



Previous Year Solved Question Papers of

CBSE Class 12 Exams

BIOLOGY – 2017

Compt. All India: Set-2

Original Question Paper + Answer Key

**CBSE: CENTRAL BOARD OF
SECONDARY EDUCATION**



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SET – 2

Series : GBM/C

कोड नं. 57/2
Code No.

रोल नं.

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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 8 हैं।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 26 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 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।
- Please check that this question paper contains 8 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 26 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 (सैद्धान्तिक)

BIOLOGY (Theory)

निर्धारित समय : 3 घंटे

Time allowed : 3 hours

अधिकतम अंक : 70

Maximum Marks : 70

सामान्य निर्देश :

- प्रश्न-पत्र में पाँच खण्डों में 26 प्रश्न दिए गए हैं। सभी प्रश्न अनिवार्य हैं।
- खण्ड – क में प्रश्न संख्या 1 से 5 अति लघु-उत्तरीय प्रश्न हैं। प्रत्येक प्रश्न एक अंक का है।
- खण्ड – ख में प्रश्न संख्या 6 से 10 लघु-उत्तरीय प्रश्न प्रकार I के हैं, प्रत्येक प्रश्न दो अंकों का है।

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[P.T.O.]

- (iv) खण्ड – ग में प्रश्न संख्या 11 से 22 लघु-उत्तरीय प्रश्न प्रकार II के हैं, प्रत्येक प्रश्न तीन अंकों का है।
- (v) खण्ड – घ में प्रश्न संख्या 23 मूल्य आधारित प्रश्न चार अंकों का है।
- (vi) खण्ड – ङ में प्रश्न संख्या 24 से 26 दीर्घ-उत्तरीय प्रश्न हैं, प्रत्येक प्रश्न पाँच अंकों का है।
- (vii) प्रश्न-पत्र में समग्र पर कोई विकल्प नहीं है, फिर भी दो अंकों वाले एक प्रश्न में, तीन अंकों वाले एक प्रश्न में और पाँच अंकों वाले सभी तीनों प्रश्नों में भीतरी चयन-विकल्प दिए गए हैं। प्रत्येक परीक्षार्थी को ऐसे प्रश्नों के दो विकल्पों में से कोई एक प्रश्न हल करना है।

General Instructions :

- (i) There are total 26 questions in **five** sections in the question paper. **All** questions are compulsory.
- (ii) Section A contains questions number 1 to 5, very short answer type questions of **one** mark each.
- (iii) Section B contains questions number 6 to 10, short answer type-I questions of **two** marks each.
- (iv) Section C contains questions number 11 to 22, short answer type-II questions of **three** marks each.
- (v) Section D contains question number 23, value based question of **four** marks.
- (vi) Section E contains questions number 24 to 26, long answer type questions of **five** marks each.
- (vii) There is no overall choice in the question paper, however, an internal choice is provided in **one** question of **two** marks, **one** question of **three** marks and all the **three** questions of **five** marks. In these questions, an examinee is to attempt any **one** of the **two** given alternatives.

खण्ड – क

SECTION – A

1. जीन चिकित्सा क्या है ? 1
What is Gene therapy ?
2. उस रोग वर्ग का नाम लिखिए जिसमें मनुष्यों के आमवाती संधिशोथ (रूमेटोइड आर्थराइटिस) रोग को रखा गया है। 1
Name the category of disease in which 'Rheumatoid arthritis' in human is put under.
3. ग्रिफीथ द्वारा स्ट्रेप्टोकोकस नीमोनी के साथ किए गए प्रयोगों के अन्त में उनके द्वारा प्राप्त निष्कर्ष लिखिए। 1
Write the conclusion Griffith arrived at the end of his experiment with Streptococcus pneumonia.

4. मानव में प्रसव प्रारंभ होने के लिए संकेत कहां से उत्पन्न होते हैं, लिखिए । 1
State where do the signals for parturition originate from in humans.
5. सामान्य वर्ण दृष्टि वाले जनकों (माता-पिता) से एक वर्णांध (कलर ब्लाइंड) बालक का जन्म होता है । 1
उसके जनकों के जीनोटाइप लिखिए ।
A colour blind boy is born to a couple with a normal colour vision. Write the genotype of the parents.

