Series OSR

कोड नं. **57/3**
Code No.

रोल नं.
Roll No.

परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।

Candidates must write the Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **12** 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 **30** 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 **12** 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 **30** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minutes 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 घण्टे *अधिकतम अंक : 70*

Time allowed : 3 hours *Maximum Marks : 70*

सामान्य निर्देश :

(i) ***सभी*** *प्रश्न अनिवार्य हैं ।*

(ii) *इस प्रश्न-पत्र में चार खण्ड* ***A, B, C*** *और* ***D*** *हैं । खण्ड* ***A*** *में* ***8*** *प्रश्न हैं जिनमें प्रत्येक का* ***एक*** *अंक है, खण्ड* ***B*** *में* ***10*** *प्रश्न हैं जिनमें प्रत्येक के* ***दो*** *अंक हैं, खण्ड* ***C*** *में* ***9*** *प्रश्न हैं जिनमें प्रत्येक के* ***तीन*** *अंक हैं तथा खण्ड* ***D*** *में* ***3*** *प्रश्न हैं जिनमें प्रत्येक के* ***पाँच*** *अंक हैं ।*

(iii) *कोई समग्र चयन-विकल्प (ओवरऑल चॉइस) उपलब्ध नहीं है । फिर भी,* ***2*** *अंकों वाले एक प्रश्न में,* ***3*** *अंकों वाले एक प्रश्न में और* ***5*** *अंकों वाले सभी तीनों प्रश्नों में भीतरी चयन-विकल्प दिए गए हैं । ऐसे प्रश्नों में विद्यार्थी को केवल एक ही विकल्प का उत्तर देना है ।*

(iv) *जहाँ भी आवश्यक हो, बनाए जाने वाले आरेख साफ़-सुथरे तथा समुचित रूप में नामांकित हों ।*

General Instructions :

(i) ***All*** *questions are compulsory.*

(ii) *This question paper consists of four Sections* ***A, B, C*** *and* ***D****. Section* ***A*** *contains* ***8*** *questions of* ***one*** *mark each, Section* ***B*** *is of* ***10*** *questions of* ***two*** *marks each, Section* ***C*** *is of* ***9*** *questions of* ***three*** *marks each and Section* ***D*** *is of* ***3*** *questions of* ***five*** *marks each.*

(iii) *There is no overall choice. However, an internal choice has been provided in one question of* ***2*** *marks, one question of* ***3*** *marks and all the three questions of* ***5*** *marks weightage. A student has to attempt only one of the alternatives in such questions.*

(iv) *Wherever necessary, the diagrams drawn should be neat and properly labelled.*

खण्ड A

SECTION A

1. किसी विजातीय DNA के लिए ऐसा क्यों संभव नहीं है कि वह क्रोमोसोम की लंबाई में किसी भी जगह पर उसका ही अंश बन जाए और सामान्य रूप से प्रतिकृतियन करता रहे ? *1*

Why is it not possible for an alien DNA to become part of a chromosome anywhere along its length and replicate normally ?

2. कोशिका-विभाजन की उस अवस्था का नाम लिखिए जिसमें क्रोमोसोमों के एक स्वतंत्र जोड़े का पृथक्करण होता है । *1*

Name the stage of cell division where segregation of an independent pair of chromosomes occurs.

3. प्राणी एवं मानव पोषण के लिए प्रोटीन का एक वैकल्पिक स्रोत लिखिए । *1*

Write an alternate source of protein for animal and human nutrition.

4. एक ऐसे पौधे का उदाहरण दीजिए जो भारत में एक संदूषक के रूप में आया और पराग ऐलर्जी का कारण है । *1*

Give an example of a plant which came into India as a contaminant and is a cause of pollen allergy.

5. उस साहचर्य-प्ररूप का नाम लिखिए जो जीनस *ग्लोमस* उच्चतर पौधों के साथ होता दर्शाती है । *1*

Name the type of association that the genus *Glomus* exhibits with higher plants.

6. गॉसे का प्रतिस्पर्धात्मक अपवर्जन सिद्धांत बताइए । *1*

State Gause's Competitive Exclusion Principle.

7. पुनर्योगज DNA प्रौद्योगिकी के लिए जीवाण्वीय (बैक्टीरियल) तथा कवकीय कोशिकाओं में DNA के पृथक्करण में इस्तेमाल किए जाने वाले एंज़ाइमों के नाम लिखिए । *1*

Name the enzymes that are used for the isolation of DNA from bacterial and fungal cells for recombinant DNA technology.

