Series AABB5/5		SET No. 2

प्रश्न–पत्र कोड
Q.P. Code **57/5/2**

रोल नं.
Roll No. | | | | | | | | |

परीक्षार्थी प्रश्न–पत्र कोड को उत्तर–पुस्तिका के मुख–पृष्ठ पर अवश्य लिखें।
Candidates must write the Q.P. 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 प्रश्न–पत्र कोड को परीक्षार्थी उत्तर–पुस्तिका के मुख–पृष्ठ पर लिखें।
- कृपया जाँच कर लें कि इस प्रश्न–पत्र में **13** प्रश्न हैं।
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर–पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।
- इस प्रश्न–पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न–पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक परीक्षार्थी केवल 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.
- Q.P. Code 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 **13** questions.
- Please write down the Serial Number of the question in the answer-book 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 candidates will read the question paper only and will not write any answer on the answer-book during this period.

जीव विज्ञान (सैद्धान्तिक)
BIOLOGY (Theory)

निर्धारित समय : 2 घण्टे — *अधिकतम अंक : 35*
Time allowed : 2 hours — *Maximum Marks : 35*

सामान्य निर्देश:

(i) *इस प्रश्न–पत्र में **13** प्रश्न हैं। **सभी** प्रश्न अनिवार्य हैं।*

(ii) *प्रश्न–पत्र में **तीन** खण्ड– **खण्ड अ, ब** तथा **स** हैं।*

(iii) ***खण्ड–अ** में 6 प्रश्न हैं, प्रत्येक के **2** अंक हैं। **खण्ड–ब** में 6 प्रश्न हैं, जिसमें प्रत्येक प्रश्न के **3** अंक हैं तथा **खण्ड–स** में एक प्रकरण आधारित प्रश्न है जिसका मान **5** अंक है।*

(iv) *सामान्यतः कोई विकल्प नहीं है। परन्तु कुछ प्रश्नों में अंतर्निहित विकल्प दिए गए हैं। ऐसे प्रश्नों में विद्यार्थी को **केवल एक** विकल्प का ही उत्तर लिखना है।*

(v) *जहाँ आवश्यक हो, वहाँ स्वच्छ, आनुपातिक तथा नामांकित चित्र बनाइए।*

खण्ड अ

1. मानव कल्याण के लिए निम्नलिखित सूक्ष्मजीवों के सबसे महत्त्वपूर्ण योगदान का उल्लेख कीजिए : 2

(क) ***मोनास्कस परप्यूरियस***

(ख) ***ट्राइकोडर्मा पॉलीस्पोरम***

2. (क) मानव शरीर पर कोकेन के प्रभाव का वर्णन कीजिए। उस स्रोत पौधे का वैज्ञानिक नाम लिखिए जिससे इसे प्राप्त किया जाता है। 2

अथवा

(ख) किशोरों (नवयुवकों) में ड्रग तथा ऐल्कोहल के कुप्रयोग के चार प्रमुख चेतावनी लक्षणों का उल्लेख कीजिए। 2

General Instructions :

*(i) This question paper contains **13** questions. **All** questions are compulsory.*

*(ii) The question paper has **three** sections-* **Section A, B** *and* **C**.

*(iii) **Section-A** has 6 questions of **2** marks each. **Section-B** has 6 questions of **3** marks each; and **Section-C** has a case-based question of **5** marks.*

*(iv) 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.*

(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION A

1. State the most important contribution of the following microbes for human welfare : 2

(a) ***Monascus purpureus***

(b) ***Trichoderma Polysporum***

2. (a) State the mode of action of cocain on human body. Write the scientific name of the source plant it is obtained from. 2

OR

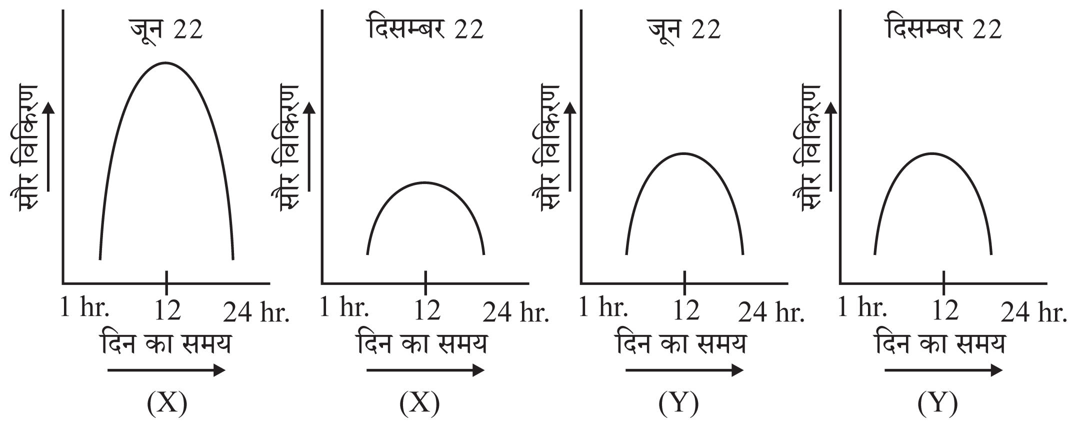
(b) Enumerate four most common warning signs of drug and alcohol abuse amongst the youth. 2