खण्ड – ख

SECTION – B

6. सर्वप्रथम खोजे गए प्रतिजैविक (एंटीबायोटिक) तथा इसकी खोज करने वाले वैज्ञानिक का नाम लिखिए । 2
Name the first antibiotic discovered and by whom.
7. कवकों (ग्लोमस स्पी.) और उच्च कोटि पादपों की जड़ों के बीच कवकमूल संबंध है । यह साहचर्य दोनों 2
सदस्यों के लिए परस्पर किस प्रकार लाभकारी है ?
Mycorrhizal association exists between fungi (Glomus sp) and roots of higher plants.
How is this association beneficial to each member ?
8. किसी समुदाय में परभक्षियों की भूमिका का वर्णन कीजिए । 2
Explain the role played by predators in a community.
9. कोशिका विभाजन चक्र के समय क्रोमेटिड विसंयोजन न होने के कारण क्या होता है ? एक उदाहरण द्वारा 2
अपने उत्तर की व्याख्या कीजिए ।

अथवा

- ABO रूधिर वर्ग सह-प्रभाविता (को-डोमिनेंस) का एक अच्छा उदाहरण है । औचित्य बताइए । 2
What happens when chromatids fail to segregate during cell division cycle ? Explain your answer with an example.

OR

ABO blood groups is a good example of co-dominance. Justify.

10. अनिषेक जनन (पार्थेनोजेनेसिस) किसे कहते हैं ? दो उदाहरण दीजिए । 2
What is parthenogenesis ? Give two examples.

खण्ड – ग
SECTION – C

11. दो उदाहरणों की सहायता से समझाइए कि गाय तथा बकरियों जैसे प्राथमिक उपभोक्ताओं से रक्षा हेतु कुछ विशिष्ट पौधों ने किस प्रकार आकारिकीय एवं रासायनिक युक्तियों का विकास किया। 3

Explain with the help of two examples how certain plants have evolved morphological and chemical defenses against primary consumers such as cows and goats.

12. पीड़कनाशियों के अत्यधिक एवं सतत उपयोग के परिणामस्वरूप पीड़कों की कुछ नई प्रजातियों का विकास हुआ। व्याख्या कीजिए कि ऐसा होना किस प्रकार संभव हुआ। इस प्रकार के विकास को क्या कहते हैं? 3

Excessive and continuous use of pesticides has resulted in evolution of some new species of pests. Explain what must have led to this. What is this type of evolution called?

13. (अ) मानव अंडाशय की आरेखीय काट का चित्र बनाइए तथा (i) प्राथमिक पुटक, (ii) तृतीयक पुटक, (iii) ग्राफी पुटक एवं (iv) पीत पिंड (कार्पस ल्युटियम) को नामांकित कीजिए।
(ब) पीत पिंड का प्रकार्य लिखिए। 3

अथवा

- (अ) आवृतबीजी के स्त्रीकेसर में पराग नलिका की वृद्धि दर्शाते हुए चित्र बनाइए तथा (i) वर्तिकाग्र, (ii) नर युग्मक, (iii) बीजाण्ड द्वार एवं (iv) बीजाण्ड को नामांकित कीजिए।

- (ब) बीजाण्ड द्वार का प्रकार्य लिखिए। 3

- (a) Draw a diagram of a sectional view of human ovary and label (i) Primary follicle; (ii) Tertiary follicle; (iii) Graafian follicle and (iv) Corpus luteum.

- (b) Write the function of corpus luteum.

OR

- (a) Draw a diagram of Pistil showing pollen tube growth in angiosperm and label (i) Stigma; (ii) male gametes; (iii) micropyle and (iv) Ovule.

- (b) Write the function of micropyle.

14. जैव-प्रौद्योगिकी प्रयोगों में प्रतिजैविक प्रतिरोधी वरण योग्य चिह्नक की अपेक्षा बीटा-गैलैक्टोसीडेस स्थल अधिमान्य वरणयोग्य चिह्नक है। औचित्य बताइए। 3

β -galactosidase enzyme site is a preferred selectable marker in comparison to antibiotic resistant selectable marker in biotechnology experiments. Justify.

