



Series EF1GH/C



SET~3

प्रश्न-पत्र कोड 57/C/3
Q.P. Code 57/C/3

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.

जीव विज्ञान (सैद्धान्तिक)

BIOLOGY (Theory)

*

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 70

Maximum Marks : 70

नोट / NOTE :

- (i) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।
Please check that this question paper contains 23 printed pages.
- (ii) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
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.
- (iii) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 33 प्रश्न हैं।
Please check that this question paper contains 33 questions.
- (iv) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।
Please write down the serial number of the question in the answer-book before attempting it.
- (v) 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 छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।
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.



सामान्य निर्देशः

निम्नलिखित निर्देशों को बहुत सावधानी से पढ़िए और उनका सख्ती से पालन कीजिएः

- (i) इस प्रश्न-पत्र में **33** प्रश्न हैं। सभी प्रश्न अनिवार्य हैं।
- (ii) यह प्रश्न-पत्र पाँच खण्डों में विभाजित है – खण्ड क, ख, ग, घ एवं ङ।
- (iii) खण्ड क में प्रश्न संख्या **1** से **16** तक बहुविकल्पीय (MCQ) प्रकार के एक-एक अंक के प्रश्न हैं।
- (iv) खण्ड ख में प्रश्न संख्या **17** से **21** तक अति लघु-उत्तरीय (VSA) प्रकार के दो-दो अंकों के प्रश्न हैं।
- (v) खण्ड ग में प्रश्न संख्या **22** से **28** तक लघु-उत्तरीय (SA) प्रकार के तीन-तीन अंकों के प्रश्न हैं।
- (vi) खण्ड घ में प्रश्न संख्या **29** तथा **30** केस-आधारित चार-चार अंकों के प्रश्न हैं। प्रत्येक प्रश्न में उप-प्रश्न हैं तथा एक उप-प्रश्न में आंतरिक विकल्प दिया गया है।
- (vii) खण्ड ङ में प्रश्न संख्या **31** से **33** तक दीर्घ-उत्तरीय (LA) प्रकार के पाँच-पाँच अंकों के प्रश्न हैं।
- (viii) प्रश्न-पत्र में समग्र विकल्प नहीं दिया गया है। यद्यपि, खण्ड ख के **1** प्रश्न में, खण्ड ग के **1** प्रश्न में, खण्ड घ के **2** प्रश्नों में तथा खण्ड ङ के **3** प्रश्नों में आंतरिक विकल्प का प्रावधान दिया गया है। परीक्षार्थी को इन प्रश्नों में से किसी एक प्रश्न का उत्तर लिखना है।
- (ix) जहाँ कहीं आवश्यक हो, साफ-सुधरे और उचित रूप से नामांकित चित्र बनाए जाने चाहिए।

खण्ड क

प्रश्न संख्या **1** से **16** तक बहुविकल्पीय (MCQ) प्रकार के एक-एक अंक के प्रश्न हैं।

$16 \times 1 = 16$

1. वंशावली विश्लेषण में, प्रयुक्त प्रतीक $\square = \bigcirc$ निरूपित करता है :

- (a) विसंबंधी मैथुन
- (b) प्रभावित व्यक्ति
- (c) रिश्तेदारों के बीच (सम रक्त) मैथुन
- (d) असम जुड़वाँ

2. निम्नलिखित में से कौन-सा विकल्प मानव अपरा (प्लैसेंटा) का कार्य नहीं है ?

- (a) भ्रून को ऑक्सीजन तथा पोषकों की आपूर्ति
- (b) एस्ट्रोजन का उत्पादन
- (c) भ्रून से कार्बन डाइऑक्साइड तथा अपशिष्ट पदार्थों का निष्कासन
- (d) रिलैक्सन हॉर्मोन स्रावित करना



General Instructions :

Read the following instructions carefully and strictly follow them :

- (i) This question paper contains **33** questions. **All** questions are **compulsory**.
- (ii) This question paper is divided into **five** sections – Section **A, B, C, D** and **E**.
- (iii) In **Section A** – Questions no. **1** to **16** are multiple choice (MCQ) type questions, carrying **1** mark each.
- (iv) In **Section B** – Questions no. **17** to **21** are very short answer (VSA) type questions, carrying **2** marks each.
- (v) In **Section C** – Questions no. **22** to **28** are short answer (SA) type questions, carrying **3** marks each.
- (vi) In **Section D** – Questions no. **29** and **30** are case-based questions, carrying **4** marks each. Each question has subparts with internal choice in one subpart.
- (vii) In **Section E** – Questions no. **31** to **33** are long answer (LA) type questions, carrying **5** marks each.
- (viii) There is no overall choice. However, an internal choice has been provided in **1** question in Section B, **1** question in Section C, **2** questions in Section D and **3** questions in Section E. A candidate has to attempt only **one** of the alternatives in such questions.
- (ix) Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION A

Questions no. **1** to **16** are Multiple Choice (MCQ) type Questions, carrying **1** mark each. $16 \times 1 = 16$

1. In a pedigree analysis,  represents :
 - (a) Unrelated mating
 - (b) Affected individuals
 - (c) Consanguineous mating
 - (d) Non-identical twins
2. Which one of the following options is **not** the function of human placenta ?
 - (a) Supply of oxygen and nutrients to the embryo
 - (b) Production of estrogen
 - (c) Removal of carbon dioxide and waste materials from the embryo
 - (d) Secretion of relaxin hormone



3. किसी आनुवंशिक क्रॉस में संतति के सभी संभावित जीनोटाइप की संगणना हेतु ग्राफीय निरूपण को कहते हैं :

- वंशावली विश्लेषण
- कैरियोटाइप
- पनेट वर्ग
- क्रोमोसोम नक्शा (मैप)

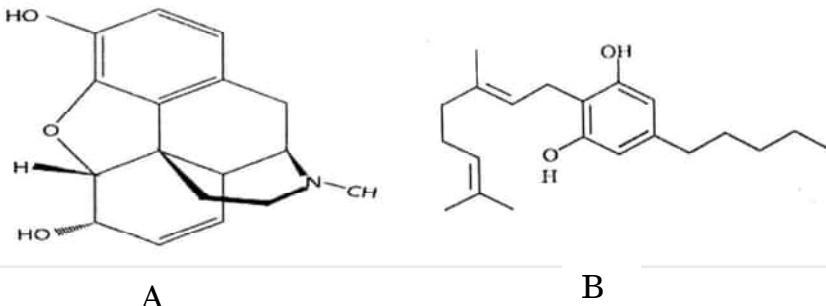
4. जीन क्लोनिंग के लिए प्लाज्मिड उपयुक्त वाहक माने जाते हैं क्योंकि :

- वे डीएनए के छोटे बलयाकार अणु होते हैं जो होस्ट (पोषी) गुणसूत्रीय डीएनए के साथ पुनर्योगित हो जाता है।
- डीएनए के छोटे बलयाकार अणु होते हैं जिनका अपना प्रतिकृतियन उद्भव स्थल होता है।
- वे असीमकेन्द्रकी तथा ससीमकेन्द्रकी कोशिकाओं के बीच आवागम कर सकते हैं।
- वे प्रतिजैविक प्रतिरोधी जीन का संवाहन करते हैं।

5. ससीमकेन्द्रकी के कोशिका चक्र में डीएनए प्रतिकृतियन इस अवधि के दौरान होता है :

(a) G_1 प्रावस्था	(b) G_2 प्रावस्था
(c) S प्रावस्था	(d) G_0 प्रावस्था

6. नीचे दिए गए A तथा B में दर्शाए गए अणुओं को पहचानिए तथा उस विकल्प को चुनिए जो उनके स्रोत तथा उपयोग को सही ढंग से प्रस्तुत करता है।



अणु	स्रोत	उपयोग
(a) A-कोकेन	एरिशोज़ाइलम	डोपेमीन के परिवहन में सहायक
(b). B-हिरोइन	कैनेबिस स्पी.	अवसादक
(c) B-कैनाबिनॉइड	एट्रोपा स्पी.	सुखाभास (यूफोरिया)
(d) A-मॉर्फीन	पैपेवर स्पी.	शामक तथा दर्द निवारक



3. The graphical representation to calculate the probability of all possible genotypes of offsprings in a genetic cross is called :

- Pedigree analysis
- Karyotype
- Punnett Square
- Chromosome Map

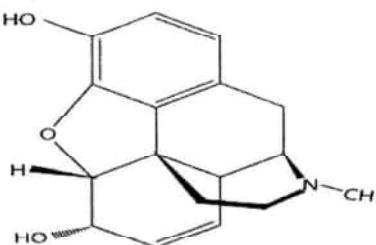
4. Plasmids are suitable vectors for gene cloning because :

- They are small circular DNA molecules which can integrate with the host chromosomal DNA.
- They are small circular DNA molecules with their own origin of replication site.
- They can shuttle between prokaryotic and eukaryotic cells.
- They carry antibiotic resistance genes.