3. (क) (i) स्कॉटलैंड के चट्टानी समुद्र तटों पर बार्नेकल के क्षेत्र में कानेल द्वारा किए गए प्रयोग के अंत में प्राप्त प्रेक्षणों को लिखिए। 2

(ii) जीवों के दो ऐसे संवर्गों के नाम लिखिए जिन पर स्पर्धा का विपरीत प्रभाव पड़ा है।

अथवा

(ख) नीचे दिए गए दो ग्राफ (X) तथा (Y) जून (गर्मी) तथा दिसम्बर (सर्दी) के दैनिक सौर विकिरण को दर्शाता है : 2



(i) इन दोनों में से कौनसे ग्राफ क्रमशः उष्ण कटिबंधीय तथा शीतोष्ण क्षेत्रों को दर्शाते हैं?

(ii) दो प्रक्षेत्रों (X) अथवा (Y) में से किसमें अधिक जैवविविधता परिलक्षित होगी तथा क्यों?

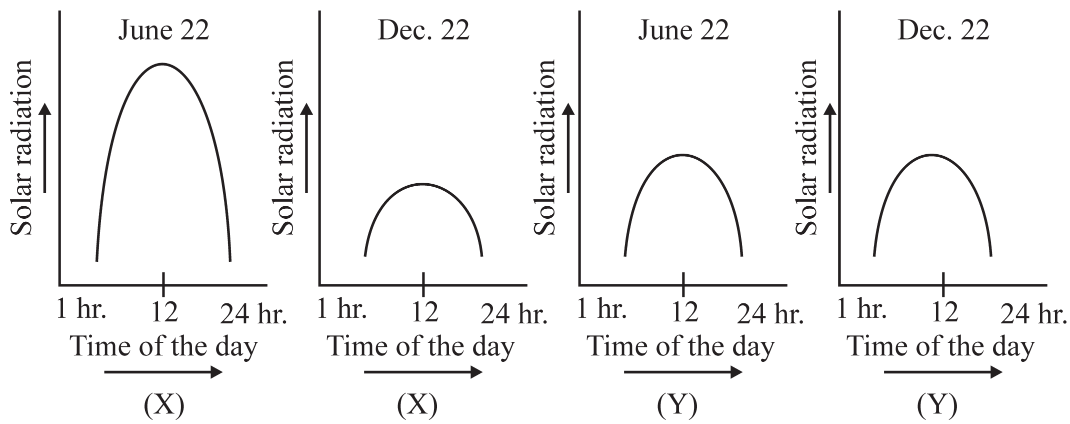
4. दाद (रिंगवर्म) मनुष्यों में एक सामान्य कवकजनित संक्रामक रोग है। दादजनक **दो** कवक वंश (जेनरा) के नाम लिखिए। इसके **दो** प्रमुख लक्षणों का उल्लेख कीजिए। 2

3. (a) (i) Write the observations made at the end of Connell's field experiment on barnacles on the rocky sea coasts of Scotland. 2

(ii) Name any two categories of organisms that in general are adversely affected by competition.

OR

(b) The graphs (X) and (Y) given below depict the diurnal variations in the solar radiations in the month of June (Summer) and in December (Winters) : 2

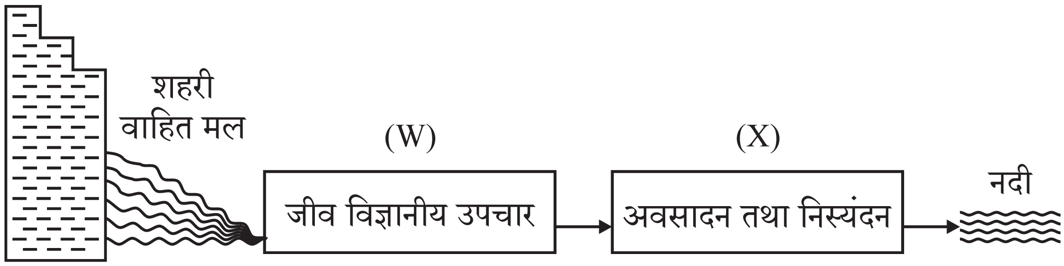


(i) Which of the two graphs depicts tropical region and temperate regions respectively ?

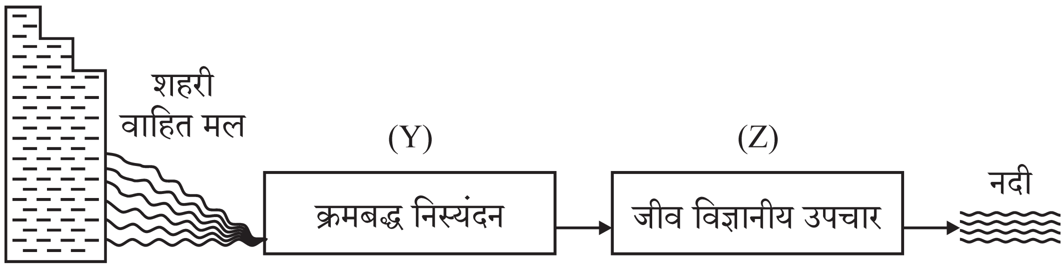
(ii) Which of the two regions (X) or (Y) will show high biological diversity and why?