15. निम्नलिखित तालिका में अ, आ, इ, ई, उ तथा ऊ की पहचान कीजिए : 3

एंजाइम का नाम / जैव-सक्रिय अणु	स्रोत	कार्य
(i) अ	स्ट्रेप्टोकोकस	आ
(ii) इ	ई	अंग प्रतिरोपण में प्रतिरक्षा निरोधक कारक
(iii) स्टेटिन्स	उ	ऊ

Identify a, b, c, d, e and f in the following table :

Name of Enzyme/ Bioactive Molecule	Source	Function
(i) a	Streptococcus	b
(ii) c	d	Immuno-suppressive agent in organ transplant patients
(iii) Statins	e	f

16. डीएनए अणु के निम्नलिखित मुख्य अभिलक्षणों की व्याख्या कीजिए :
(अ) इसकी दो शृंखलाओं के क्षार क्रमों का एक-दूसरे के पूरक होना ।
(ब) दोनों शृंखलाओं के मध्य प्रति-समानांतर ध्रुवणता होना । 3

Explain the following salient features of a DNA molecule :

- (a) Complimentarity of the base pairs of its two chains.
(b) Anti-parallel polarity of the two chains.

17. उस जीव का नाम लिखिए जिससे 'क्राई' जीन विलगित किए जाते हैं । उचित उदाहरण की सहायता से स्पष्ट कीजिए कि जैव-प्रौद्योगिकी वैज्ञानिकों ने 'क्राई' जीनों का उपयोग क्यों और कैसे किया । 3

Name the organism from which the 'cry' genes are isolated. Mention with the help of suitable example why and how bio-technologists have made use of 'cry' genes.

18. भारतीय कृषि अनुसंधान संस्थान ने अनाज तथा सब्जियों की ऐसी अनेक किस्मों को सन्नविष्ट किया है, जिनमें विटामिन तथा खनिज पोषकों का प्राचुर्य है । इस प्रकार के पादप-प्रजनन को क्या कहते हैं ? इस प्रकार के प्रजनन कार्यक्रमों को चलाने का मुख्य उद्देश्य लिखिए । 3

The Indian Agricultural Research Institute has introduced several cereal and vegetable crops that are nutritionally rich in vitamins and minerals. What is this kind of breeding called ? Write the main objectives with which such breeding programme is carried.

19. आर डी एन ए तकनीकों के उपयोग द्वारा इंसुलिन के उत्पादन में क्या चुनौती थी ? आर डी एन ए तकनीक का उपयोग करके एली लिली ने इंसुलिन का उत्पादन कैसे किया ? 3

What was the challenge for production of insulin using rDNA techniques ? How did Eli Lilly produce insulin using rDNA technology ?

20. पशु प्रजनन कार्यक्रम का उद्देश्य लिखिए। कुक्कुट फार्म प्रबंधन के आवश्यक चरणों का वर्णन कीजिए। 3
- Write the aim with which animal breeding programmes are carried. Describe the essential steps to be followed in Poultry management.
21. ऑक्टोपस एवं मनुष्य की आँख को किस प्रकार का अंग कहा जाता है ? इसी प्रकार के अंग का एक अन्य उदाहरण जन्तुओं से तथा एक उदाहरण पौधों से भी दीजिए। उनके द्वारा प्रदर्शित इस विकास प्रक्रम का नाम लिखिए तथा व्याख्या भी कीजिए। 3
- What type of organs eye of an Octopus and that of a human called ? Give another example from the animal group and one from the plants of such organs. Name and explain the evolutionary process they exhibit.
22. स्त्रियों के लिए उपलब्ध किन्हीं दो आई यू डी के नाम लिखिए तथा उनकी कार्य पद्धति बताइए। 3
- List any two types of IUDs that are available for human females and state their mode of action.

खण्ड – घ

SECTION – D

23. सूचना प्रौद्योगिकी में क्रांति के बाद अब यह भारत में ग्रामीण एवं शहरी क्षेत्रों में रहने वाले प्रत्येक व्यक्ति के जीवन का एक अभिन्न हिस्सा बन गया है। आपको अपने पड़ोस के विद्यालयों के इको-क्लब में इलेक्ट्रॉनिक अपशिष्ट (ई-वेस्ट्स) के उत्पादन तथा प्रबंधन पर विद्यार्थियों को संबोधित करने के लिए कहा जाता है – 4
- (अ) लिखिए, ई-वेस्ट (ई.अपशिष्ट) कैसे जनित होते हैं ?
- (ब) बताइए कि, आप ई-अपशिष्ट के प्रबंधन के विषय पर विद्यार्थियों को किस प्रकार जागरूक करेंगे ?
- (स) ई-अपशिष्ट के प्रबंधन के संदर्भ में विकसित राष्ट्रों ने विकासशील देशों का किस प्रकार शोषण किया है ?