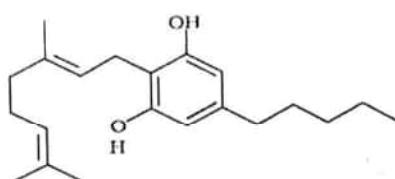
5. In Eukaryote cell cycle, DNA replication occurs during :

(a) G ₁ phase	(b) G ₂ phase
(c) S phase	(d) G ₀ phase

6. Identify the molecules A and B shown below and select the option that gives their source and use correctly.



A

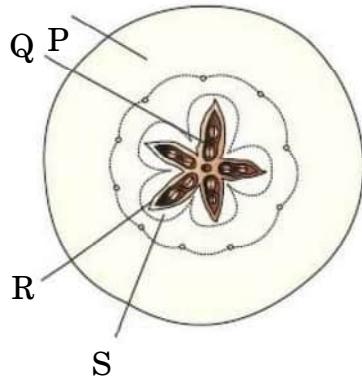


B

	<i>Molecule</i>	<i>Source</i>	<i>Use</i>
(a)	A-Cocaine	<i>Erythroxylum</i>	Helps in transport of Dopamine
(b)	B-Heroin	<i>Cannabis</i> sp.	Depressant
(c)	B-Cannabinoid	<i>Atropa</i> sp.	Euphoria
(d)	A-Morphine	<i>Papaver</i> sp.	Sedative and painkiller



7. उस विकल्प को चुनिए जो एक सेब के अनुप्रस्थ-काट के चित्र में दिए गए नामांकन के साथ सही ढंग से मेल खाता हो जिसके कारण इसे एक आभासी फल की श्रेणी में रखा गया है।



8. सूत्रकृमि प्रतिरोधी तंबाकू के पौधों को डीएनए के निवेशन द्वारा विकसित किया गया है जो निम्न का उत्पादन करता है :

- (a) जीव-विष प्रोटीन
- (b) एक विशिष्ट हॉर्मोन
- (c) अर्थ (सेंस) तथा प्रतिअर्थ (एंटीसेंस) आरएनए
- (d) केवल अर्थ (सेंस) आरएनए

9. पौधों में चरघातांकी वृद्धि को निम्न रूप से दर्शाया जा सकता है :

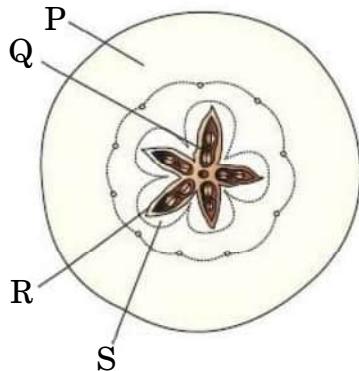
- (a) $L_t = L_0 + rt$
- (b) $W_1 = W_0 e^{rt}$
- (c) $W_1 = W_0 e^{rt}$
- (d) $W_1 = W_0 + e^{rt}$

10. मानव यकृत पर्णाभ कृमि अपने परजीवी जीवन चक्र को पूरा करने हेतु जो दो मध्यस्थ परपोषी इसके प्राथमिक परपोषी के परजीवीकरण को सुगम बनाते हैं, वे हैं :

- (a) घोंघा तथा मच्छर
- (b) मछली तथा मानव
- (c) घोंघा तथा मछली
- (d) मच्छर तथा मछली



7. Select the option that correctly matches with the labelling in the given diagram of T.S. of an apple which categorizes it as a false fruit.



8. Nematode resistant tobacco plants have been developed by introduction of the DNA that produces :

- (a) Toxin protein
- (b) A particular hormone
- (c) Sense and Antisense RNA
- (d) Only Sense RNA

9. Exponential growth in plants can be expressed as :

- (a) $L_t = L_0 + rt$
- (b) $W_1 = W_0 e^{rt}$
- (c) $W_1 = W_0 e^{rt}$
- (d) $W_1 = W_0 + e^{rt}$

10. The two intermediate hosts which the human liver fluke depends on to complete its parasitic mode of life cycle so as to facilitate its parasitisation of its primary host are :

- (a) Snail and mosquito
- (b) Fish and human being
- (c) Snail and fish
- (d) Mosquito and fish



11. 'टी-डीएनए' के लिए संवाहक है :

- (a) एशरिकिआ कोलाई
- (b) एग्रोबैक्टीरियम ट्र्यूमीफेशिएंस
- (c) थर्मस एक्वेटिक्स
- (d) बैसीलस थुरीनजिएंसीस

12. ग़लत ढंग से मिलान किए गए युग्म को चुनिए ।

- (a) खासी तथा जयंतिया पहाड़ियाँ – मेघालय
- (b) अरावली पर्वत – कर्नाटक
- (c) पश्चिमी घाट – महाराष्ट्र
- (d) चंदा तथा बस्तर क्षेत्र – मध्य प्रदेश

प्रश्न संख्या 13 से 16 के लिए, दो कथन दिए गए हैं — जिनमें एक को अभिकथन (A) तथा दूसरे को कारण (R) द्वारा अंकित किया गया है । इन प्रश्नों के सही उत्तर नीचे दिए गए कोडों (a), (b), (c) और (d) में से चुनकर दीजिए ।

- (a) अभिकथन (A) और कारण (R) दोनों सही हैं और कारण (R), अभिकथन (A) की सही व्याख्या करता है ।
- (b) अभिकथन (A) और कारण (R) दोनों सही हैं, परन्तु कारण (R), अभिकथन (A) की सही व्याख्या नहीं करता है ।
- (c) अभिकथन (A) सही है, परन्तु कारण (R) ग़लत है ।
- (d) अभिकथन (A) ग़लत है, परन्तु कारण (R) सही है ।

13. अभिकथन (A) : अनुकूलन क्षमता का एक आनुवंशिक आधार होता है तथा यह वंशानुगत होती है ।

कारण (R) : अनुकूलनशीलता और प्रकृति द्वारा वरण का अंतिम परिणाम उपयुक्तता होता है ।

14. अभिकथन (A) : केला एक अनिषेकजनित फल है ।

कारण (R) : यह केवल अंडाशय से ही विकसित होता है ।

15. अभिकथन (A) : गर्भाशय ग्रीवा टोपी तथा वॉल्ट स्ट्रियों द्वारा उपयोग किए जाने वाले अवरोधक उपाय हैं ।

कारण (R) : शुक्राणुओं की भक्षकाणु क्षमता के कारण यह युक्तियाँ गर्भाधान को अवरुद्ध कर देती हैं ।

16. अभिकथन (A) : कोकेन सुखाभास (यूफोरिया) तथा ऊर्जा में वृद्धि की अनुभूति उत्पन्न करता है ।

कारण (R) : यह तंत्रिका प्रेषक (न्यूरोट्रांसमीटर) डोपेमीन के परिवहन में अवरोध उत्पन्न करता है ।



11. The vector for 'T-DNA' is :

- (a) *Escherichia coli*
- (b) *Agrobacterium tumefaciens*
- (c) *Thermus aquaticus*
- (d) *Bacillus thuringiensis*

12. Choose the pair that is incorrectly matched.

- (a) Khasi and Jaintia Hills – Meghalaya
- (b) Aravalli Hills – Karnataka
- (c) Western Ghats – Maharashtra
- (d) Chanda and Bastar areas – Madhya Pradesh

For Questions number 13 to 16, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).
- (c) Assertion (A) is true, but Reason (R) is false.
- (d) Assertion (A) is false, but Reason (R) is true.

13. *Assertion (A)* : Adaptive ability has a genetic basis and is inherited.
Reason (R) : Fitness is the end result of the ability to adapt and get selected by nature.

14. *Assertion (A)* : Banana is a parthenocarpic fruit.
Reason (R) : It develops only from the ovary.

15. *Assertion (A)* : Cervical caps and vaults are barrier methods of contraception used by human females.
Reason (R) : They prevent conception by phagocytosis of sperms.

16. *Assertion (A)* : Cocaine produces a sense of euphoria and energy.
Reason (R) : It interferes with the transport of neurotransmitter dopamine.