4. Ringworm is one of the most common infectious fungal disease in humans. Name any **two** genera of fungi which cause ringworm and state any of its **two** symptoms. 2

5. वाहित मल उपचार संयंत्र (S.T.P.) के नीचे दिए गए आरेख का अध्ययन कीजिए तथा दिए गए संबंधित प्रश्नों के उत्तर लिखिए : 2



वाहित मल उपचार संयंत्र (A)



वाहित मल उपचार संयंत्र (B)

(क) शहरी मानव मल–मूत्र जनित शहरी अपशिष्ट के दो वाहित मल उपचार संयंत्र (A) अथवा (B) में से कौनसी विधि अधिक प्रभावी है?

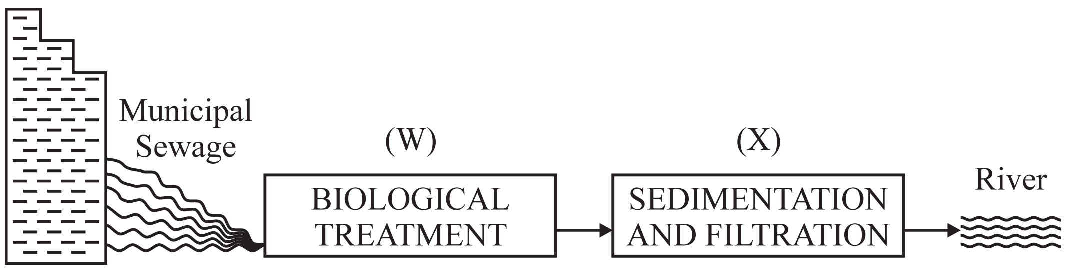
(ख) वाहित मल उपचार के 'Z' तरीके में बी.ओ.डी. के महत्त्वपूर्ण रूप से घटने के बाद से इसके ''अवायवीय आपंक संपाचित्र'' (ऐनारोबिक स्लज डाइजेस्टर) तक के चरणों को लिखिए।

6. एक पेट्री प्लेट में किस संवर्धन की सघन कॉलोनी का सम्पूर्ण समष्टि घनत्व ज्ञात करने की सर्वोत्तम विधि क्या है तथा क्यों ? 2

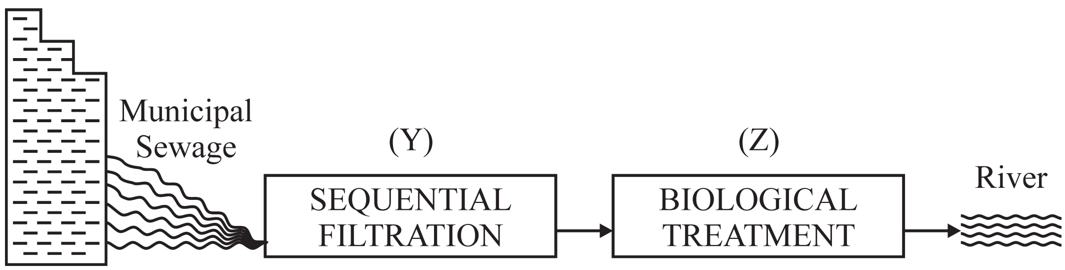
खण्ड ब

7. किसी रोगकारक (रोगजनक) के हमारे शरीर में प्रविष्ट होने की अनुक्रिया में B-लसीकाणु विभिन्न प्रतिरक्षी अणु (एंटीबॉडीज) उत्पन्न करते हैं। इस प्रकार निर्मित होने वाले किन्हीं दो प्रतिरक्षी अणुओं के नाम लिखिए। एक प्रतिरक्षी अणु का योजनात्मक आरेख निरूपण कीजिए तथा इसके चार भागों को नामांकित कीजिए। 3

5. Study the given diagram of Sewage Treatment Plant (S.T.P.) and answer the questions that follow : 2



S.T.P. (Sewage Treatment Plant) (A)



S.T.P. (Sewage Treatment Plant) (B)

(a) Which one of the two 'S.T.P.' (A) or (B) will be more effective in treating the human excreta in the municipal waste?

(b) Write the steps followed in carrying the treatment of the sewage in step (Z), once the BOD of sewage is reduced significantly till it is passed on to the "anaerobic sludge digesters".

6. What would be the best method to measure the total population density of a dense bacterial culture in a petridish and why ? 2

SECTION B

7. Different types of antibodies are produced in our body by the B-lymphocytes in response to a pathogen that enters in our blood. Name any two antibodies produced and draw a schematic representation of an antibody molecule and label its four parts. 3

8. सन् 1980 के मध्य में विकसित डी.एन.ए. प्रवर्धन की कोशिका विहीन तकनीक की खोज ने जैव प्रौद्योगिकी के क्षेत्र में क्रांति ला दी। उस तकनीक का नाम लिखकर उसके मूल चरणों की व्याख्या कीजिए। 3

9. ''एच.आई.वी. का रोगी सामान्यतः 'एड्स' के कारण नहीं मरता परन्तु अन्य अनेक संक्रमणों के कारण उसकी मृत्यु होती है।'' क्या आप इस कथन से सहमत हैं? अपने उत्तर के समर्थन में व्याख्यात्मक कारण दीजिए। 3

10. समझाइए कि एली लिली नामक अमेरिकी कम्पनी ने पुनर्योगज मानव इंसुलिन का निर्माण किस प्रकार किया। 3