With the revolution in information technology, now it has become an integral part of everybody's life, living in rural and urban India. You are asked to address the gathering of students of eco-clubs of your neighbourhood schools on generation and management of e-waste.

- (a) Write how e-waste is generated.
- (b) Explain how would you address the awareness issue of e-waste management amongst the students.
- (c) How have the developed countries exploited the developing countries with respect to e-waste managements ?

खण्ड – ड
SECTION – E

24. मानव में त्वचा के वर्ण के स्पष्ट विकल्पी प्ररूप परिलक्षित नहीं होते, परन्तु यह इसमें त्वचीय वर्ण का परास परिलक्षित होता है। इस प्रकार के विशेषक की वंशागति के पैटर्न की व्याख्या कीजिए। इस प्रकार की वंशागति को क्या कहते हैं? इस प्रकार की वंशागति दर्शाने वाला एक अन्य उदाहरण दीजिए। 5

अथवा

एक असीम केन्द्रकी में अनुलेखन प्रक्रम का वर्णन कीजिए। 5

Skin colour in humans does not have distinct alternate forms but shows a whole range of possible variations in skin colour. Explain the pattern of inheritance of such a trait. What is this type of inheritance known as? Provide another example of exhibiting such an inheritance pattern.

OR

Explain the process of transcription in a prokaryote.

25. (अ) पिछली शताब्दी के अन्त में वन आच्छादित भूमि का प्रतिशत लिखिए।
(ब) ऐसी दो गतिविधियों का वर्णन कीजिए जिनके कारण वनोन्मूलन हुआ।
(स) वनोन्मूलन के परिणाम बताइए।
(द) वनोन्मूलन को रोकने का एक उपाय सुझाइए। 1 + 2 + 1 + 1 = 5

अथवा

- (अ) बदलती पर्यावरणीय परिस्थितियों के साथ सभी समुदायों के संगठन एवं संरचना में हो रहे परिवर्तनों के पैटर्न पर व्याख्या कीजिए।
(ब) 'चरम समुदाय' तथा 'क्रमक' की व्याख्या कीजिए।
(स) उदाहरणों की सहायता से प्राथमिक तथा द्वितीयक अनुक्रमण में विभेद कीजिए। 1 + 2 + 2 = 5
(a) Write the percentage of land area that was covered by forests by the end of the last century.
(b) Describe any two practices that led to deforestation.
(c) State the consequences of deforestation.
(d) Suggest a method to overcome deforestation.

OR

- (a) Comment on the pattern in which all communities undergo a change in composition and structure with changing environmental conditions.
(b) Explain 'Climax community' and 'sere'.
(c) Differentiate between primary and secondary succession with examples.

26. (अ) पात्रे निषेचन (इनविट्रो फर्टिलाइजेशन), जिसे आमतौर पर टेस्ट ट्यूब बेबी कार्यक्रम से जाना जाता है, के विभिन्न चरणों का वर्णन कीजिए।

(ब) इस कार्यक्रम का महत्त्व बताइए।

4 + 1 = 5

अथवा

(अ) सजातपुष्पी परागण तथा परनिषेचन के बीच एक समानता तथा एक असमानता लिखिए।

(ब) पुष्पी पौधों में विकसित ऐसी तीन युक्तियों की व्याख्या कीजिए जो उनमें स्व-परागण को हतोत्साहित तथा पर-परागण को प्रोत्साहित करते हैं।

5

(a) Explain the steps involved in *in vitro* fertilisation popularly known as test tube baby programme.

(b) State the importance of this programme.

OR

(a) State one difference and one similarity between geitonogamy and xenogamy.

(b) Explain any three devices developed in flowering plants to discourage self pollination and encourage cross pollination.