खण्ड ख

17. निम्नलिखित मानदंडों के आधार पर मानव स्त्रियों के आर्तव चक्र की पुटकीय प्रावस्था तथा स्रावी प्रावस्था के बीच विभेद कीजिए : 2

(a) चक्र में इनके होने के दिन
(b) पुटक की अवस्था
(c) अवस्थाओं को प्रभावित करने वाले हॉर्मोन्स
(d) गर्भाशय के अन्तःस्तर परत की अवस्था

18. भुट्टा (मक्का) पौधे के नर तथा मादा पुष्प वायु परागण के लिए भलीभाँति अनुकूलित होते हैं। कथन की न्यायसंगतता को सिद्ध कीजिए। 2

19. किसी एक फाइलेरिया कूमि का वैज्ञानिक नाम लिखिए जो फाइलेरिएसिस का कारक है। इस रोग के संक्रमण के तरीके तथा शरीर पर इसके प्रभाव का उल्लेख कीजिए। 2

20. “डीएनए जीवाणु की कोशिका झिल्ली से बाहर नहीं जा सकता।” क्यों? विजातीय (बाहरी) डीएनए को स्वीकार करने के लिए किसी जीवाणु कोशिका को किस प्रकार सक्षम बनाया जाता है? $\frac{1}{2} + 1 \frac{1}{2} = 2$

अथवा

(a) एक प्रतिबंधन एंजाइम को इस प्रकार क्यों पुकारा जाता है?
(b) प्रतिबंधन एंजाइम के कोई दो उदाहरण लिखिए। 2

21. किसी अणु के आनुवंशिक पदार्थ के रूप में कार्य करने के लिए विभिन्न चार मानदंडों की सूची बनाइए जिनको पूर्ण करना आवश्यक है। 2

खण्ड ग

22. (a) स्ट्रेप्टोकोकस नीमोनी के ‘आर’ प्रभेद तथा ‘एस’ प्रभेद के बीच अंतर का उल्लेख कीजिए।
(b) ग्रिफ्टीथ द्वारा अपने प्रयोग में अपनाए गए विभिन्न चरणों को लिखिए तथा प्रयोग के अंत में उनके निष्कर्ष का भी उल्लेख कीजिए। 3



SECTION B

17. Differentiate between Follicular phase and Luteal phase of the Menstrual cycle in human females on the basis of the following criteria : 2

- (a) Days of their occurrence in the cycle
- (b) Stage of the follicle
- (c) Hormones influencing the phases
- (d) State of endometrium

18. The male and female flowers of corn plant (maize) are well adapted for pollination by wind. Justify. 2

19. Write the scientific name of any one species of filarial worm that causes filariasis. Mention the mode of infection of the disease and its effect on the body. 2

20. "DNA cannot pass through cell membrane of bacteria." Why ? How is a bacterial cell made competent to take up foreign DNA ? $\frac{1}{2} + 1 \frac{1}{2} = 2$

OR

- (a) Why is a restriction enzyme so called ?
- (b) Give any two examples of restriction enzymes. 2

21. List the different criteria (4 points) that a molecule must fulfil to act as a genetic material. 2

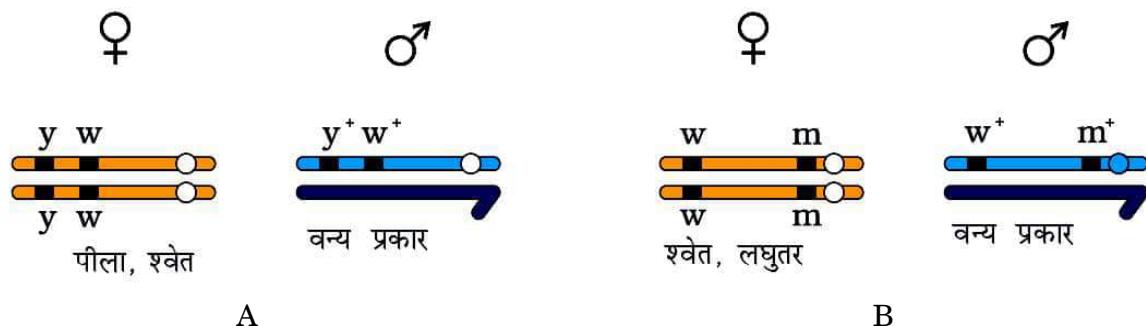
SECTION C

22. (a) Mention the difference between the 'R' strain and 'S' strain in *Streptococcus pneumoniae*.

(b) Write the steps followed by Griffith during the course of his experiment and the conclusion he arrived at, at the end of his experiment. 3



23. टी.एच. मोर्गन द्वारा ड्रोसोफिला में कराए गए द्विसंकर क्रॉस के आधार पर लिंग क्रोमोसोम पर स्थित दो विशेषकों के जीन के चित्रात्मक निरूपण का अध्ययन कीजिए।



निम्नलिखित प्रश्नों के उत्तर दीजिए :

(a) 'y', 'w' तथा 'm' संकेतों द्वारा व्यक्त किए गए विशेषकों को पहचानिए। उनके विपर्यास स्वरूप भी लिखिए। 1

(b) मोर्गन द्वारा क्रमशः क्रॉस A तथा क्रॉस B में प्राप्त पुनर्योजकों का प्रतिशत क्या था? 1

(c) इस प्रकार के प्रतिशत के लिए मोर्गन द्वारा प्रस्तृत व्याख्या को लिखिए। 1

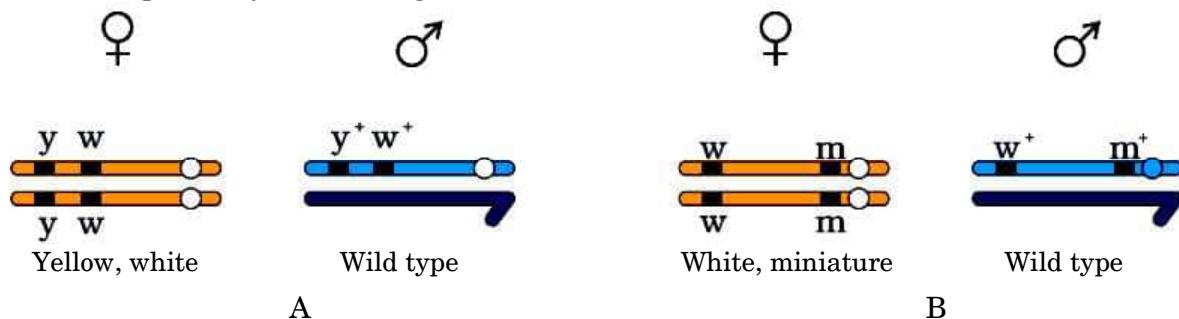
24. द्वितीय विश्व युद्ध में घायल सैनिकों के उपचार में उपयोग किए गए प्रतिजैविक (एंटिबायोटिक) का नाम लिखिए। इसकी खोज एक आकस्मिक घटना के कारण हुई, व्याख्या कीजिए। 2
उन वैज्ञानिकों के नाम लिखिए जिन्हें इस खोज के लिए नोबल पुरस्कार दिया गया। 1

25. (a) आवृत्तबीजी (एंजियोस्पर्म) के एक परिपक्व भ्रूण कोष का स्वच्छ आरेख बनाकर उसके किन्हीं चार कोशिकीय घटकों को नामांकित कीजिए।

(b) तंतुरूप समुच्चय का प्रकार्य लिखिए।



23. Study the diagrammatic representation of the sex chromosomes with locations of the genes of two traits, based on the dihybrid cross carried in *Drosophila* by T.H. Morgan.



Answer the questions that follow :

(a) Identify the traits denoted by 'y', 'w' and 'm'. Also write their contrasting forms. 1

(b) What was the percentage of recombinants obtained in Cross A and Cross B respectively by Morgan ? 1

(c) Write the explanation that Morgan gave for such a percentage. 1

24. Name the antibiotic that was used to treat wounded soldiers in World War II. Explain its chance discovery. 2

Name the scientists who were awarded the Nobel Prize for this discovery. 1

25. (a) Draw a neat diagram of a mature angiospermic embryo sac and label any four cellular components. 3

(b) Write the function of filiform apparatus. 3

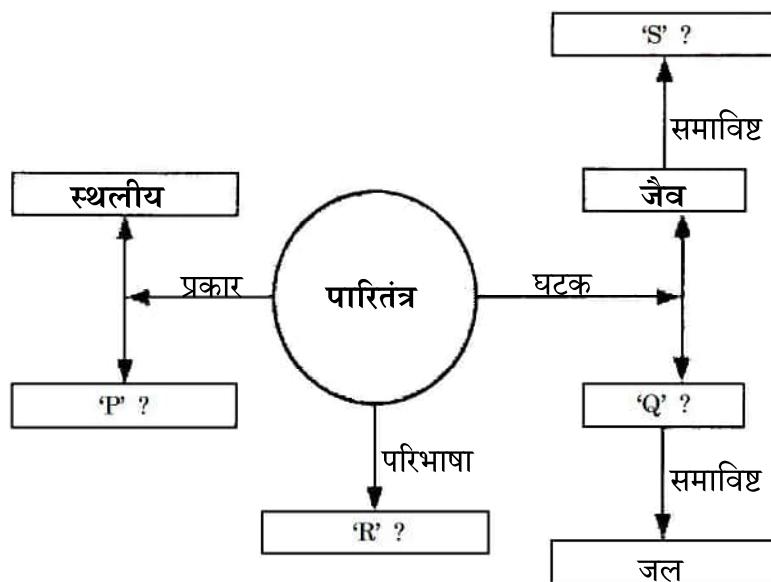


26. (a) परभक्षियों से बचने के लिए निम्नलिखित जीवों द्वारा विकसित विभिन्न रक्षा विधियों का उल्लेख कीजिए :