8. मानव इन्सुलिन में C पेप्टाइड की भूमिका बताइए । *1*

State the role of C peptide in human insulin.

खण्ड B

SECTION B

9. फल-मक्खी का वैज्ञानिक नाम लिखिए । मॉर्गन ने अपने प्रयोगों में फल-मक्खियों का ही क्यों उपयोग किया ? कोई तीन कारण लिखिए । *2*

अथवा

जीनों की सहलग्नता एवं उनका विनिमय एक-दूसरे के विकल्पी हैं । एक उदाहरण की सहायता से इस कथन को न्यायसंगत कीजिए ।

Write the scientific name of the fruit-fly. Why did Morgan prefer to work with fruit-flies for his experiments ? State any three reasons.

OR

Linkage and crossing-over of genes are alternatives of each other. Justify with the help of an example.

10. ऐस्केरिसता (ऐस्केरिएसिस) के रोगलक्षणों की सूची बनाइए । किसी स्वस्थ व्यक्ति में यह संक्रमण किस प्रकार पहुँचता है ? *2*

List the symptoms of Ascariasis. How does a healthy person acquire this infection ?

11. किसी पारिस्थितिकी संवेदनशील क्षेत्र में जीनस *न्यूक्लिओपॉलिहेड्रोवाइरस* की महत्त्वपूर्ण भूमिका समझाइए । *2*

Explain the significant role of the genus *Nucleopolyhedrovirus* in an ecological sensitive area.

12. एक ऐसा आयु पिरैमिड बनाइए जिसमें मानव जनसंख्या की प्रसरणशील वृद्धि की स्थिति प्रदर्शित होती हो । *2*

Construct an age pyramid which reflects an expanding growth status of human population.

13. अंजीर के वृक्ष और ततैये के बीच परस्पर संबंध का वर्णन कीजिए और उस परिघटना पर टिप्पणी कीजिए जो उनके संबंध में कार्य करती है । *2*

Describe the mutual relationship between fig tree and wasp and comment on the phenomenon that operates in their relationship.

14. पारजीनी प्राणी निम्नलिखित के विषय में किस प्रकार लाभकारी सिद्ध हुए हैं : *2*

(a) जैविकीय उत्पादों के उत्पादन

(b) रासायनिक सुरक्षा परीक्षण

How have transgenic animals proved to be beneficial in :

(a) Production of biological products

(b) Chemical safety testing

15. रेस्ट्रिक्शन (प्रतिबंधन) न्यूक्लिएज़ किस प्रकार कार्य करता है ? समझाइए । *2*

How does a restriction nuclease function ? Explain.

16. उन दो कारकों के विषय में समझाइए जो DNA की दोहरी कुंडलिनी संरचना स्थिर बनाए रखने के लिए उत्तरदायी हैं । *2*

Explain the two factors responsible for conferring stability to double helix structure of DNA.

17. स्नैपड्रैगन में, जब यथार्थ प्रजननकारी लाल फूल (RR) वाले पौधों का यथार्थ प्रजननकारी सफ़ेद फूल (rr) वाले पौधों के साथ संकरण कराया गया तो उनकी संतानें ऐसे पौधे बने जिनमें सभी फूल गुलाबी रंग के थे । *2*

(a) गुलाबी फूलों का प्रकट होना सम्मिश्रण नहीं कहलाता । ऐसा क्यों ?

(b) इस परिघटना को किस नाम से जाना जाता है ?

In Snapdragon, a cross between true-breeding red flowered (RR) plants and true-breeding white flowered (rr) plants showed a progeny of plants with all pink flowers.

(a) The appearance of pink flowers is not known as blending. Why ?

(b) What is this phenomenon known as ?

18. एक परिपक्व ग्राफ़ियन पुटक पर L.H. के उच्च सांद्रण से क्या प्रभाव पड़ता है, लिखिए । *2*

Write the effect of the high concentration of L.H. on a mature Graafian follicle.