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Senior School Certificate Examination

April 2017

Marking Scheme - Biology (Theory)

Expected Answers/Value Points

General Instructions :

The Marking Scheme and mechanics of marking

1. In the marking scheme the marking points are separated by commas, one oblique line (/) indicates acceptable alternative, two obliques (//) indicate complete acceptable alternative set of marking points.
2. Any words/phrases given within brackets do not have marks.
3. Allow spelling mistakes unless the misspelt word has another biological meaning. Ignore plurals unless otherwise stated in the marking scheme.
4. In any question exclusively on diagram no marks on any description. But in questions on descriptions, same value points may be marked on the diagrams as a substitute.
5. All awarded marks are to be written in the left hand margin at the end of the question or its part.
6. Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place “Half-tick” ½ wherever there is ½ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).
7. If no marks are awarded to any part or question put a cross (×) at incorrect value portion and mark it zero (in words only).
8. Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.
9. Add part totals of the question and write the question total at the end. Count all the ticks for the entire question as a recheck and draw a circle around the question total to confirm correct addition.
10. If parts have been attempted at different places do the totalling at the end of the part attempted last.
11. If any extra part is attempted or any question is reattempted, score out the last one and write “extra”.
12. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.
13. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.
14. Points/answer given in brackets in marking scheme are not so important and may be ignored for marking.

Question Paper Code 57/2

SECTION – A

Q. Nos. 1 - 5 are of one mark each

1. What is Gene therapy ?

Ans Correction of genetic defect / involves delivery of a normal gene to take over the function of non-functional gene = 1

[1 Mark]

2. Name the category of disease in which ‘Rheumatoid arthritis’ in human is put under.

Ans Auto-immune disease = 1

[1 Mark]

3. Write the conclusion Griffith arrived at the end of his experiment with Streptococcus pneumonia.

Ans He concluded that the R-strain bacteria had somehow been transformed by heat- killed S-strain bacteria, this must be due to transfer of genetic material = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

4. State where do the signals for parturition originate from in humans.

Ans Fully developed foetus and the placenta = 1

[1 Mark]

5. A colour blind boy is born to a couple with a normal colour vision. Write the genotype of the parents.

Ans Ans Father - XY , Mother -XX^C = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

SECTION - B

Q Nos. 6-10 are of two marks each

6. Name the first antibiotic discovered and by whom.

Ans Penicillin , Alexander Flemming = 1 +1

[2 Marks]

7. Mycorrhizal association exists between fungi (Glomus sp) and roots of higher plants. How is this association beneficial to each member ?

Ans The Glomus helps the plant in absorption of essential nutrients / phosphorus from the soil , and the plant in turn provide the fungus with energy yielding carbohydrate = 1 + 1

[2 Marks]

8. Explain the role played by predators in a community.

- Ans
- Predators act as conduits for energy transfer across trophic levels.
 - They keep prey population under control.
 - They help in maintaining species diversity in a community by reducing intensity of competition among competing prey species.
 - An efficient predator may cause extinction of prey species (Any two) = 1 + 1

[2 Marks]

9. What happens when chromatids fail to segregate during cell division cycle ? Explain your answer with an example.

Ans Failure of segregation of chromatids during cell division cycle results in the gain or loss of chromosome/ called aneuploidy = 1

E.g Down' syndrome results in the gain of extra copy of chromosome 21 /

Turner's syndrome results due to loss of an X-chromosome in human female = 1

OR

ABO blood groups is a good example of co-dominance. Justify.

Ans -ABO blood group in humans is contributed by gene 'I' that has 3 alleles 'I^A' 'I^B' and 'i.'

- Because human beings are diploid each person has two of the three alleles.

- I^A and I^B produce two different types of sugar while allele i does not produce sugar on the plasma membrane of RBC

- When I^A and I^B are present they both express their own type of sugar- this is codominance

= $\frac{1}{2} \times 4$

[2 Marks]

10. What is parthenogenesis ? Give two examples .

Ans A new organism develops from an unfertilised egg / without fertilization of an egg = 1

e.g Drones /turkey / Rotifers / some lizards (whiptail) (Any two) = $\frac{1}{2} + \frac{1}{2}$

[2 Marks]

SECTION - C

Q Nos. 11-22 are of three marks each

11. Explain with the help of two examples how certain plants have evolved morphological and chemical defenses against primary consumers such as cows and goats.

Ans - Thorns of *Acacia* / Cactus are morphological means of defence against cows & goats = 1

- Plants produce & store chemicals that make herbivore sick when they are eaten inhibit feeding or digestion and disrupt its reproduction or even kill it = 1

- *Calotropis* produces highly poisonous cardiac glycosides so cows and goats can never browse on these plants / Chemical substances like nicotine / caffeine / defences / strychnine / opium are actually defences against grazers & browsers = 1

[3 Marks]

12. Excessive and continuous use of pesticides has resulted in evolution of some new species of pests. Explain what must have led to this. What is this type of evolution called?