11. (क) 'जैव विविधता' को अधिकतम संरक्षण देने के उद्देश्य से किसी क्षेत्र के 'हॉट स्पॉट' के रूप में निर्धारण के लिए दो मानदंड सूचीबद्ध कीजिए। 3

(ख) अपने देश के किन्हीं दो ''जैव विविधता हॉट स्पॉट'' के नाम लिखिए।

12. (क) नीचे एक समीकरण दिया गया है जो जातीय समृद्धि तथा क्षेत्र के पारस्परिक संबंध को दर्शाता है। यह जाति समृद्धि और अनावृतजीवी पादपों, पक्षी, चमगादड़ इत्यादि जैसे जीवों की व्यापक किस्मों का तथा क्षेत्र के बीच संबंध दर्शाता है। 3

$$S = CA^{Z}$$

(i) जाति–क्षेत्र संबंध दर्शाने वाले समीकरण का ग्राफीय निरूपण कीजिए।

(ii) उपरोक्त समीकरण में 'S' क्या निरूपित करता है?

(iii) विभिन्न महाद्वीपों के उष्ण कटिबंध वनों में फलाहारी पक्षी तथा स्तनधारियों के लिए 'Z' (समाश्रयण गुणांक) का मान क्या है?

अथवा

8. A cell free method of amplifying DNA first developed in the mid 1980's revolutionized the field of biotechnology. Name the method and explain the basic steps of the technique involved. 3

9. 'An HIV patient normally doesn't die of 'AIDS', but death is caused due to many other infections.' Do you agree with the statement ? Give explanatory reasons in support of your answer. 3

10. Explain how recombinant human insulin was prepared in 1983 by Eli Lily an American company. 3

11. (a) Enlist two criteria that are used to identify a region for maximum protection as 'Biodiversity hotspots'. 3

(b) Name any two "hotspot" regions in our country.

12. (a) Given below is an equation describing the Species-Area relationship between species richness and area for a wide variety of taxa as angiosperm plants, birds, bats etc. 3

$$S = CA^{Z}$$

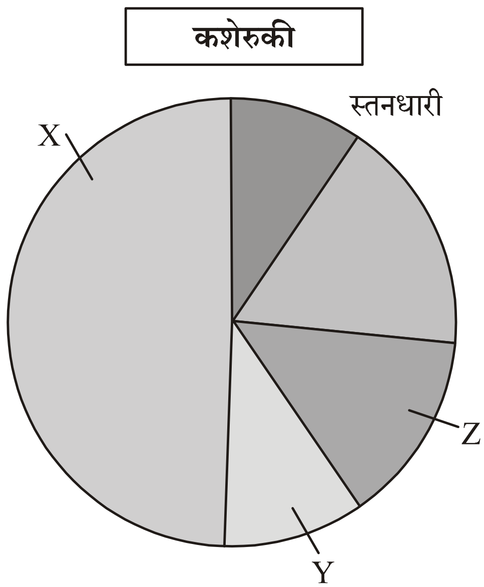
(i) Give a graphical representation of the given equation showing Species-Area relationship.

(ii) What does 'S' represent in the given equation ?

(iii) What is the value of 'Z' (regression coefficient) for frugivorous birds and mammals in the tropical forests of different continents ?

OR

(ख) वैश्विक जैव विविधता का प्रतिनिधित्व : विभिन्न वर्गकों की आनुपातिक संख्या को नीचे दिए गए 'पाई-चार्ट' द्वारा निरूपित किया गया है। 3

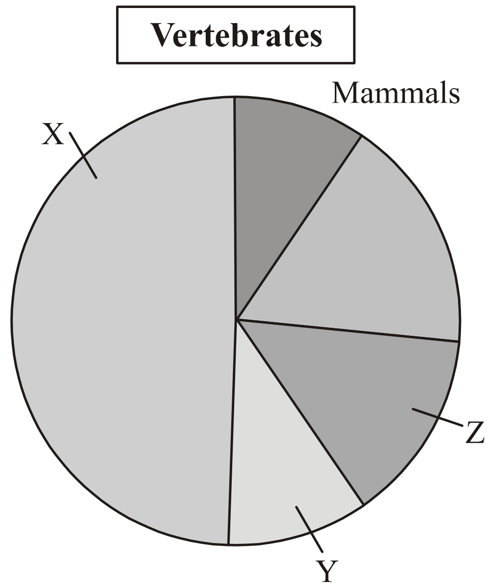


(i) 'पाई-चार्ट' में (X) तथा (Y) को पहचानिए।

(ii) ''वर्गकों के मध्य जातियों का विलोपन यादृच्छिक नहीं है।'' स्तनधारियों में किस वर्ग को विलोपन का सर्वाधिक खतरा है?