खण्ड C

SECTION C

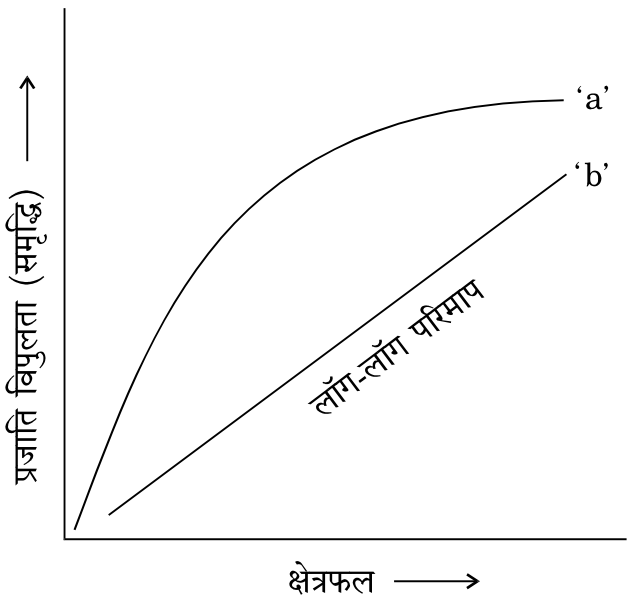
19. पोषण-चक्र में कुण्ड का क्या कार्य होता है, लिखिए । प्रकृति में कार्बन-चक्र का सरलीकृत मॉडल समझाइए । *3*

State the function of a reservoir in a nutrient cycle. Explain the simplified model of carbon cycle in nature.

20. उस तकनीक का नाम लिखिए एवं उसका वर्णन कीजिए जिसके द्वारा उन DNA खण्डों को पृथक् करने में सहायता मिलती है जो रेस्ट्रिक्शन (प्रतिबंधन) एंडोन्यूक्लिएज़ का उपयोग करके बनते हैं । *3*

Name and describe the technique that helps in separating the DNA fragments formed by the use of restriction endonuclease.

21. नीचे दिए जा रहे ग्राफ़ में प्रजाति – क्षेत्रफल संबंध दिखाया गया है । उसके आगे पूछे जा रहे प्रश्नों के निर्देशानुसार उत्तर दीजिए । *3*



(a) उस प्रकृति-वैज्ञानिक का नाम लिखिए जिसने ग्राफ़ में दर्शाए गए संबंध के प्रकार का अध्ययन किया था । उसके द्वारा किए गए प्रेक्षण लिखिए ।

(b) पारिस्थितिकी-विशेषज्ञों द्वारा खोजी गई तब की वे स्थितियाँ लिखिए जब 'Z' का मान (रेखा का ढलान) रहता है

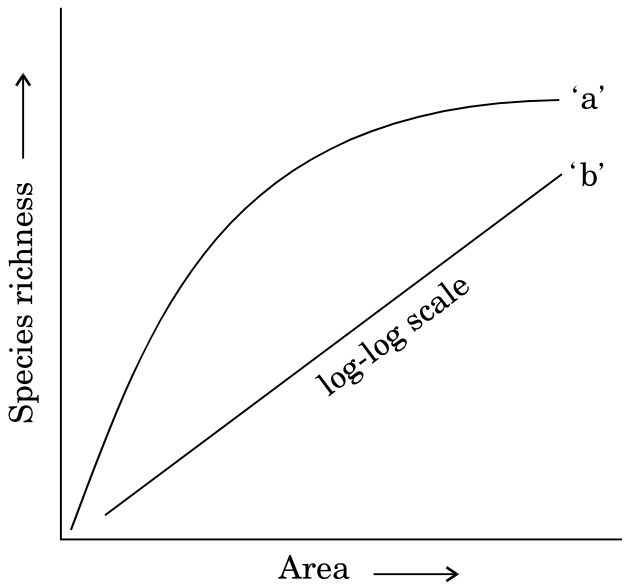
(i) 0·1 तथा 0·2 के बीच

(ii) 0·6 तथा 1·2 के बीच

'Z' क्या व्यक्त करता है ?

(c) रेखा 'b' का ढलान कब दुरारोही बन जाएगा ?

The following graph shows the species – area relationship. Answer the following questions as directed.



(a) Name the naturalist who studied the kind of relationship shown in the graph. Write the observations made by him.

(b) Write the situations as discovered by the ecologists when the value of 'Z' (slope of the line) lies between

(i) 0·1 and 0·2

(ii) 0·6 and 1·2

What does 'Z' stand for ?

