रोल नं. 
Roll No. 

परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।
Candidates must write the Code on the title page of the answer-book.

• कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 15 हैं।
• प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नंबर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
• कृपया जाँच कर लें कि इस प्रश्न-पत्र में 27 प्रश्न हैं।
• कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें।
• इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वांचल में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र एक सुलभ प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।
• Please check that this question paper contains 15 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.

जीव विज्ञान (सैद्धांतिक) 

BIOLOGY (Theory)

निर्धारित समय : 3 घण्टे
Time allowed : 3 hours

अधिकतम अंक : 70
Maximum Marks : 70

57/5/1 1  P.T.O.
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. Biotechnological techniques can help to diagnose the pathogen much before the symptoms of the disease appear in the patient. Suggest any two such techniques.

**OR**

Mention the form in which inactive protein toxin is produced by *Bacillus thuringiensis*. How does it get activated in the pest body to kill it?

2. ‘Swiss cheese’ is characterised by the presence of large holes. Name the bacterium responsible for it.

3. What do ‘X’ and ‘Y’ represent in the transcription unit of the DNA molecule shown?

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**खण्ड A**

**SECTION A**

1. किसी रोगी में रोग के लक्षण परिलक्षित होने के समय से पहले ही रोगकारक रोगाणुओं के निदान में जैव-प्रौद्योगिक-तकनीक सहायक हो सकती है। इस प्रकार की किन्हीं दो तकनीकों का सुझाव दीजिए।

**अथवा**

*बैक्टीरियल* थराइनजिएंसिस द्वारा निर्मित निष्क्रिय प्रोटीन टॉक्सिन जिस रूप में बनता है, उसका उच्च धातुक कीजिए। पीड़क जीव के शरीर में यह किस प्रकार सक्रिय हो जाता है जिससे यह उसके लिए प्राण घातक बन जाता है?

Biotechnological techniques can help to diagnose the pathogen much before the symptoms of the disease appear in the patient. Suggest any two such techniques.

**OR**

Mention the form in which inactive protein toxin is produced by *Bacillus thuringiensis*. How does it get activated in the pest body to kill it?

2. ‘स्विस चीज़’ में पाए जाने वाले बड़े-बड़े छिद्र उसकी लक्षणिक विशेषता है। इसके लिए उत्तरदायी जीवाणु का नाम लिखिए।

‘Swiss cheese’ is characterised by the presence of large holes. Name the bacterium responsible for it.

3. नीचे दर्पण गए डी.एन.ए. अणु की अनुलेखन इकाई में ‘X’ एवं ‘Y’ किसका प्रतिनिधित्व करते हैं?

![Diagram](image)

What do ‘X’ and ‘Y’ represent in the transcription unit of the DNA molecule shown?
4. Name the disorder in humans with the following karyotype:
(a) 22 pairs of autosomes + XO
(b) 22 pairs of autosomes + 21st chromosome + XY

5. The diploid number of chromosomes in an angiospermic plant is 16. What will be the number of chromosomes in its endosperm and antipodal cells?

OR
State the reason why pollen grains lose their viability when the tapetum in the anther is malfunctioning.

खण्ड B
SECTION B

6. Differentiate between spermiogenesis and spermiation.

7. You are given a tall pea plant and asked to find its genotype. How would you find its genotype? Explain.
8. Scientists tried to develop a single plant exhibiting the characteristic of tomato and potato by using cells from tomato and potato plants respectively. Name the procedure and list the steps to achieve this.

9. (a) How will you measure population density of fish in a lake?
(b) In a pond there are 100 frogs. 20 more were born in a year. Calculate the birth rate of this population.

OR

Draw a “stable” human age pyramid. Comment on the population growth rate that is depicted by it.

10. Why is tobacco smoking associated with rise in blood pressure and emphysema? Explain.
11. निम्नलिखित परिक्षण क्या है ? जैव-विविधता के संरक्षण में इसका किस प्रकार उपयोग किया जाता है ? उल्लेख कीजिए।

What is cryopreservation? Mention how it is used in conservation of biodiversity.