(i) मेंढक	$\frac{1}{2}$
(ii) मोनार्क तितली	1
(iii) पौधे (शाकाहारियों से सुरक्षा के लिए आकारिकीय तथा रासायनिक रक्षा विधियाँ)	$1\frac{1}{2}$

अथवा

(b) (i) पारिस्थितिक तंत्र के निम्न आरेखित चार्ट में दिए गए रिक्त स्थान (P), (Q), (R) तथा (S) को भरिए । 2



(ii) उपर्युक्त आरेख में पारिस्थितिक तंत्र में ऊर्जा प्रवाह के लिए उत्तरदाई दो प्रकार की खाद्य शृंखलाओं के नाम लिखिए । 1



26. (a) State the various defence mechanisms the following organisms have evolved with, to protect themselves from predators :

(i) Frogs

$\frac{1}{2}$

(ii) Monarch butterfly

1

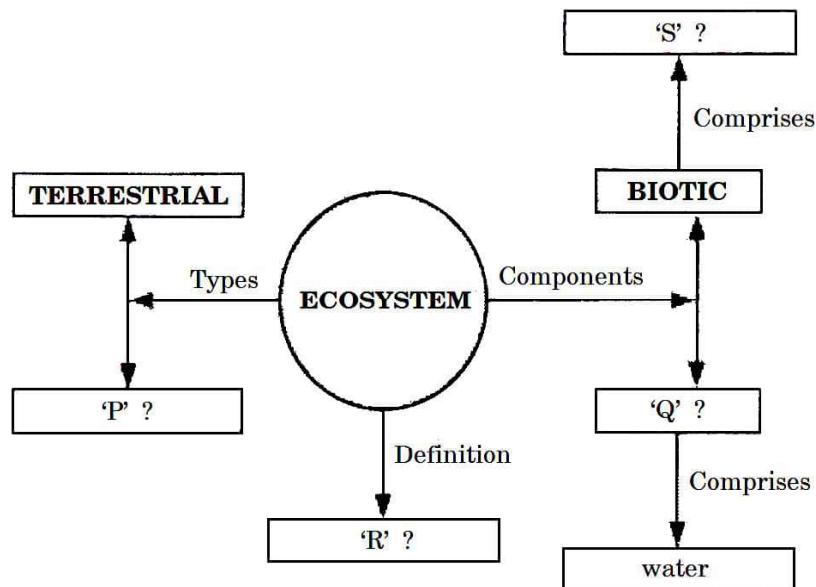
(iii) Plants (Morphological and chemical defence against herbivores)

$1\frac{1}{2}$

OR

(b) (i) Fill in the blanks (P), (Q), (R) and (S) in the following chart of ecosystem.

2

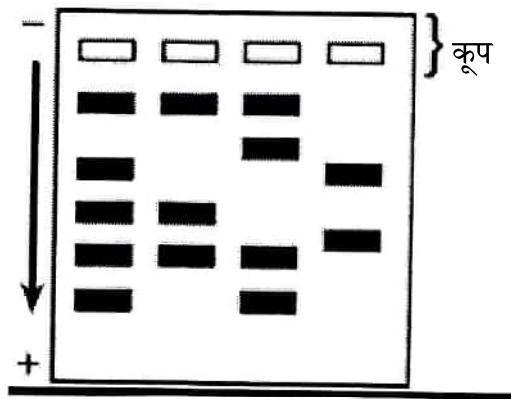


(ii) Name the two types of food chains responsible for the flow of energy in the ecosystems represented in the above diagram.

1



27. एक प्रतिबंधन एंजाइम एक विशिष्ट डीएनए अणु का पाचन कर उसे खंडों में विभाजित कर देता है। इन खंडों पर एक तकनीक का प्रयोग किया गया तथा प्राप्त परिणाम को नीचे दिए गए अरेख द्वारा दर्शाया गया है। चित्र का प्रेक्षण कर दिए गए संबंधित प्रश्नों के उत्तर लिखिए।



(a) इस तकनीक का नाम तथा इसका उद्देश्य लिखिए।

(b) निम्नलिखित चरणों में अपनाए जाने वाली क्रियाविधि की व्याख्या कीजिए :

(i) उपयोग किए जाने वाले माध्यम का नाम तथा इसकी भूमिका

(ii) डीएनए का अभिरंजन तथा निष्कर्षण

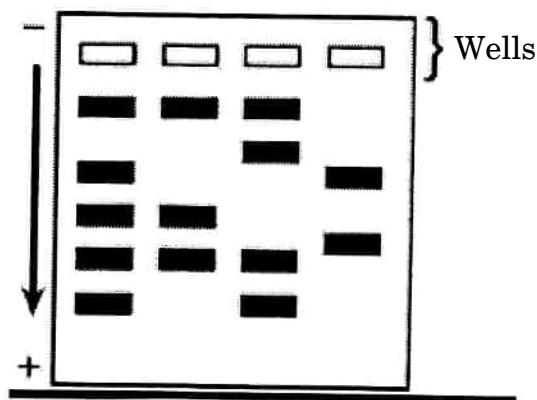
3

28. एक आरेखित निरूपण की सहायता से समझाइए कि किसी समष्टि में विभिन्न लक्षणों पर प्राकृतिक वरण की संक्रिया किस प्रकार होती है।

3



27. A restriction enzyme digests a certain DNA into fragments. The fragments are subjected to a technique, the result obtained is in the illustration given below. Observe and answer the questions that follow.



(a) Name the technique and its purpose.

(b) Explain the procedure carried out under the following steps :

(i) Matrix used and its role

(ii) Staining and extraction of the DNA

3

28. Explain with the help of a diagrammatic representation, how natural selection operates on different traits in a population.

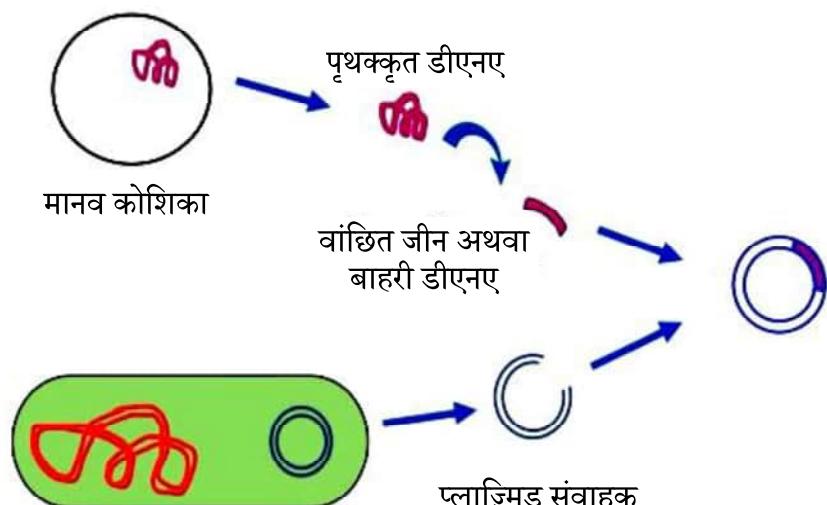
3



खण्ड घ

प्रश्न 29 तथा 30 प्रकरण-आधारित प्रश्न हैं। प्रत्येक प्रश्न के उपभाग हैं तथा एक उपभाग में आंतरिक विकल्प दिया गया है।

29. कक्षा के प्रदर्शन पट्ट पर लगे चित्रण आरेख को निम्न रूप से दर्शाया गया है। इस आरेख का अध्ययन करके संबंधित प्रश्नों के उत्तर लिखिए।



(i) (a) प्रदर्शित विशिष्ट तकनीक का नाम लिखिए। 1

अथवा

(b) जीवाणु कोशिकाओं तथा कवक कोशिकाओं से डीएनए पृथक करने हेतु आवश्यक एंजाइमों के नाम क्रमशः लिखिए। 1