(iii) रूस, मॉरीशस तथा ऑस्ट्रेलिया में प्रत्येक क्षेत्र में विलुप्त होने वाली नई विलुप्त जाति के एक-एक उदाहरण लिखिए।

(b) Given below is a 'pie chart' representing the global biodiversity : proportionate number of species of major taxa. 3



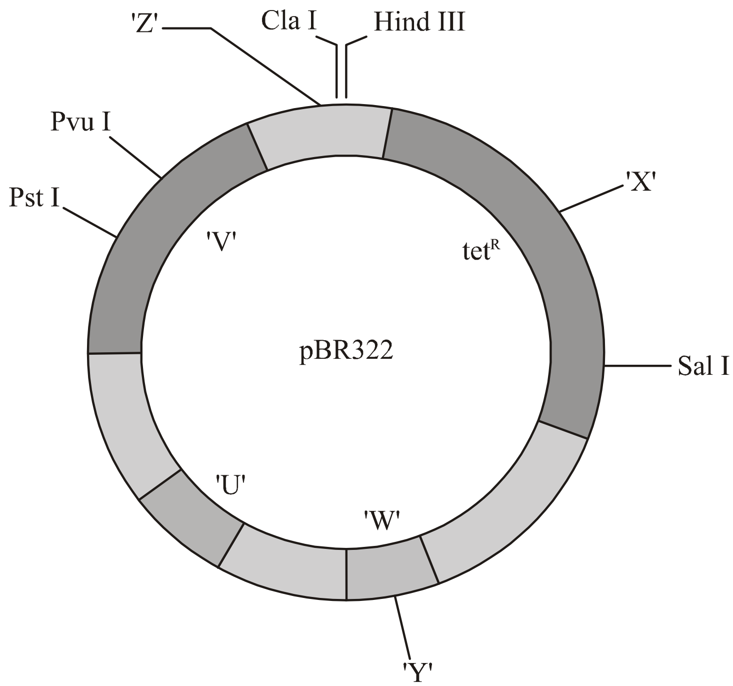
(i) Identify (X) and (Y) in the given 'pie chart'.

(ii) "Extinction of species across taxa are not random." Which group amongst the vertebrates is more vulnerable to extinction.

(iii) Give one example each of recent extinctions of species in Russia, Mauritius and Australia.

खण्ड स

13. (क) आनुवंशिक इंजीनियरिंग में जीन की क्लोनिंग अत्यंत महत्त्वपूर्ण भूमिका निभाती है। यह वांछित विजातीय जीन को विभिन्न परपोषी में स्थानांतरण करने में सहायता करता है। इस प्रक्रम को अधिक सरल तथा प्रभावी बनाने के लिए वैज्ञानिक इंजीनियर्ड संवाहकों के सृजन (निर्माण) में जुटे हैं ताकि विजातीय डी.एन.ए. से जोड़ने व अपुनर्योगजों के चयन में सहायता मिल सके। वैज्ञानिकों द्वारा विकसित 'pBR322' एक ऐसा ही संवाहक है। pBR322 संवाहक का चित्र नीचे दिया गया है : 5



(i) क्लोनिंग संवाहक के परपोषी का नाम लिखिए।

(ii) चित्र में चिह्नित 'U', 'V', 'W', 'X', 'Y' तथा 'Z' में से 'Rop' तथा 'Ori' को पहचानिए तथा उनके कार्य भी लिखिए।

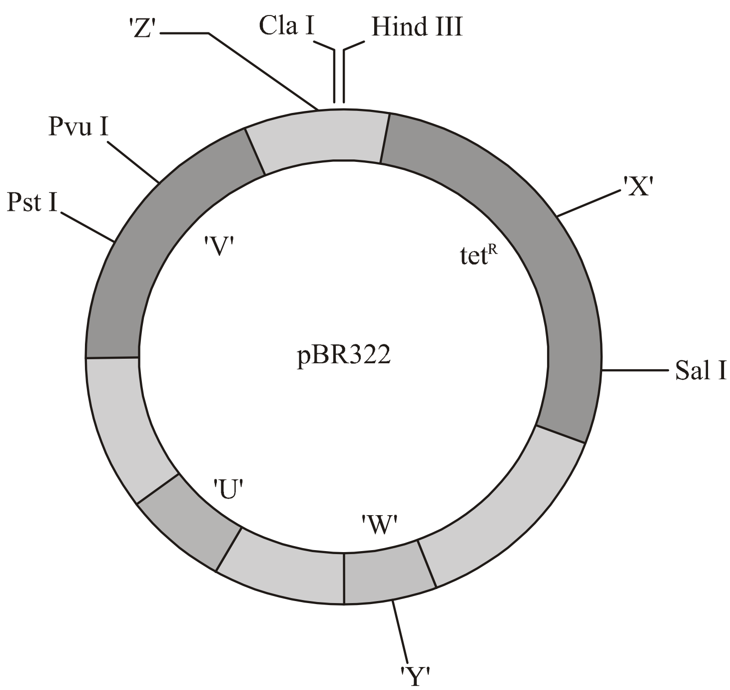
(iii) उन खण्डों का आरेख बनाइए जो चित्र में चिह्नित 'Z' द्वारा नीचे दिए गए डी.एन.ए. खण्ड के विशिष्ट स्थल पर बनेगा :

5' --- GTACGAATTCCTGA---3'
3'---CATGCTTAAGGACT---5'

अथवा

SECTION C

13. (a) Cloning of genes, play a very significant role in genetic engineering, helping the transfer of desirable foreign genes into different hosts. The scientists, to make this process easier and effective are creating engineered vectors in such a way that they help easy linking of foreign DNA and selection of recombinants from non recombinants. 'pBR322' is one such engineered vectors developed by scientists. A diagram of an engineered vector pBR322 is given below : 5



(i) Name the host for this cloning vector.