(c) When would the slope of the line 'b' become steeper ?

22. आपके स्कूल के सामुदायिक सेवा विभाग ने स्कूल के पास वाले एक गंदी बस्ती क्षेत्र के निरीक्षण की योजना बनाई जिसका उद्देश्य था वहाँ के निवासियों को स्वास्थ्य एवं स्वास्थ्य-रक्षा के विषय में प्रशिक्षित करना । *3*

(a) ऐसी मुलाक़ातों के गठन करने की क्यों आवश्यकता है ?

(b) उन कदमों के विषय में लिखिए जो आप इस विभाग के एक सदस्य के रूप में उनके साथ बातचीत में उठाएँगें ताकि वे एक स्वस्थ जीवन चला सकें ।

Community Service department of your school plans a visit to a slum area near the school with an objective to educate the slum dwellers with respect to health and hygiene.

(a) Why is there a need to organise such visits ?

(b) Write the steps you will highlight, as a member of this department, in your interaction with them to enable them to lead a healthy life.

23. नीचे दी जा रही सारणी में 'a', 'b', 'c', 'd', 'e' तथा 'f' क्या हैं, पहचानिए : *3*

संख्या	सिंड्रोम	कारण	प्रभावित व्यष्टियों की विशिष्टताएँ	लिंग नर/मादा/दोनों
1.	डाऊन	21 की त्रिसूत्रता	'a' (i) (ii)	'b'
2.	'c'	XXY	कुल मिलाकर पुंजातीय परिवर्धन	'd'
3.	टर्नर	45 और XO	'e' (i) (ii)	'f'

Identify 'a', 'b', 'c', 'd', 'e' and 'f' in the table given below :

No.	Syndrome	Cause	Characteristics of affected individuals	Sex Male/Female/Both
1.	Down's	Trisomy of 21	'a' (i) (ii)	'b'
2.	'c'	XXY	Overall masculine development	'd'
3.	Turner's	45 with XO	'e' (i) (ii)	'f'

24. (a) एक उपयुक्त उदाहरण की सहायता से अनुकूली विकिरण को समझाइए ।

(b) एक ऐसा उदाहरण दीजिए जिसमें किसी पृथक्कृत भौगोलिक क्षेत्र में एक से अधिक अनुकूली विकिरण हुए हों । आपके दिए गए उदाहरण में दर्शाया गया विकास प्ररूप कौन-सा है, नाम लिखिए और बताइए यह नाम क्यों दिया गया । *3*

(a) Explain adaptive radiation with the help of a suitable example.

(b) Cite an example where more than one adaptive radiations have occurred in an isolated geographical area. Name the type of evolution your example depicts and state why it is so named.

25. (a) ऐसे किन्हीं दो IUDs के नाम लिखिए जिनसे ताम्र का विमोचन होता है ।

(b) मानव मादाओं में ये किस प्रकार प्रभावकारी गर्भनिरोधकों का काम करते हैं, समझाइए । *3*

(a) Name any two copper releasing IUDs.

(b) Explain how do they act as effective contraceptives in human females.

26. ऐसी किन्हीं तीन बहि:प्रजनन युक्तियों की सूची बनाइए जो पुष्पी पौधों में विकसित हुई हैं और समझाइए कि वे पर-परागण को किस प्रकार प्रोत्साहित करने में मदद करती हैं । *3*

अथवा

आवृतबीजी के परागकोशों को द्विकोष्ठी क्यों कहा जाता है ? इसकी लघुबीजाणुधानी की संरचना का वर्णन कीजिए ।

Make a list of any three outbreeding devices that flowering plants have developed and explain how they help to encourage cross-pollination.

OR

Why are angiosperm anthers called dithecous ? Describe the structure of its microsporangium.

27. (a) जीवधारियों में स्थिर आंतरिक पर्यावरण उनके लिए किस प्रकार लाभकारी होता है, लिखिए ।

(b) ऐसे कोई दो विकल्प समझाइए जिनके द्वारा जीवधारी तनावपूर्ण बाहरी दशाओं का असर नहीं होने देते । *3*

(a) State how the constant internal environment is beneficial to organisms.

(b) Explain any two alternatives by which organisms can overcome stressful external conditions.

