समस्या के समाधान हेतु किन्हीं तीन सुधारात्मक उपायों की व्याख्या कीजिए।

अथवा
ध्वनि प्रदूषण के ऐसे कोई तीन तरीके लिखिए जो मानव शरीर पर दुष्प्रभाव डालते हैं। ध्वनि प्रदूषण को कम करने के लिए अपनाए जानें वाले किन्हीं तीन उपायों की सूची बनाइए।

Explain any three remedial measures to overcome the acute air pollution in our cities.

OR

Write any three ways by which noise pollution affects the human body adversely. List any three steps that should be followed in order to reduce noise pollution.
14. (a) What is the primary productivity of an ecosystem and how is it expressed?
(b) Explain what does the equation given below show:

\[ \text{NPP} = \text{GPP} - \text{R} \]

OR

(a) Name the type of detritus that decomposes faster. List any two factors that enhance the rate of decomposition.
(b) Write the different steps taken in humification and mineralisation during the process of decomposition.

15. (a) Compare the characteristics of the following:
(i) Eurythermal and Stenothermal organisms
(ii) Euryhaline and Stenohaline organisms
(b) How does our body get acclimatized to ‘altitude sickness’?
16. Write any two biochemical/molecular diagnostic procedures for early detection of viral infection. Explain the principle of any one of them.

**OR**

Describe the steps that are followed during secondary treatment of sewage.

17. How did the plant breeders produce suitable varieties of sugarcane for cultivation in North India? Why did they do it?

18. While on an excursion to a hill station, some of the children developed allergic symptoms.

(a) List any two allergic symptoms.

(b) Name any two allergens.

(c) List any two antiallergens.

20. Write any six salient features of the human genome as drawn from the human genome project.

21. विषमयुक्तता क्या है ? ड्रोसोफिला में लिंग निर्धारण प्रक्रम की व्याख्या कीजिए।

अथवा

सुकंद्रकियों में विषमांगी कंद्रकिय आर.एन.ए. (hnRNA) से पूर्णतः क्रियाशील एम.आर.एन.ए. (mRNA) के निर्माण के प्रक्रम की व्याख्या कीजिए। कोशिका में यह प्रक्रम कहाँ सम्पन्न होता है?

What is heterogamety? Explain the mechanism of sex determination in *Drosophila*.

OR

Explain the process of making heterogeneous nuclear RNA (hnRNA) into a fully functional mRNA in eukaryotes. Where does this process occur in the cell?

22. (a) किन्हीं दो प्रकार के अंतःगर्भाशयी युक्तियों (आई.यू.डी.ई.) के नाम लिखिए तथा उनकी क्रियाविधि की व्याख्या कीजिए।

(b) ‘सहेली’ नामक गोली का गर्भनिरोधक के रूप में उपयोग करने के लाभों की सूची बनाईए।

(a) Name and explain the mode of action of any two types of IUDs.
(b) List the advantages of using ‘Saheli’ as a contraceptive.

23. (a) एक जीवाणु को ‘सक्षम’ कैसे बनाया जाए?

(b) जैव-प्रौद्योगिकी में ‘सूक्ष्म-अंतःक्षेप’ (माइक्रोइंजेक्शन) तथा ‘जीन गन’ की भूमिका की व्याख्या कीजिए।

(a) Why should a bacterium be made ‘competent’?
(b) Explain the role of ‘microinjection’ and ‘gene gun’ in biotechnology.
24. Draw a T.S. of a young anther of an angiosperm. Label the different layers of the wall and write their functions.

SECTION D

25. (a) Explain the role of stigma in pollen-pistil interactions.

(b) Describe the post-pollination events leading to double fertilization in angiosperms, starting with a two-celled pollen grain.

OR

(a) Mention the events that lead to the development of placenta during pregnancy in human females.

(b) Explain the role of placenta during pregnancy including its action as an endocrine organ.

26. (a) आप कैसे पता लगाएंगे कि उद्यान मटर का दिया गया लंबा पौधा समयुग्मजी (होमोजोजाइगस) है अथवा विषयमयग्मजी (हेटरोजोजाइगस) ? पनेट वर्गों की सहायता से अपने उत्तर को प्रमाणित कीजिए।
(b) How would you find out whether a given tall garden pea plant is homozygous or heterozygous? Substantiate your answer with the help of Punnett squares.

(b) Given below are the F<sub>2</sub>-phenotypic ratios of two independently carried monohybrid crosses:

(i) 1 : 2 : 1
(ii) 3 : 1

Mention what does each ratio suggest.

OR

(a) Why did Hershey and Chase use radioactive \( ^{32}\)P and \( ^{35}\)S in their experiments? Explain.

(b) Following the experiments conducted by them, write what conclusion did they arrive at and how.
(a) Write the specific name of the genus *Plasmodium* that causes one of the most serious types of diseases in humans. Name the disease.

(b) Describe the events in the life cycle of *Plasmodium* which take place in the female *Anopheles*.

(c) Explain what happens in the RBCs of the humans when *Plasmodium* gains entry into them. How does the human body get affected?

**OR**

Explain the interrelationship between organic farming and biofertilizers, with the help of any three suitable examples.