(ii) Identify 'Rop' and 'Ori' in the diagram from 'U', 'V', 'W', 'X', 'Y' and 'Z'. Write their functions.

(iii) Draw the fragments that will be formed by the action of 'Z' (marked in the diagram) on the specific site of the DNA segment given below :

5' --- GTACGAATTCCTGA---3'
3'---CATGCTTAAGGACT---5'

OR

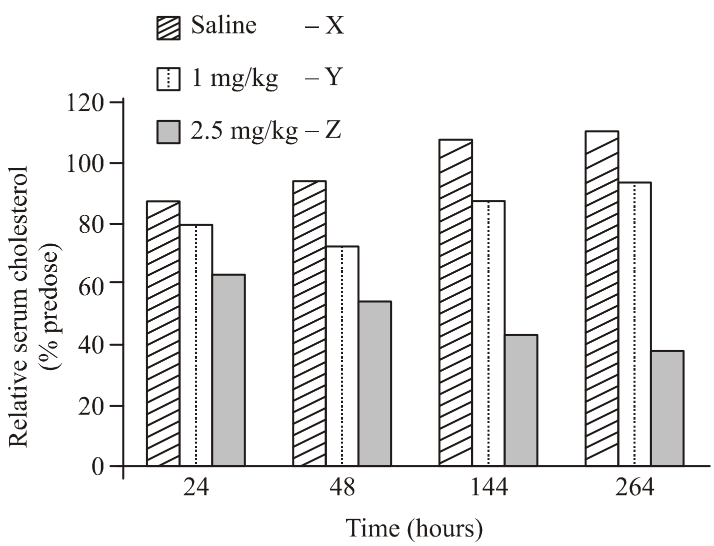
(ख) मानव रोगों की चिकित्सा तथा कृषि क्षेत्र में पीड़कों के नियंत्रण के लिए आर.एन.ए. व्यतिकरण (आर.एन.ए. i/RNAi)) की चिकित्सीय एजेंट के रूप में बहुत अधिक संभावनाएँ हैं। कोलेस्ट्रॉल उपापचय विकारों की चिकित्सा में 'आर.एन.ए.i' के उपयोग का अध्ययन करने के लिए एक प्रयोग किया गया। कुछ लोगों में कुछ आनुवंशिक परिवर्तन होते हैं, जिसमें 'ApoB' जीन के उच्च स्तर के कारण हृद्–धमनी रोग हो जाता है। 5

'ApoB' के स्तर को कम करने के परिणामस्वरूप लिपोप्रोटीन तथा रक्त कोलेस्ट्रॉल की मात्रा में कमी आ सकती है।

ट्रेसी जिमरमैन तथा उनके सहयोगियों ने 2006 में **सायनोमोलगस** वानरों में 'ApoB' के स्तर (मात्रा) को कम करने के लिए किया।

वानरों के एक समूह को आर.एन.ए.i चिकित्सा (अल्प व्यतिकारी आर.एन.एज. SiRNAs) की 1 mg/kg SiRNAs खुराक दी गई। वानरों के दूसरे समूह को आर.एन.ए.i (RNAi) चिकित्सा हेतु (2.5 mg/kg SiRNAs) की खुराक दी गई तथा तीसरे समूह को नियंत्रण प्रतिदर्श हेतु सेलाइन निवेशन (इन्जेक्ट) किया गया।

प्रयोग से प्राप्त परिणामों को नीचे दिए गए ग्राफ द्वारा दर्शाया गया है :



(i) 2.5 mg/kg से उपचार के दौरान 24 घण्टों तथा 144 घण्टों की तुलना करने पर कोलेस्ट्रॉल उपापचय पर क्या प्रभाव पड़ता है ?

(ii) विशिष्ट mRNA का शमन करने के हेतु ds आर.एन.ए. अणु को प्राप्त करने के लिए दो प्राकृतिक स्रोतों के नाम लिखिए।

(iii) तंबाकू के पौधों की जड़ों के सूत्रकृमि ***मिल्वाडेगाइन इनकॉग्नीशिया*** द्वारा संक्रमण के नियंत्रण में RNAi (आर.एन.ए.i) का उपयोग किस प्रकार किया जाता है?

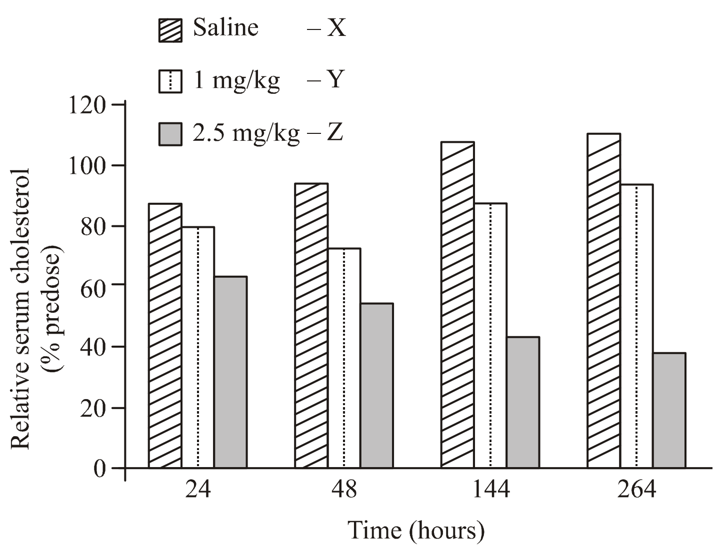
(b) RNA interference (RNAi) holds great potential as a therapeutic agent for the treatment of human diseases and as biocontrol agents in controlling pests in the field of agriculture. An experiment was carried to study the use of 'RNAi' for the potential treatment of disorders of cholesterol metabolism. Some people possess genetic mutations with elevated levels of ApoB gene which predisposes them to coronary artery diseases. 5

Lowering the amount of ApoB can reduce the number of lipoproteins and lower the blood cholesterol.