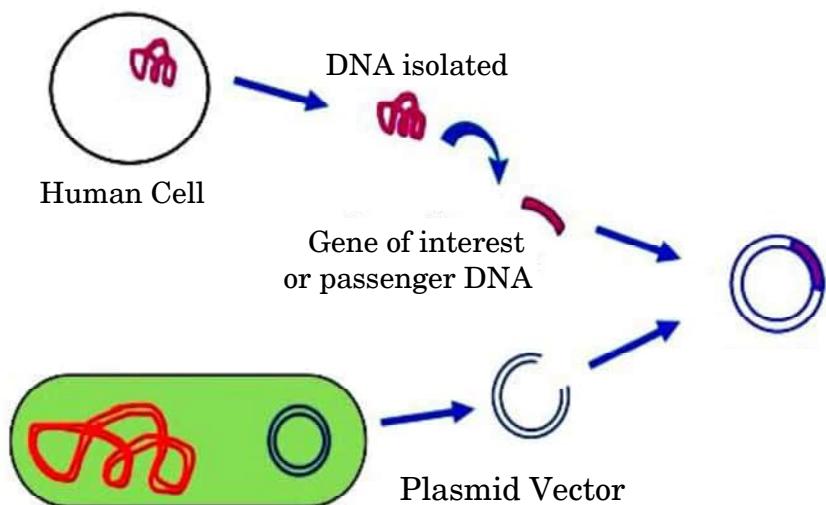
(ii) एली लिली कंपनी के वैज्ञानिकों द्वारा मधुमेह के रोगियों के लिए अत्यधिक लाभदायक दवा के उत्पादन में उपयोग किए गए विभिन्न चरणों की व्याख्या प्रदर्शित चित्र की सहायता से कीजिए। 3



SECTION D

Questions number **29** and **30** are case-based questions. Each question has subparts with internal choice in one subpart.

29. An illustration given below was on the display board in the class. Study the illustration and answer the questions that follow.



(i) (a) Name the particular technique shown. 1

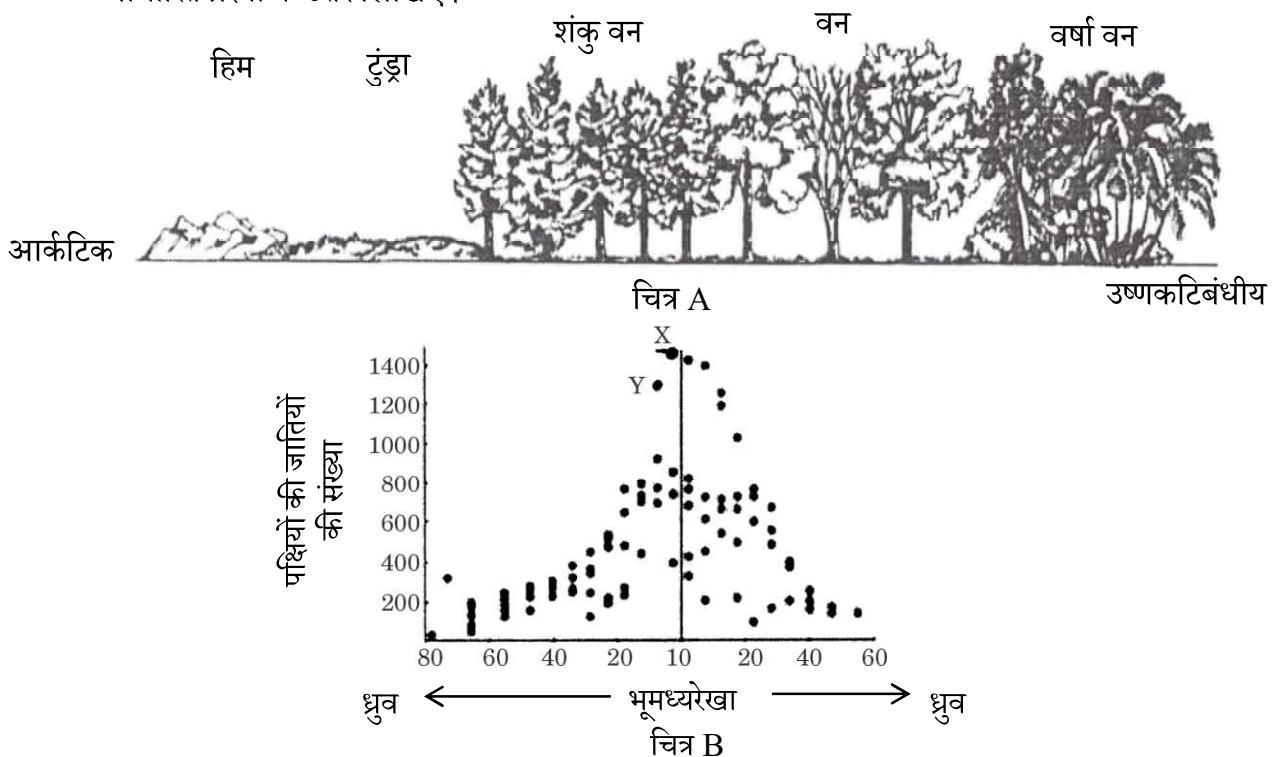
OR

(b) Name the enzymes needed to isolate the DNA from bacterial and fungal cells respectively. 1

(ii) Taking the help of the illustration, explain the steps used by the scientists at Eli Lilly Company to produce a drug that proved to be highly beneficial to diabetic patients. 3



30. संपूर्ण विश्व में पौधों तथा जंतुओं में विविधता एकसमान नहीं है, वरन् इससे एक असमान वितरण परिलक्षित होता है। नीचे प्रदर्शित अभिचित्रण 'A' तथा 'B' का ध्यानपूर्वक अध्ययन करके उन पर आधारित प्रश्नों के उत्तर लिखिए।



(i) (a) चित्र A में आपके द्वारा प्रेक्षित जैव विविधता के पैटर्न (प्रतिमान) का उल्लेख कीजिए। 1
अथवा

(b) चित्र B में पक्षियों की जातियों (स्पीशीज़) की संख्या दर्शाई गई है। 'X' तथा 'Y' चिह्नित देशों को पहचानिए। 1

(ii) चित्र A में प्रेक्षित जैव विविधता के पैटर्न के लिए उत्तरदाई तीन कारणों की व्याख्या कीजिए। 3

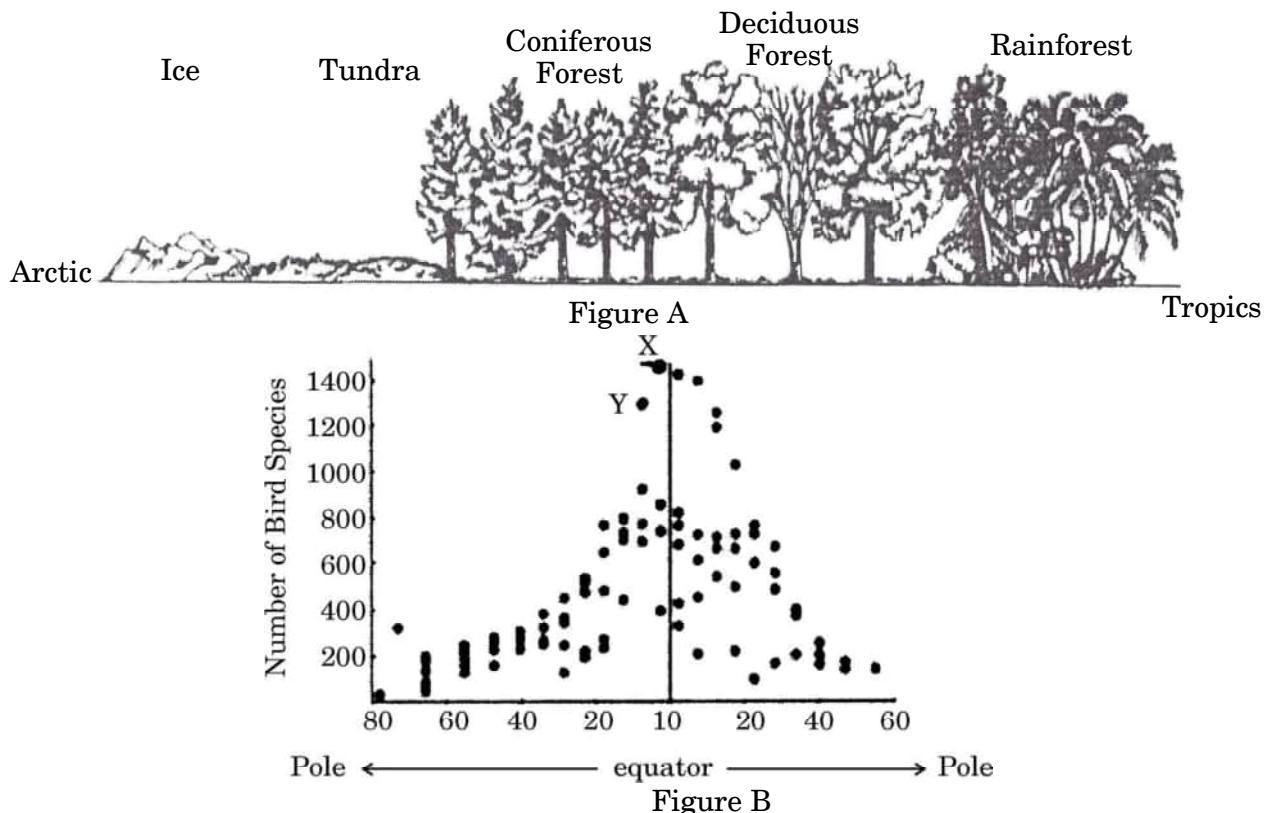
खण्ड ड

31. (a) (i) एक स्त्री (मानव मादा) में अंडजनन प्रक्रिया (1) कब प्रारंभ होती है, तथा (2) कब पूर्ण होती है ? 1