खण्ड D

SECTION D

28. वाहित-मल जल उपचार की प्रक्रिया समझाइए जो उसे प्राकृतिक जल पिंडों में छोड़ने से पहले की जाती है । यह उपचार क्यों अनिवार्य है ? *5*

अथवा

किसी रेट्रोवायरस के मानव शरीर में प्रवेश कर जाने के बाद उसकी प्रतिकृति की प्रक्रिया समझाइए ।

Explain the process of sewage water treatment before it can be discharged into natural water bodies. Why is this treatment essential ?

OR

Explain the process of replication of a retrovirus after it gains entry into the human body.

29. (a) मानवों में निषेचन कहाँ होता है ? इस प्रक्रिया में होने वाली घटनाएँ समझाइए ।

(b) एक ऐसा युगल जिसमें पति और पत्नी दोनों में ही कार्यशील युग्मक बन रहे हैं, फिर भी पत्नी गर्भवती नहीं हो रही, चिकित्सीय सहायता तलाश रहा है । किसी एक ऐसी विधि का वर्णन कीजिए जिसे आप उस युगल को सुझा सकते हैं, ताकि वे सुखी माता-पिता बन सकें । *5*

अथवा

(a) असंगजननिक बीजों के विकसित होने के विभिन्न तरीके समझाइए । प्रत्येक का एक-एक उदाहरण दीजिए ।

(b) असंगजननिक बीजों से किसानों को मिलने वाला एक लाभ बताइए ।

(c) किसी एक द्विबीजपत्री भ्रूण की परिपक्व अवस्था का नामांकित आरेख बनाइए ।

(a) Where does fertilization occur in humans ? Explain the events that occur during this process.

(b) A couple where both husband and wife are producing functional gametes, but the wife is still unable to conceive, is seeking medical aid. Describe any one method that you can suggest to this couple to become happy parents.

OR

(a) Explain the different ways apomictic seeds can develop. Give an example of each.

(b) Mention one advantage of apomictic seeds to farmers.

(c) Draw a labelled mature stage of a dicotyledonous embryo.

30. (a) ग्रिफ़िथ के उस प्रयोग के विभिन्न चरणों का वर्णन कीजिए जिसके द्वारा 'रूपांतरणकारी सिद्धांत' का निष्कर्ष निकला था ।

(b) 'रूपांतरणकारी सिद्धांत' की रासायनिक प्रकृति किस प्रकार स्थापित हुई थी ? *5*

अथवा

ई.कोलाई में प्रेरक की उपस्थिति एवं अनुपस्थिति, दोनों दशाओं में *लैक* ओपेरॉन किस प्रकार कार्य करता है, वर्णन कीजिए ।

(a) Describe the various steps of Griffith's experiment that led to the conclusion of the 'Transforming Principle'.

(b) How did the chemical nature of the 'Transforming Principle' get established ?

OR

Describe how the *lac* operon operates, both in the presence and absence of an inducer in *E.coli*.

Question Paper Code 57/3

BIOLOGY (THEORY)

SECTION A

1. Why is it not possible for an alien DNA to become part of a chromosome anywhere along its length and replicate normally?

Ans. Alien DNA must be linked to ori / origin of replication / site to start replication.

[1 mark]

2. Name the stage of cell division where segregation of an independent pair of chromosomes occurs.

Ans. Anaphase-1 of Meiosis -1 / Anaphase -1.

[1 mark]

3. Write an alternate source of protein for animal and human nutrition.

Ans. Single cell protein / Spirulina.

[1 mark]

4. Give an example of a plant which came into India as a contaminant and is a cause of pollen allergy.

Ans. Parthenium / Carrot grass.

[1 mark]

5. Name the type of association that the genus Glomus exhibits with higher plants.

Ans. Symbiosis / Mycorrhizae / Mutualism.

[1 mark]

6. State Gause's Competitive Exclusion Principle.

Ans. Two closely related species competing for same resources, cannot coexist indefinitely (the inferior will be eliminated).

[1 mark]

7. Name the enzymes that are used for the isolation of DNA from bacterial and fungal cells for recombinant DNA technology.

Ans. Bacteria: lysozyme = ½, fungi: chitinase = ½

[1 mark]

8. State the role of C peptide in human insulin.

Ans. C-peptide (extra stretch of polypeptide) which makes the insulin inactive / proinsulin is inactive because it contain C-peptide.

SECTION B

9. Write the scientific name of the fruit-fly. Why did morgan prefer to work with fruit-flies for his experiments? State any three reasons.