12. डेविड टिलमैन ने किस प्रकार दर्शाया कि “किसी समुदाय का स्थायित्व उसकी प्रजातियों की समृद्धता पर निर्भर करता है”? व्याख्या कीजिए।

How did David Tillman show that “stability of a community depends on its species richness”? Explain.

खण्ड C

SECTION C

13. (a) एक रोगी को मायोकार्डियल इंफेक्शन हो जाता है तथा उसकी रक्त बाहिकाओं में थक्क से पाए जाते हैं। थक्क हटाने के लिए ‘थक्क स्फोटक’ के रूप में उपयोग किए जाने वाले पदार्थ का नाम लिखिए और उस सूक्ष्मजीव का नाम भी लिखिए जिससे इसे प्राप्त किया जाता है।

(a) A patient had suffered myocardial infarction and clots were found in his blood vessels. Name a ‘clot buster’ that can be used to dissolve the clots and the micro-organism from which it is obtained.

(b) एक स्त्री को अभी-अभी वृक्क प्रत्यारोपण हुआ है। उसका शरीर इस वृक्क को अस्वीकार न करे इसलिए उसे जैव-संक्रिय-अणु विशिष्ट दवा के रूप में दिए गए। यह जैव-संक्रिय-अणु क्या है? उस सूक्ष्मजीव का नाम लिखिए जिससे इसे प्राप्त किया जाता है।

(b) A woman had just undergone a kidney transplant. A bioactive molecular drug is administered to oppose kidney rejection by the body. What is the bioactive molecule? Name the microbe from which this is extracted.

(c) ऊचा रक्त कोलेस्ट्रॉल वाले रोगियों में रक्त कोलेस्ट्रॉल के स्तर को कम करने के लिए चिकित्सक किस औषधि द्वारा उपचार करते हैं? उस स्रोत जीव का नाम लिखिए जिससे इस औषधि को प्राप्त किया जाता है।

(c) What do doctors prescribe to lower the blood cholesterol level in patients with high blood cholesterol? Name the source organism from which this drug can be obtained.
Give reasons for the following:

(a) Antibody mediated immunity is called humoral immunity.

(b) How is a child protected from a disease for which he/she is vaccinated?

(c) Name the type of cells the AIDS virus enters after getting into the human body.

OR
(a) Identify the nos. (i) to (iv) in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Name of Disease</th>
<th>Causative Organism</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>w</td>
<td>Pneumonia</td>
<td><em>Streptococcus</em></td>
<td>(i)</td>
</tr>
<tr>
<td>x</td>
<td>Typhoid</td>
<td></td>
<td>(ii) High fever, weakness, headache, stomach pain</td>
</tr>
<tr>
<td>y</td>
<td>(iii)</td>
<td>Rhinoviruses</td>
<td>Nasal congestion and discharge, sore throat, cough, headache</td>
</tr>
<tr>
<td>z</td>
<td>Ascariasis</td>
<td><em>Ascaris</em></td>
<td>(iv)</td>
</tr>
</tbody>
</table>

(b) Which ones of the above mentioned diseases are transmitted through mechanical carriers?

15. एच.एम.एस. बीगल नामक जहाज द्वारा प्रसिद्ध समुद्र विश्व भ्रमण के दौरान चार्ल्स डॉर्विन ने निष्कर्ष निकाला कि जीवन का अनुक्रमिक विकास हुआ है। निम्नलिखित प्रश्नों के उत्तर दीजिए:

(a) उनके सिद्धांत को किस नाम से जानते हैं? उनके सिद्धांत की प्रमुख विशेषताओं की व्याख्या कीजिए।

(b) उस वैज्ञानिक का नाम लिखिए जो चार्ल्स डॉर्विन की तरह ही उसके समान निष्कर्षों तक पहुँचा।

Charles Darwin during his famous sea voyage around the world in a ship (HMS Beagle), concluded that there has been gradual evolution of life. Answer the following questions:

(a) What is his theory known as? Explain the salient features of his theory.