(ii) अंडजननी (अगोनिया) से प्रारंभ करके परिपक्व ग्राफि पुटक बनने तक के दौरान इसमें होने वाले परिवर्तनों की व्याख्या कीजिए। 4
अथवा



30. The diversity of plants and animals is not uniform throughout the world but shows a rather uneven distribution. Study carefully the illustrations 'A' and 'B' given below. Answer the questions based on them.



(i) (a) Mention the pattern of biodiversity that you observe in Figure A. 1

OR

(b) Figure B shows number of bird species. Identify the countries marked 'X' and 'Y'. 1

(ii) Explain the three reasons for the pattern of biodiversity that is observed in Figure A. 3

SECTION E

31. (a) (i) When does oogenesis in a human female get (1) initiated, and (2) completed ? 1

(ii) Starting from oogonia, explain the changes that it undergoes leading to the formation of a mature Graafian follicle. 4

OR



(b)	(i)	मानव शुक्रजनक नलिकाओं (वर्धित) की आरेखित काट का चित्र बनाकर निम्नलिखित भागों को नामांकित कीजिए :	3
	(1)	स्पर्मिओजेनेसिस दर्शाने वाली कोशिकाएँ	1
	(2)	नर युग्मक को पोषित करने वाली कोशिकाएँ	1
	(3)	कोशिकाएँ जिनमें प्रथम अर्धसूत्री विभाजन तथा द्वितीय अर्धसूत्री विभाजन होता है	1
	(ii)	समझाइए कि शुक्रीय प्लाज्मा क्या है । इसके संघटकों तथा कार्य का उल्लेख कीजिए । यह वीर्य से किस प्रकार भिन्न है ?	2
32.	(a)	‘कैंसर’ के संदर्भ में निम्नलिखित की व्याख्या कीजिए :	1
	(i)	संस्पर्श संदमन (कॉटेक्ट इनहिबिशन)	1
	(ii)	सभी प्रसामान्य कोशिकाओं में आदि-अर्बुद जीन (प्रोटो-आँकोजीन) होते हैं	1
	(iii)	कैंसरजन का नाम तथा उनकी भूमिका लिखिए	1
	(iv)	सुदम (बिनाइन) तथा दुर्दम (मैलिग्नेंट) अर्बुद में अंतर लिखिए अथवा	2
	(b)	(i) नदियों तथा झरनों (जल स्रोत) में विसर्जित करने से पहले वाहितमल जल का उपचार करना क्यों आवश्यक है ? वाहितमल जल उपचार में किए जाने वाले विभिन्न चरणों तथा इस प्रक्रम में ईंधन के निर्माण की व्याख्या कीजिए ।	4
	(ii)	हमारे देश में प्रमुख नदियों को प्रदूषण से बचाने के लिए पर्यावरण तथा वन मंत्रालय द्वारा की गई पहल/उठाए गए उपायों का उल्लेख कीजिए ।	1
33.	(a)	(1) मटर के पौधे के फूल के रंग के विकल्पी लक्षणों वाले दो पौधों के एकल संकर क्रॉस तथा	1
		(2) एंटिराइनम के पुष्प रंग के विकल्पी लक्षणों वाले दो पौधों के मध्य एकल संकर क्रॉस	1
		F ₂ पीढ़ी तक बनाइए । उनके वंशागति के पैटर्न पर टिप्पणी कीजिए ।	2
		अथवा	
	(b)	(i) hn आरएनए का विस्तृत रूप लिखिए । उन कोशिकाओं का प्रकार तथा एंजाइम का	1
		नाम लिखिए जो इसे अनुलेखित करते हैं ।	2
	(ii)	क्या यह एक अग्रदूत है ? एक प्रकार्यात्मक अणु बनने के लिए इसके प्रक्रम की	2
		व्याख्या कीजिए । इस अणु का नाम लिखिए ।	2
	(iii)	कोशिकाओं में उनकी भूमिका के संदर्भ में एम-आरएनए तथा टी-आरएनए के मध्य विभेद कीजिए ।	2



(b) (i) Draw a diagrammatic sectional view of a human seminiferous tubule (enlarged) and label the following : 3

(1) Cells that undergo spermiogenesis
(2) Cells that nourish male gamete
(3) Cells which undergo Meiosis I and Meiosis II

(ii) State what is Seminal Plasma. Mention its constituents and function. How is it different from semen ? 2

32. (a) Explain the following with reference to 'Cancer' :
(i) Contact Inhibition 1
(ii) All normal cells have proto-oncogenes 1
(iii) Name of carcinogens and their role 1
(iv) Difference between benign and malignant tumours 2

OR

(b) (i) Why is it necessary to treat sewage water before it can be discharged into rivers and streams ? Explain different steps carried out in the treatment of sewage water and the production of fuel during this process. 4

(ii) Mention the initiative taken by the Ministry of Environment and Forests to save the major rivers of our country from pollution. 1

33. (a) Work out a monohybrid cross up to F_2 generation (1) between two pea plants (2) between two *Antirrhinum* plants, both having contrasting traits with respect to colour of the flower. Comment on their pattern of inheritance. 5

OR

(b) (i) Expand hnRNA. Name the type of cells and the enzyme that transcribes it. $1\frac{1}{2}$

(ii) Is it a precursor ? Explain the process that it undergoes to become a functional molecule. Name this molecule. $2\frac{1}{2}$

(iii) Differentiate between mRNA and tRNA with respect to their roles in the cells. 1

Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Senior School Certificate Supplementary Examination, 2023
SUBJECT NAME: BIOLOGY (SUBJECT CODE 044) (PAPER CODE 57/C/3)

General Instructions: -

1	<p>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.</p>
2	<p>“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 various rules of the Board and IPC.”</p>
3	<p>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 due marks be awarded to them. In class-XII, 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, due marks should be awarded.</p>
4	<p>The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.</p>
5	<p>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. If there is any variation, the same should be zero after deliberation and discussion. 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.</p>
6	<p>Evaluators will mark(✓) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.</p>

7	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.
8	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.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note " Extra Question ".
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
13	<p>Ensure that you do not make the following common types of errors committed by the Examiner in the past:-</p> <ul style="list-style-type: none"> • Leaving answer or part thereof unassessed in an answer book. • Giving more marks for an answer than assigned to it. • Wrong totalling of marks awarded on an answer. • Wrong transfer of marks from the inside pages of the answer book to the title page. • Wrong question wise totalling on the title page. • Wrong totalling of marks of the two columns on the title page. • Wrong grand total. • Marks in words and figures not tallying/not same. • 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.
14	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.
15	Any un assessed portion, non-carrying over of marks to the title page, or totalling 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.
16	The Examiners should acquaint themselves with the guidelines given in the " Guidelines for spot Evaluation " before starting the actual evaluation.