Ans. *Drosophila melanogaster* = ½

Grown in simple synthetic medium, complete the life cycle in two weeks / short life cycle, single mating produce more progeny , dimorphism, many heritable variations / easy to handle.

(any three) = 1½

[2 marks]

OR

Linkage or crossing-over of genes are alternatives of each other. Justify with the help of an example.

Ans. In Drosophila a yellow bodied white eyed female was crossed with brown bodied red eyed male, F_1 progeny produced and intercrossed the F_2 phenotypic ratio of Drosophila deviated significantly from Mendel's 9:3:3:1, the genes for eye colour & body colour are closely located on the 'X' chromosome showing linkage & therefore inherited together, recombinants were formed due to crossing over but at low percentage. = ½×4

[2 marks]

10. List the symptoms of Ascariasis. How does a healthy person acquire this infection?

Ans. Internal bleeding, muscular pain, anaemia, blockage of intestinal passage.

(any three) = 1½

Intake of water, vegetables / fruits / foods contaminated with eggs of the parasite. = ½

[2 marks]

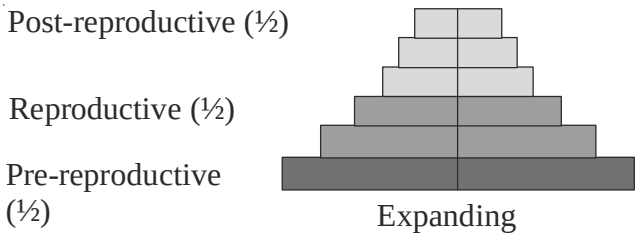
11. Explain the significant role of the genus Nucleopolyhedrovirus in an ecologicalsensitive area.

Ans. Species specific, narrow spectrum , insecticidal application (IPM), no negative impact on plants / mammals / birds / fish / even non target insects. = ½×4

[2 marks]

12. Construct an age pyramid which reflects an expending growth status of human population.

Ans.



Construction of Pyramid = ½

[2 marks]

13. Describe the mutual relationship between fig tree and wasp and comment on the phenomenon that operates in their relationship.

Ans. Wasp - helps in pollination / pollinator (specific)

Oviposition / seeds and ovules used for nourishing larva.

(any two) = ½+½

Co evolution exists between their close specific tight relationship. = 1

[2 marks]

14. How have transgenic animals proved to be beneficial in:

(a) Production of biological products

(b) Chemical safety testing

Ans. a) (Rosie - transgenic cow) produced human protein / alpha lactalbumin enriched milk, alpha-1 antitrypsin used to treat emphysema. = ½+½

b) (Toxicity Testing) - more sensitive to toxic substances, results obtained in less time. =½+½

[2 marks]

15. How does a restriction nuclease function? Explain.

Ans. Restriction nuclease cut DNA at specific sites = 1

exonuclease cuts DNA at the ends, endonuclease cuts at specific position within DNA. /

Restriction endonuclease cuts the DNA at specific pallindromic sequence. = ½+½

[2 marks]

16. Explain the two factors responsible for conferring stability to double helix structure of DNA.

Ans. Presence of H-bonds, the plane of one base pair stacks over the other, complementarity, presence of thymine in place of uracil.

(any two) = 1+ 1

[2 marks]

17. In Snapdragon, A cross between true breeding red flower (RR) plants and true breeding white flower (rr) plants showed a Progeny of plants with all pink flowers.

(a) The appearance of pink flowers is not know as blending. Why?

(b) What is the phenomenon known as?

Ans. (a) R (dominant allele red colour) is not completely dominant over r (recessive allele white colour) / r maintains its originality and reappear in F_2 generation. = 1

(b) Incomplete dominance = 1

[2 marks]