Tracy Zimmerman and her colleagues used RNAi in 2006 to reduce the level of ApoB in non human primates **Cynomolgus** monkeys.

One group of monkeys were given RNAi treatment (small interfering RNAs, SiRNAs) (doses 1 mg/kg SiRNAs), second group of monkeys were given RNAi treatment (doses 2.5 mg/kg SiRNAs) and third group of monkeys were injected with saline.

The results of the study are depicted in the graph below :



(i) How does the treatment with 2.5 mg/kg brings an effect on cholesterol metabolism when compared from 24 hours and 144 hours.

(ii) Write any two natural sources from where dsRNA molecule could be obtained for silencing the specific mRNA.

(iii) How is RNAi used in controlling the infection on the roots of tobacco plants by the nematode ***Meloidogyne incognitia.***

Strictly Confidential: (For Internal and Restricted use only)

Senior Secondary School Term II Examination, 2022

Marking Scheme – BIOLOGY (SUBJECT CODE – 044)

(PAPER CODE – 57/5/2)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.

2. **"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under IPC."**

3. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In class-X, while evaluating two competency based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**

4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.

5. Evaluators will mark(√) wherever answer is correct. For wrong answer 'X' be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**

6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.

7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.

8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.

9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.

10. A full scale of marks 0-35 has to be used. Please do not hesitate to award full marks if the answer deserves it.

11. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 30 answer books per day in main subjects and 35 answer books per day in other subjects (Details are given in Spot Guidelines).This is in view of the reduced syllabus and number of questions in question paper.

12. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
    - Leaving answer or part thereof unassessed in an answer book.
    - Giving more marks for an answer than assigned to it.
    - Wrong totaling of marks awarded on a reply.
    - Wrong transfer of marks from the inside pages of the answer book to the title page.
    - Wrong question wise totaling on the title page.
    - Wrong totaling of marks of the two columns on the title page.
    - Wrong grand total.
    - Marks in words and figures not tallying.
    - Wrong transfer of marks from the answer book to online award list.
    - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
    - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.

14. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.

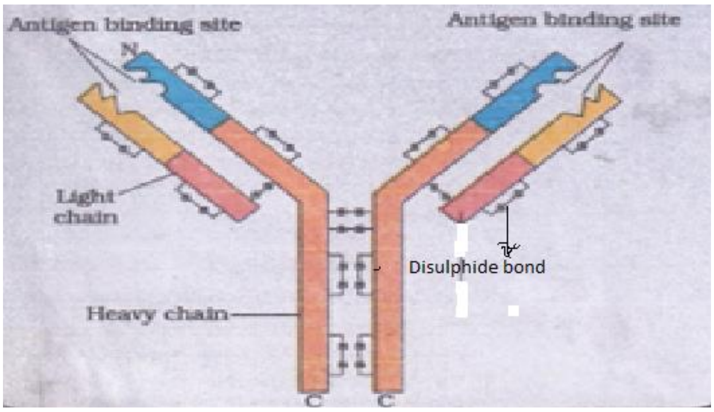
16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

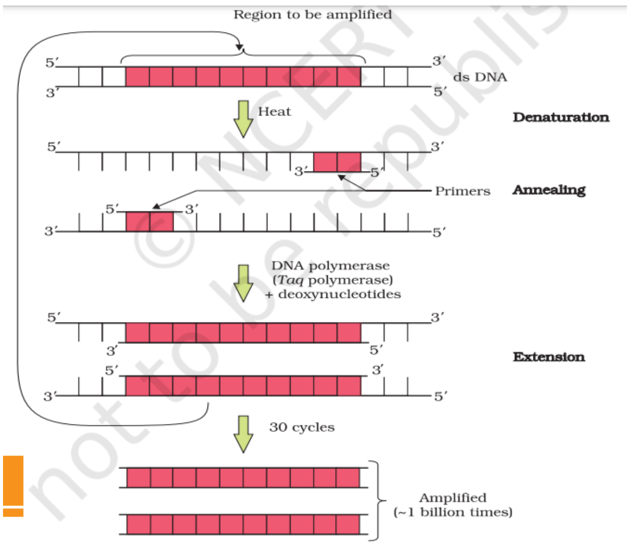
17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

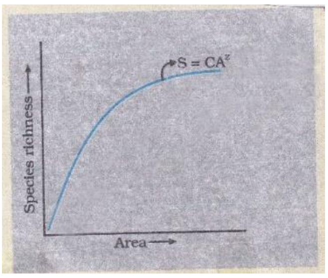
MARKING SCHEME
Senior Secondary School Examination TERM–II, 2022
BIOLOGY (Subject Code–044)
[Paper Code : 57/5/2]