Ans Excessive use of pesticides has resulted in selection of resistant varieties in a much lesser time scale, as evolution is a stochastic process based on chance events in nature and chance mutation in organism = 1 + 1

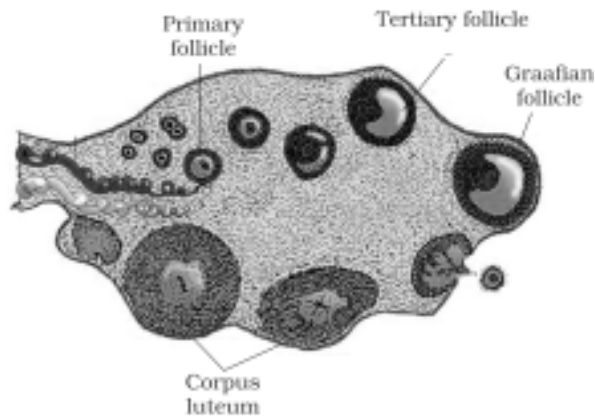
Evolution by anthropogenic action = 1

[3 Marks]

13. (a) Draw a diagram of a sectional view of human ovary and label (i) Primary follicle; (ii) Tertiary follicle; (iii) Graafian follicle and (iv) Corpus luteum.

Write the function of corpus luteum.

Ans



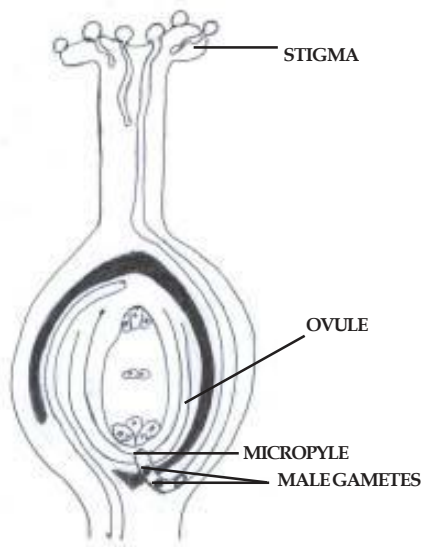
= $\frac{1}{2} \times 4$

- b) Secretes (large amounts of) progesterone, which is essential for maintenance of endometrium = $\frac{1}{2} \times 2$

OR

- (a) Draw a diagram of Pistil showing pollen tube growth in angiosperm and label (i) Stigma; (ii) male gametes; (iii) micropyle and (iv) Ovule.
 (b) Write the function of micropyle.

Ans (a)



= $\frac{1}{2} \times 4$

- (b) the pollen tube enters the ovule through micropyle, it facilitates the entry of oxygen and water for seed germination. = $\frac{1}{2} + \frac{1}{2}$

[3 Marks]

14. β -galactosidase enzyme site, is a preferred selectable marker in comparison to antibiotic resistant selectable marker in biotechnology experiments. Justify.

Ans When a gene of interest is inserted within the coding sequence of β -galactosidase enzyme (select-

able marker), if the recipient cell fails to develop blue colour in presence of a chromogenic substrate, it is an indicative of successful recombinant formation and presence of blue colour show no recombinants formed, whereas when an antibiotic resistant selectable markers are used it requires simultaneous plating of two different plates having different antibiotics, to differentiate between transformants from non-transformants and then select the transformants to identify the recombinants from them, which is a very time consuming and cumbersome process in comparison to the first one = $\frac{1}{2} \times 6$

15. Identify a, b, c, d, e and f in the following table :

Name of Enzyme/ Bioactive Molecule	Source	Functions
(i) a	Streptococcus	b
(ii) c	d	Immuno-suppressive agent in organ transplant patients
(iii) Statins	e	f

- Ans i) a) Streptokinase b) 'Clot buster' for removing clots from the blood vessels (of patients who have undergone myocardial infarction leading to heart attack) / clot buster enzyme
 ii) c) Cyclosporin A d) *Trichoderma polysporum*
 iii) e) *Monascus purpureus* (yeast)
 f) Blood cholesterol lowering agent.

[3 Marks]

16. Explain the following salient features of a DNA molecule :

- (a) Complimentarity of the base pairs of its two chains.
 (b) Anti-parallel polarity of the two chains.