18. Write the effect of the high concentration of L.H. on a mature graafian follicle.

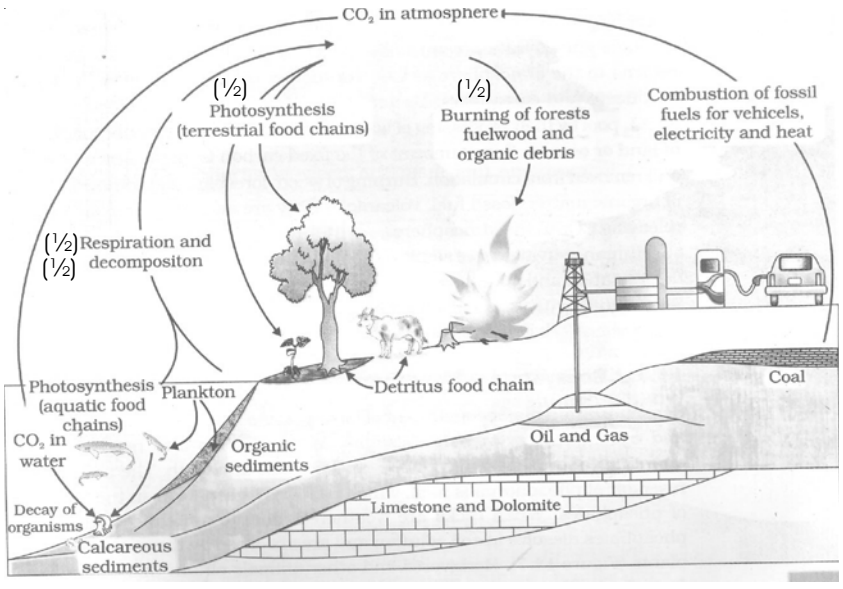
Ans. Rupture of graffian follicle, release of ovum / secondary oocyte / ovulation = 1+1

[2 marks]

SECTION C

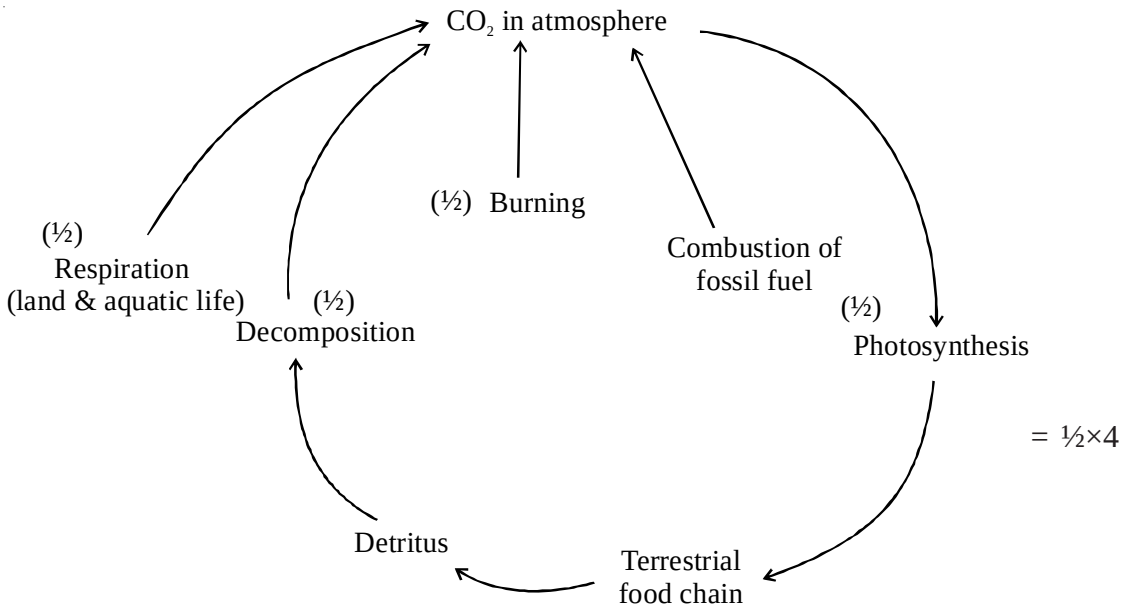
19. State the function of a reservoir in a nutrient cycle. Explain the simplified model of carbon cycle in nature.

Ans. Function : To meet the deficit which occurs due to imbalance in the rate of influx & efflux. =1



= ½×4

//



= ½×4

Carbon-cycle in Biosphere

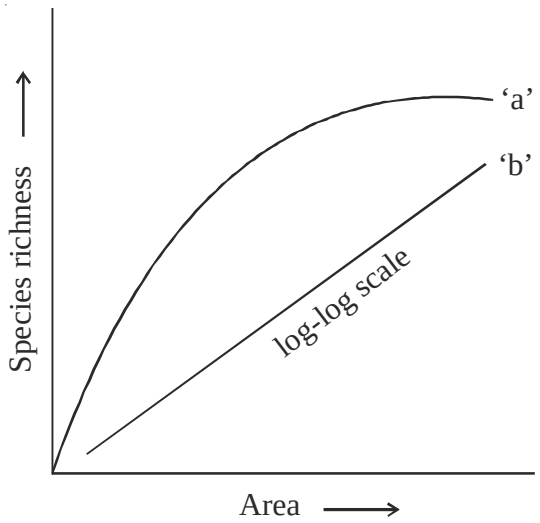
20. Name and describe the technique that helps in separating the DNA fragments formed by the use of restriction endonuclease.