(b) Name a scientist who arrived at a similar conclusion as that of Charles Darwin.
16. Draw a diagram of LS of Maize grain and label its any six parts.

17. A woman with ‘O blood group’ marries a man with ‘AB blood group’. Work out the cross to show all the possible phenotypes and genotypes of the progeny with respect to blood groups. Explain the pattern of inheritance observed in this cross.

18. Hershey and Chase carried out their experiment under three steps: (a) Infection, (b) Blending, and (c) Centrifugation. Explain each one of these steps that helped them to prove that DNA is the hereditary material.

OR

(a) Why does DNA replication occur within a replication fork and not in its entire length simultaneously?

(b) “DNA replication is continuous and discontinuous on the two strands within the replication fork.” Give reasons.
19. (a) What is the breeding of crops for enhancing their nutritional value called? Why is the need felt for enhancing the nutritional value of the crops?

(b) Rice, wheat and maize are the most commonly used food grains the world over. How have these grains improved in their nutritional value in comparison to their conventional varieties?

OR

(a) Write the scientific names of the source plants from where opioids and cannabinoids are extracted.

(b) Write their receptor sites in the human body. How do these drugs affect the human beings?

20. Restriction endonucleases have played a very significant role in rDNA technology. Explain the roles of EcoRI and DNA ligase in formation of recombinant DNA.
21. Why DNA cannot pass through the cell membrane? How can the bacteria be made competent to take up a plasmid? Explain a method for introduction of alien DNA into a plant host cell. Name a pathogen that is used as a disarmed vector.

22. The vector pBR-322 is shown below. Explain its function and its use in cloning.

Diagram:

A, B, C, D

EcoR I, Cla I, Hind III, BamH I, Pvu I, Pvu II

Diagram: pBR322

Answer:

An attempt at uniqueness: If three enzymes were used, they should be different.

3
Study the figure of vector pBR322 given below.

Identify A, B and C and explain their roles in cloning a vector.

OR

Many people are apprehensive of accepting GM crops. Give three reasons so as to convince them to use these crops.

23. मानव शुक्रजनक नलिका की आरेखीय काट का चित्र बना कर उसके किन्हीं छः (6) भागों को नामांकित कीजिए।
   Draw a diagram of the sectional view of a human seminiferous tubule and label any six of its parts.

24. “स्व-स्थाने” अथवा “बाह्य-स्थाने” जैव-विविधता संरक्षण में से कौन-सा तरीका अधिकतर जातियों के अस्तित्व को बचाने में अधिक सहायक है? व्याख्या कीजिए।
   Which one of the two “in-situ” or “ex-situ” biodiversity conservation measures help the larger number of species to survive? Explain.
25. (a) Draw the embryo sac of a flowering plant and label the following:
   (i) Central cell
   (ii) Chalazal end
   (iii) Synergids

(b) Name the cell and explain the process it undergoes to develop into an embryo sac.

(c) Explain the development of endosperm in coconut.

OR

Write the duration and the events that occur in the ovary and the uterus during follicular and luteal phases of the menstrual cycle in humans. How do pituitary and ovarian hormones influence these two phases?
26. (a) Describe aminoacylation of tRNA.

(b) Explain the process that takes place in the ribosomes when mRNA makes its entry into it in a prokaryote.

(c) Due to transcription error, ATG codon of DNA is transcribed into UAG in mRNA which translates a non-functional polypeptide chain in the ribosome. Justify the statement.

OR

Explain how does lac operon in *E. coli* operate

(a) in the absence of an inducer.

(b) in the presence of an inducer.
27. (a) **State what is an ecological succession.**

(b) **Write one similarity and one difference between hydrarch and xerarch successions.**

(c) **Explain the mechanism of co-evolution as seen in orchid Ophrys and bee.**

**OR**

(a) **List any two ways the biodiversity loss affects any region.**

(b) **Explain any two causes of biodiversity loss, with the help of suitable examples.**