Maximum Marks : 35

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks
	SECTION—A	
1.	(a)Produces statin / blood cholesterol lowering agents (b)Produces cyclosporin A / immunosuppressive agent (in organ transplant patients)	1 1
		2
2.	(a) ● Interferes with the transport of neurotransmitter(dopamine) / stimulating action on central nervous system (CNS) / hallucinations / sense of euphoria / increased energy ● *Erythroxylum coca* **OR** (b) Drop in academic performance, unexplained absence from school/college, lack of interest in personal hygiene, withdrawal, isolation, depression, fatigue, aggressive and rebellious behaviour, deteriorating relationships with family and friends, loss of interest in hobbies, change in sleeping and eating habits, fluctuations in weight, appetite, stealing/mental stress/financial stress or any other relevant point (Any *four* points)	1 1 ½ × 4
		2
3.	(a)(i) The larger and <u>competitively superior</u> barnacle (*Balanus*) <u>dominates</u> the <u>intertidal</u> area , and excludes the smaller barnacle (*Chathamalus*) from the zone (ii) Herbivores, plants **OR** (b) (i) Note: Since graphs shown are not conclusive enough for drawing any interpretation, so one mark to be given to students, if attempted. (ii) Tropical region has high biological diversity due to less seasonal fluctuations / predictable climate / relatively more constant environments / constant environment promotes niche specialisation / more solar energy available / long evolutionary time for species diversification (any *one* point)	½ + ½ ½+½ 1 1
		2
4.	• *Trichophyton, Epidermophyton, Microsporum* (Any *two*)	½ x 2

	• <u>Symptoms</u> Appearance of dry lesions, Scaly lesions on different parts of the body (as skin/nails/scalp), Intense itching (Any *two* symptoms)	½ x 2
		2
5.	(a) S.T.P (B) / B (b) ● The effluent is passed into the <u>settling tanks</u> ● The <u>bacterial 'flocs' are allowed to settle</u> (sediment is called activated sludge) ● a small part of the '<u>activated sludge</u>' is <u>pumped back into the aeration tanks</u> as inoculum (for secondary/biological treatment)	½ ½ ½ ½
		2
6.	●R<u>elative</u> density ●Measuring total number (absolute population densities) is <u>not easily adoptable method /</u>Cannot be done as <u>populations are large / Counting is impossible</u>.	1 1
		2
	SECTION—B	
7.	*(a)* IgA , IgM , IgE , IgG , IgD (any *two*) *(b)* Correct diagram only to be marked  (four parts to be labelled)	½+½ ½ x 4
		3
8.	●Polymerase Chain Reaction / PCR ●Denaturation by heating /DNA strands are separated by heating. Annealing of two primers to complementary region of DNA/ Joining of primer to complementary region of DNA <u>Extension</u> of primers ,using thermostable DNA Polymerase or *Taq* Polymerase . (The process is repeated many times/amplification)	1 ½ ½ ½ +½

	// Polymerase Chain Reaction/PCR 	1 ½ ½ ½ ½ 3
9.	• Yes • HIV attacks macrophages and helper T-lymphocytes (T-helper cells), leads to decrease in T-helper cells, patient becomes immuno-deficient / reduced immunity, becomes prone to infection by pathogens (*Mycobacterium*/viruses/fungi and even parasites like <u>Toxoplasma</u>).	1 ½ ×4 3
10.	Two DNA sequences corresponding to chain A, and chain B of human insulin were prepared using rDNA technology, Introduced separately in plasmids of *E. coli* to produce insulin chains, Chains A and B were separately produced, Extracted the chains, Combined by creating disulphide bonds to form human insulin	½ + ½ ½ ½ ½ ½ 3
11.	*(a)* – High degree of endemism – high levels of species richness *(b)* Western Ghats, Himalaya, Indo-Burma (Any two)	1 1 ½+ ½ 3

12.	 (a) (i) (ii) S = Species richness (iii) 1·15 **OR** (b) (i) X → Fishes Y → Amphibians (ii) Y → Amphibians (iii) Russia — Steller's sea cow Mauritius — Dodo Australia — Thylacine (any other correct example)	1 1 1 ½ ½ ½ ½ ½ ½
		3
	SECTION—C	
13.	(a)(i) *E.coli* / *Escherichia coli* (ii) rop —'W', — code for the proteins involved in the replication of the plasmid. – ori —'U', — this is a sequence from where replication starts / control the copy number of the linked DNA (iii) 5'---GTACG 3 ' 5' AATTCCTGA---3' 3'---CATGCTTAA 5' 3' GGACT---5' **OR** (b) *(i)*There is a <u>considerable decrease in the level of serum cholesterol</u> after 144 hrs. as compared to 24 hrs. *(ii)* •Infection by RNA viruses / Retrovirus •mobile genetic elements / transposons /jumping genes *(iii)* Using *Agrobacterium* vectors, nematode-specific genes are introduced into the host plant, introduced DNA forms both sense and anti-sense RNA in the host cell, these two RNAs being complementary to each other form a dsRNA (double-stranded RNA), that initiates RNAi thus silencing the specific mRNA of the nematode, nematode is unable to survive in the transgenic plant	1 ½+½ ½+½ 1+1 1 ½ ½ ½ x 6
		5

* * *