17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

MARKING SCHEME
 Senior Secondary School Supplementary Examination, 2023
BIOLOGY (Subject Code-044)
[Paper Code: 57/C/3]

Maximum Marks: 70

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION—A		
1.	(c) / Consanguineous mating.	1	1
2.	(d) / Secretion of relaxin hormone	1	1
3.	(c) / Punnett square	1	1
4.	(b) / They are small circular DNA molecules with their own origin of replication site.	1	1
5.	(c) / S-Phase	1	1
6.	(d) / Molecule- A Morphine ; Source- <i>Papaver</i> sp ; Use- Sedative and pain killer	1	1
7.	(a) / P-Thalamus	1	1
8.	(c) / Sense and Antisense RNA.	1	1
9.	(c) / $W_1=W_0 e^{rt}$.	1	1
10.	(c) / Snail and Fish	1	1
11.	(b) / <i>Agrobacterium tumefaciens</i> .	1	1
12.	(b) / Aravalli Hills- Karnataka.	1	1
13.	(a) / Both (A) and (R) are true and (R) is correct explanation of (A).	1	1
14.	(b) / Both (A) and (R) are true, but (R) is not the correct explanation of (A).	1	1
15.	(c) / (A) is true, but (R) is false.	1	1
16.	(a) / Both (A) and (R) are true, and (R) is the correct explanation of (A).	1	1

SECTION B			
17.		Follicular phase	Luteal Phase
	(a) Days of their occurrence in the cycle	6 th -13 th /6 th -14 th day	15 th -28 th /15 th -29 th day
	(b) Stage of the follicle	Development of Primary follicle into Graafian follicle	Transformation of Graafian follicle into Corpus Luteum
	(c) Hormones influencing the phases	LH/FSH/Estrogen	Progesterone
18.	(d) State of endometrium	Regeneration of endometrium through proliferation.	Endometrium further proliferate and thickens.
	(½ mark to be awarded for every correct difference)		
19.	<p>Features of male flowers: Well exposed stamen, so that pollens are easily dispersed into wind current / light and non-sticky pollen grains, so that they are easily transported in wind current.</p> <p>Features of female flowers: Large often feathery stigma and style wave in the air, to easily trap air borne pollen grains/ numerous flowers packed into an inflorescence, to easily trap air borne pollen grains.</p> <p style="text-align: center;">(Or any other features with correct justification)</p>		
	<ul style="list-style-type: none"> • Wuchereria bancrofti / Wuchereria malayi • Through the bite by the female mosquito vectors. • Chronic inflammation of Lower limbs and genital organs resulting in gross deformities. 	1 ½ ½	2
20.	<ul style="list-style-type: none"> • DNA is a hydrophilic molecule, • The bacterial cells are treated with divalent cation such as calcium which increases the efficiency with which DNA enters the bacterium through pores in its cell wall, 	½ ½	

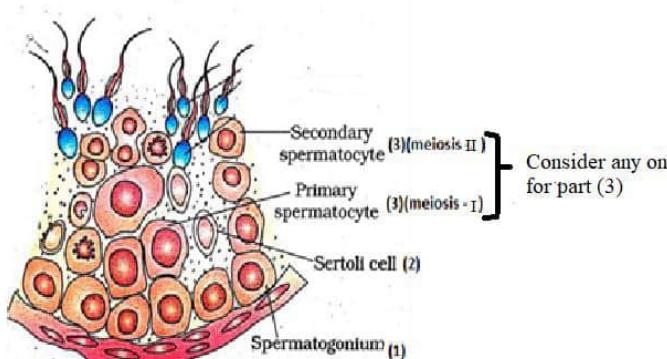
	<ul style="list-style-type: none"> Foreign DNA can then be forced into such cells by incubating these cells on ice, <p>Followed by placing them briefly at 42^0C (heat shock) and then putting them back on ice,</p> <p style="text-align: center;">OR</p> <p>(a) Restriction enzymes restrict the growth of bacteriophages by cutting their DNA at specific site.</p> <p>(b) Hind II, EcoRI, BamH I, Pst-I, Pvu-I, Sal-I (or any other correct name)</p> <p style="text-align: center;">(Any two)</p>	$\frac{1}{2}$	$\frac{1}{2}$						
21	<p>A molecule that can act as a genetic material must fulfil the following criteria:</p> <ul style="list-style-type: none"> - It should be able to generate its replica (Replication). - It should be stable chemically and structurally. - It should provide the scope for slow changes (mutation) that are required for evolution. - It should be able to express itself in the form of 'Mendelian characters'. 	$\frac{1}{2} \times 4$	2						
	SECTION-C								
22	<p>(a)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">‘R’ Strain</td> <td style="text-align: center;">‘S’ Strain</td> </tr> <tr> <td style="text-align: center;">Non-Virulent</td> <td style="text-align: center;">Virulent</td> </tr> <tr> <td style="text-align: center;">No polysaccharide coat</td> <td style="text-align: center;">Have polysaccharide coat</td> </tr> </table> <p style="text-align: center;">($\frac{1}{2}$ mark for any one difference)</p> <p>(b)</p> <p>S strain \longrightarrow Inject into mice \longrightarrow Mice die</p> <p>R strain \longrightarrow Inject into mice \longrightarrow Mice live</p> <p>S strain (heat killed) \longrightarrow Inject into mice \longrightarrow Mice live</p> <p>S strain (heat killed)+ R stain \longrightarrow Inject into mice \longrightarrow Mice die</p> <p>Conclusion: He concluded that the R strain bacteria had somehow been transformed by the heat-killed S strain bacteria / Some ‘transforming principle’ transferred from heat killed S strain and transform R strain into S strain.</p>	‘R’ Strain	‘S’ Strain	Non-Virulent	Virulent	No polysaccharide coat	Have polysaccharide coat	$\frac{1}{2}$	3
‘R’ Strain	‘S’ Strain								
Non-Virulent	Virulent								
No polysaccharide coat	Have polysaccharide coat								

23	<p>(a)</p> <table border="1" data-bbox="233 392 1200 630"> <thead> <tr> <th>Gene</th><th>Identification</th><th>Contrasting forms</th></tr> </thead> <tbody> <tr> <td>y</td><td>Yellow body</td><td>Brown body</td></tr> <tr> <td>w</td><td>White eye</td><td>Red eye</td></tr> <tr> <td>m</td><td>Miniature wings</td><td>Normal wings</td></tr> </tbody> </table> <p style="text-align: center;">(Consider any two correct points)</p>	Gene	Identification	Contrasting forms	y	Yellow body	Brown body	w	White eye	Red eye	m	Miniature wings	Normal wings	$\frac{1}{2} + \frac{1}{2}$	
Gene	Identification	Contrasting forms													
y	Yellow body	Brown body													
w	White eye	Red eye													
m	Miniature wings	Normal wings													
	<p>(b) Cross A- 1.3%</p>	$\frac{1}{2}$													
	<p>Cross B- 37.2%</p>	$\frac{1}{2}$													
	<p>(c) The genes Yellow and white are very tightly linked and showed very low recombination frequency (1.3%), while white and miniature wing are very loosely linked and showed higher recombination frequency (37.2%).</p>	$\frac{1}{2} + \frac{1}{2}$	3												
24	<ul style="list-style-type: none"> • Penicillin • Alexander Fleming while working on <i>Staphylococci</i> bacteria, once observed a mould growing in one of his unwashed culture plates around which <i>Staphylococci</i> could not grow, He found out that it was due to a chemical produced by the mould and he named it Penicillin after the mould <i>Penicillium notatum</i>. • Alexander Fleming, Ernest Chain , Howard Florey. <p>(1/2 mark each for any two correct names)</p>	$\frac{1}{2}$													
		$\frac{1}{2} \times 3$													
25	<p>(a)</p> <p>Mature Embryo Sac</p>	$\frac{1}{2} + \frac{1}{2}$	3												
		$\frac{1}{2} + \frac{1}{2}$													
		$\frac{1}{2} \times 4$													

	(b) Guide pollen tube into synergids.	1	3
26	<p>(a)</p> <p>(i) Cryptically colored/ camouflaged</p> <p>(ii) Highly distasteful because of special chemicals present in them , the butterfly acquires this chemical during its caterpillar stage by feeding on a poisonous weed.</p> <p>(iii) Morphological- Presence of thorns</p> <p>Chemicals- Plant produce chemical like cardiac glycoside that make herbivores sick / A wide variety of chemical substances like nicotine caffeine quinine strychnine opium, etc. are produced as defences against grazers and browsers</p> <p>OR</p> <p>(b)</p> <p>(i)</p> <p>‘P’- Aquatic</p> <p>‘Q’- Abiotic</p> <p>‘R’- Functional unit of nature where living organisms interaction among themselves and also with the surroundings.</p> <p>‘S’- Organisms (plants, animals, microbes)</p> <p>(ii)</p> <p>Detritus food chain</p> <p>Grazing food chain</p>	$\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$	
27	<p>(a) Gel electrophoresis, to separate DNA fragments.</p> <p>(b)</p> <p>(i) Agarose gel, to separate DNA fragments according to their size through sieving effect.</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3