- Ans (a) Complimentarity- Adenine (A), Guanine (G), Thymine (T) and Cytosine (C) are the four bases in a DNA molecule; 'A' always pairs with 'T' with the help of two hydrogen bonds; 'G' always pairs with 'C' with the help of three hydrogen bonds = $\frac{1}{2} \times 3$
 (b) It means if one chain has polarity $5' \rightarrow 3'$ the other has $3' \rightarrow 5'$, a polymer thus formed has at one end a free phosphate moiety at $5'$ of deoxyribose sugar ($5'$ end of the polynucleotide chain), at the other end of the polymer the deoxyribose sugar has a free $3' \text{ OH}$ ($3'$ end of polynucleotide chain) = $\frac{1}{2} \times 3$

17. Name the organism from which the 'cry' genes are isolated. Mention with the help of suitable example why and how bio-technologists have made use of 'cry' genes.

- Ans *Bacillus thuringiensis* = 1
 - Source of insecticidal (crystal) protein that control the cotton bollworms / corn borer = 1
 - Specific Bt toxin genes were isolated from *Bacillus thuringiensis*, incorporated into several crop plants such as cotton = $\frac{1}{2} \times 2$

[3 Marks]

18. The Indian Agricultural Research Institute has introduced several cereal and vegetable crops that are nutritionally rich in vitamins and minerals. What is this kind of breeding called? Write the main objectives with which such breeding programme is carried.

- Ans Biofortification = 1

Objectives : Improving -

- i) Protein content and quality
- ii) Oil content and quality
- iii) Micronutrient and mineral content
- iv) Vitamin content = $\frac{1}{2} \times 4$

19. What was the challenge for production of insulin using rDNA techniques ? How did Eli Lilly produce insulin using rDNA technology ?

Ans The challenge for production of insulin using r DNA technique was getting insulin assembled into a mature form = 1

- Prepared two DNA sequence corresponding to A and B chains of human insulin.
- introduced them in plasmids of *E.coli* to produce insulin chains.
- chains A and B were produced separately.
- extracted and combined by creating disulfide bonds to form human insulin = $\frac{1}{2} \times 4$

[3 Marks]

20. Write the aim with which animal breeding programmes are carried. Describe the essential steps to be followed in Poultry management.

Ans Aims - increasing the yield of animals , improving the desirable qualities of the produce = $\frac{1}{2} + \frac{1}{2}$

Steps to be followed in Poultry Management

- Selection of disease free and suitable breeds
- Proper and safe farm conditions
- Proper feed and water
- Proper hygiene and health care = $\frac{1}{2} \times 4$

[3 Marks]

21 What type of organs eye of an Octopus and that of a human called ? Give another example from the animal group and one from the plants of such organs. Name and explain the evolutionary process they exhibit.

Ans Analogous = 1

- Flippers of Penguins & Dolphins / Eye of octopus and mammals = $\frac{1}{2}$ (any other appropriate & correct example)
- Sweet potato (root modification) and potato (stem modification) = $\frac{1}{2}$

They are anatomically dissimilar structure though they perform similar function , convergent evolution = $\frac{1}{2} + \frac{1}{2}$

[3 Marks]

22. list any two types of IUDs that are available for human females and state their mode of action.

- Ans
- i) Non medicated IUDs = 1 , increase phagocytosis of sperms within the uterus = $\frac{1}{2}$
 - ii) Copper releasing IUDs = 1 , Cu ions suppress sperm motility and fertilising capacity of sperms = $\frac{1}{2}$
 - iii) Hormone releasing IUDs = 1 , make uterus unsuitable for implantation / makes cervix hostile to sperms = $\frac{1}{2}$

(Any two) ($1\frac{1}{2} + 1\frac{1}{2}$)

[3 Marks]

SECTION - D

Q Nos. 23 are of four marks each

23. With the revolution in information technology, now it has become an integral part of everybody's life, living in rural and urban India. You are asked to address the gathering of students of eco-clubs of your neighbourhood schools on generation and management of e-waste.

- (a) Write how e-waste is generated.**
- (b) Explain how would you address the awareness issue of e-waste management amongst the students.**
- (c) How have the developed countries exploited the developing countries with respect to e- waste managements ?**

Ans (a) irreparable computers / any other electronic good = 1

(b) Recycling is the only possible solution of e-waste management keeping in mind the safety measures to be adopted by the worker involved in the cycling of e- wastes , so as to avoid their exposure to the toxic substance present in the e- wastes = 1 + 1

(c) By exporting their e-waste to the developing countries / China / India / Pakistan = 1

[4 Marks]

SECTION - E

Q Nos. 24-26 are of five marks each

24. Skin colour in humans does not have distinct alternate forms but shows a whole range of possible variations in skin colour. Explain the pattern of inheritance of such a trait. What is this type of inheritance known as ? Provide another example of exhibiting such an inheritance pattern.

Skin colour is controlled by three genes; A,B,C dominant genes and a,b,c the recessive genes ; the effect of each type of allele is additive ; more the dominant allele, darker the skin colour; more the recessive allele lighter the skin colour ; when three dominant alleles and three recessive alleles

are present in an individual the skin colour is intermediate = $\frac{1}{2} \times 6$

- Polygenic inheritance =1

- Human Height /or any other correct example =1

OR

Explain the process of transcription in a prokaryote

Ans DNA dependent RNA polymerase ; binds to the promoter site (of DNA) ; to initiate transcription; it uses nucleoside triphosphate / nucleotides as substrates; polymerises in a template dependant fashion; following the rule of complementarity.

DNA dependent RNA polymerase is only capable of catalysing elongation process; it associates temporarily with initiation factor (σ) / to initiate transcription ; and with termination factor (ρ) to terminate transcription, once the polymerase reaches terminator region the nascent RNA falls off so also the RNA polymerase from DNA template thus completing transcription. = $\frac{1}{2} \times 10 = 5$

- 25. (a) Write the percentage of land area that was covered by forests by the end of the last century.**
- (b) Describe any two practices that led to deforestation.**
 - (c) State the consequences of deforestation.**

(d) **Suggest a method to overcome deforestation.**

- Ans (a) $19.4\% = \frac{1}{2}$
 (b) -Trees are axed for timber / firewood / land for industrial requirement
 -Slash and burn agriculture
 - habitat loss and fragmentation- clearing of forest land into grass land for raising cattle
 (Any two)= 1+1
 (c) -Deterioration of our environment in terms of air - water and soil quality.
 -causes loss of bio diversity
 - disturbance in hydrological cycle / biogeochemical cycle
 (Any two) = 1 + 1
 (d) Reforestation or any other appropriate alternative = $\frac{1}{2}$

[5Marks]

OR

- (a) **Comment on the pattern in which all communities undergo a change in composition and structure with changing environmental conditions.**
 (b) **Explain 'Climax community' and 'sere'.**
 (c) **Differentiate between primary and secondary succession with examples.**

- Ans (a) Orderly and sequential changes parallel with changes in physical environment =1
 (b) climax community-changes finally lead to a community that is in equilibrium with environment =1
 Sere-the entire sequence of communities that successively change in a given area =1
 (c) **Primary succession** **Secondary succession**
 (i) occurs in newly cooled lava / occurs in abandoned / destroyed forest
 bare rock / newly created pond.
 (ii) Slow process **Fast Process**

$\frac{1}{2} \times 4 = 2$
 [5Marks]

- 26 (a) Explain the steps involved in *in vitro* fertilisation popularly known as test tube baby programme.**
(b) State the importance of this programme.

- Ans (a) i) Ova from wife / donor and sperms from husband / donor are collected
 ii) They are induced to form zygote under simulated conditions (in the labortory)
 iii) The zygote or early embryos upto 8 blastomeres could then be transferred to fallopian tube /ZIFT
 iv) Embryos more than 8 blastomeres, into the uterus / IUT/ Intra uterin transfer = 1×4
 (b) Allows couples to bear children who were unable to do so naturally = 1

[4+1=5]

OR

- (a) **State one difference and one similarity between geitonogamy and xenogamy.**
 (b) **Explain any three devices developed in flowering plants to discourage self pollination and encourage cross pollination.**

- Ans (a) Difference- In geitonogamy pollen grains from one flower are transferred to the stigma of another flower on the same plant whereas in xenogamy the pollen grains are transferred to the stigma of a flower on another plant(of the same species) genetically similar , genetically

different

Similarity -In both types of pollination pollen grains from the anther are transferred to the stigma of another flower of the same species =1

- (b) - Pollen release & stigma receptivity not synchronised / hence the maturity of stigma and pollen are different /Protandry / Protogyny
- Anther and Stigma are placed at different positions so that pollen cannot come in contact with stigma of the same flower.
- Self incompatibility/ Self sterility.
- Production of unisexual flowers (Any three) = 1 × 3

[5Marks]

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