	(ii) Stained with Ethidium bromide followed by exposure to UV light which can be seen as orange coloured DNA band, Separated DNA bands are cut out from the gel and extracted from gel piece (by the process of elution)	$\frac{1}{2} + \frac{1}{2}$	3
28	<p>The diagram shows a vertical axis labeled 'Number of individuals with phenotype' and a horizontal axis. Four bell-shaped curves are shown, each representing a different type of natural selection:</p> <ul style="list-style-type: none"> Stabilizing (1/2 MARK): The peak is high and narrow, with the text 'Peak gets higher and narrower' above it. Directional (1/2 MARK): The peak is shifted to the right, with the text 'Peak shifts in one direction' above it. Disruptive (1/2 MARK): There are two distinct peaks, with the text 'Two peaks form' above it. Phenotypes favoured by natural selection: The peak is broad and centered, with the text 'Medium-sized individuals are favoured' above it. <p>Yellow arrows point from the text labels to their corresponding bell curves.</p>	$\frac{1}{2} \times 6$	
	($\frac{1}{2}$ mark for each figure with correct labelling)		
	SECTION-D		
29	<p>(i)</p> <p>(a) Recombinant DNA technology</p> <p style="text-align: center;">OR</p> <p>(b) Bacterial- Lysozyme, Fungal- Chitinase</p> <p>(ii)</p> <p>Scientist at Eli Lilly company prepared two DNA sequences , corresponding to A and B peptide chains of human insulin, and introduced them in plasmids of <i>E. coli</i> to produce insulin chains ,Chains A and B were produced separately, extracted , and combined by creating disulfide bonds to form human insulin.</p>	<p>1</p> <p>//</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} \times 6$</p>	3

			4
30	<p>(i)</p> <p>(a) Biodiversity increases as we move from arctic towards tropics/ biodiversity decreases as we move from tropics towards arctic</p> <p style="text-align: center;">OR</p> <p>(b) X- Columbia Y- India/ South America</p> <p style="text-align: center;">(Or any other correct name)</p> <p>(ii) Tropics harbor more biological diversity:</p> <ul style="list-style-type: none"> - Speciation is generally a function of time unlike temperate regions subjected to frequent glaciations in the past tropical latitudes have remained relatively undisturbed for millions of years and thus had a long evolutionary time for species diversification. - Tropical environments are less seasonal relatively more constant and predictable which promote niche specialization and lead to a greater species diversity. - There is more solar energy available in the tropics which contributes to higher productivity that contributes indirectly to greater diversity. 	1	$\frac{1}{2} \times 2$
	SECTION-E		
31	<p>(a)</p> <p>(i)</p> <p>(1) Initiated – During Embryonic stage</p> <p>(2) Completed- At the time of fertilization</p> <p>(ii)</p> <p>-Oogonia cells start division and enter into prophase-I of the meiotic division and get temporarily arrested at that stage called primary oocytes, each primary oocyte then gets surrounded by a layer of granulosa cells and is called the primary follicle,</p> <p>-The primary follicles get surrounded by more layers of granulosa cells and a new theca and are called secondary follicles,</p> <p>-The secondary follicle soon transforms into a tertiary follicle which is characterized by a fluid filled cavity called antrum. The theca layer is organized into an inner theca interna and an outer</p>	$\frac{1}{2}$	$\frac{1}{2}$

	<p>theca externa. The primary oocyte within the tertiary follicle completes its first meiotic division. (It is an unequal division resulting in the formation of a large haploid secondary oocyte and a tiny first polar body),</p> <p>-The tertiary follicle further changes into mature Graafian follicle in which the secondary oocyte forms a new membrane called zona pellucida surrounding it.</p>	1
	<p>OR</p> <p>(b)(i)</p>  <p>(½ mark for identification and ½ mark for labelling)</p> <p>(ii)</p> <ul style="list-style-type: none"> Secretions of accessory glands (seminal vesicles, a prostate and paired bulbourethral glands) constitute the seminal plasma It is rich in fructose calcium and certain enzymes. Helps in the lubrication of the penis / essential for maturation / essential for motility of sperms The seminal plasma along with the sperms constitute the semen. 	3
		5
32	<p>(a)</p> <p>(i) Cancer cells appears to have lost the property of contact inhibition as a result they continue to divide to form mass of cells(tumor).</p>	1

	<p>(ii) When proto-oncogenes are activated under certain conditions it could lead to oncogenic transformation of the cells .</p> <p>(iii)</p> <ul style="list-style-type: none"> • X-rays/ UV rays/ Nicotine / Caffeine/ Tobacco smoke/ Oncogenic viruses • Damage DNA which causes neoplastic transformation. <p>(iv)</p> <table border="1"> <tr> <td>Benign tumors</td><td>Malignant tumors</td></tr> <tr> <td>Remain confined to their original location</td><td>Not remain confined to their original location/ Show property of metastasis</td></tr> <tr> <td>Cause little damage</td><td>Damage surrounding tissue and starve normal cells by competing for vital nutrients</td></tr> </table>	Benign tumors	Malignant tumors	Remain confined to their original location	Not remain confined to their original location/ Show property of metastasis	Cause little damage	Damage surrounding tissue and starve normal cells by competing for vital nutrients	1
Benign tumors	Malignant tumors							
Remain confined to their original location	Not remain confined to their original location/ Show property of metastasis							
Cause little damage	Damage surrounding tissue and starve normal cells by competing for vital nutrients							
		$\frac{1}{2}$						
		$\frac{1}{2}$						
		1+1						
(b) (i)	<ul style="list-style-type: none"> • To make it less polluting • Steps in sewage treatment <ul style="list-style-type: none"> -Primary treatment- physical removal of floating debris through sequential filtration and sedimentation - Secondary treatment/ biological treatment -primary effluent is passed to large aeration tank where it is constantly agitated and air is pumped into it -This allow vigorous growth of aerobic microbes into floc which significantly reduces organic matter or BOD -Flocs are allowed to settle in settling tank this sediment is called activated sludge -Major part of sludge is pumped into anaerobic sludge digestor to produce biogas 	1						
		$\frac{1}{2} \times 6$						
		5						
(ii)	Ganga Action plan, Yamuna action plan ,To build a large number of sewage treatment plants so that only treated sewage may be discharged into the rivers.	$\frac{1}{2} + \frac{1}{2}$						

33	(a)	<ul style="list-style-type: none"> • In case of Pea plant 	$ \begin{array}{ccc} \text{VV} & \times & \text{vv} \\ (\text{Violet}) & & (\text{White}) \\ & \downarrow & \\ \text{F}_1 & & \text{Vv(violet)} \\ & \downarrow & \\ & \text{Selfing} & \\ & & \\ \text{F}_2 & & \\ \text{Gametes (Male/Female)} & & \\ & \text{V} & \text{v} \\ & \text{v} & \\ & \text{v} & \\ \hline & \text{VV} & \text{Vv} \\ & \text{Violet} & \text{Violet} \\ & \text{Vv} & \text{vv} \\ & \text{Violet} & \text{White} \end{array} $	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
		Phenotype-	Violet:White $3 : 1$	
		It shows Complete dominance		$\frac{1}{2}$
		<ul style="list-style-type: none"> • In case of Snapdragon flower / Dogflower / <i>Antirrhinum</i> 		
		$ \begin{array}{ccc} \text{RR} & \times & \text{rr} \\ (\text{Red}) & & (\text{White}) \\ & \downarrow & \\ \text{F}_1 & & \text{Rr(Pink)} \\ & \downarrow & \\ & \text{Selfing} & \\ & & \\ \text{F}_2 & & \\ \text{Gametes (Male/Female)} & & \\ & \text{R} & \text{r} \\ & \text{r} & \\ & \text{r} & \\ \hline & \text{RR} & \text{Rr} \\ & \text{Red} & \text{Pink} \\ & \text{Rr} & \text{rr} \\ & \text{Pink} & \text{White} \end{array} $	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	$\frac{1}{2}$

	<p>Phenotype- Red:Pink:White 1 :2 :1</p> <p>One Allele is incompletely dominant over the other allele/ Incomplete dominance.</p> <p>OR</p> <p>(b)</p> <p>(i)</p> <ul style="list-style-type: none"> • Heterogenous nuclear RNA • Eukaryotic cells • RNA polymerase-II <p>(ii)</p> <ul style="list-style-type: none"> • Yes • hn RNA it is subjected to a process called <u>splicing</u> where the introns are removed and exons are joined in a defined order , In <u>capping</u> an unusual nucleotide (methyl guanosine triphosphate) is added to the 5'-end of hnRNA , In <u>tailing</u> adenylate residues (200-300) are added at 3'-end. • mRNA <p>(iii)</p> <table border="1" data-bbox="228 1326 1165 1468"> <tr> <td data-bbox="228 1326 700 1371">mRNA</td><td data-bbox="700 1326 1165 1371">tRNA</td></tr> <tr> <td data-bbox="228 1371 700 1468">Provide template for protein synthesis</td><td data-bbox="700 1371 1165 1468">Act as adaptor molecule/ brings amino acids and read genetic code</td></tr> </table>	mRNA	tRNA	Provide template for protein synthesis	Act as adaptor molecule/ brings amino acids and read genetic code	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2} \times 3$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2} \times 3$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>5</p>
mRNA	tRNA					
Provide template for protein synthesis	Act as adaptor molecule/ brings amino acids and read genetic code					