Ans. Gel electrophoresis = ½,

DNA are -vely charged, forced to move towards anode, electric field in agarose gel matrix, separate according to their size / sieving effect, smaller fragments moves faster and further than the larger. = ½×5

[3 marks]

21. The following graph shows the species-area relationship.Answer the following question as directed.



(a) Name the naturalist who studied the kind of relationship shown in the graph. Write the observation made by him.

(b) Write the situations as discovered by the ecologists when the value of 'Z' (slope

of the line) lies

(i) 0.1 and 0.2

(ii) 0.6 and 1.2

What does 'Z' stand for?

(c) When would the slope of the line 'b' become steeper?

Ans. a) Alexander Von Humboldt. = ½

Within a region species richness increased with increasing explored area but only up to a limit. = ½

b) i. the slopes of regression lines are similar / unaffected distribution in an area / normal range = ½

ii. the slope of regression is steeper when we analyse the species area relationship among very large areas like entire continent = ½

Z (slope of the line) regression co-efficient = ½

c) If species richness is more / 0.62 - 1.2 = ½

[½ x 6 = 3 marks]

22. Community Service department of your school plans a visit to a slum area near the school with an objective to educate the slum dwellers with respect to health and hygiene.

(a) Why is there a need to organize such visits?

(b) Write the steps you will highlight,as a member of this department, in your interaction with them to enable them to lead a healthy life.

Ans. (i) To create awareness about disease and their effects on the body / about immunization / health and hygiene. = 1

(ii) Disposal of waste

Control of Vectors

Hygienic food and water / fresh drinking water /

Balanced diet / Regular exercise / Yoga

(any four) = ½×4=2 [1+2=3 marks]

23. Identify 'a', 'b', 'c', 'd', 'e' and 'f' in the table given below :

No.	Syndrome	Cause	Characreristics of affected individual	Sex Male/Female/Both
1	Down's	Trisomy of 21	'a' (i) (ii)	'b'
2	'c'	XXY	Overall masculine development	'd'
3	Turner's	45 with OX	'e' (i) (ii)	'f'

Ans. a. short statured / small round head / furrowed tongue / partially open mouth / palm is broad / physical development retarded / psychomotor development retarded / mental development retarded .

(any two) = ½

b. both / male and female = ½

c. klinefelter's syndrome = ½

d. male = ½

e. sterile ovaries / rudimentary ovaries, lack of secondary sexual characters. = ½

f. female= ½

[½×6= 3 marks]

24. (a) Explain adaptive radiation with the help of a suitable example.

(b) Cite an example where more than one adaptive radiation have occurred in an isolated geographical area. Name the type of evolution your example depicts and state why it is so named.

Ans. (a) Darwin finches / black birds (on Galapagos islands), evolved from original seed eating features, into insectivorous & vegetarian features in different habitat / islands. = ½×3=1½

(b) Australian marsupials and placental mammals. = ½

Convergent evolution, more than one adaptive radiation occured in isolated geographical area. =½+½

[3 marks]

25. (a) Name of two copper releasing IUDs.

(b) Explain how do they act as effective contraceptives in human females.

Ans. (a) Intra Uterine Devices - CuT, Cu7, Multiload 375

(any two) = ½+½

(b) Supress sperm motility, supress fertilizing capacity of sperms, increase phagocytosis of sperms within utreus.

(any two) = 1+1 [3 marks]

26. Make a list of any three out breeding devices that flowering plants have developed and explain how they help to encourage cross-pollination.

Ans. (i) Time of pollen release and stigma receptivity are different (not synchronized), self pollination prevented.

(ii) Anther & stigma are placed at different positions, so the pollen can not come in contact with the stigma of the same flower.

(iii) Self incompatibility, genetic mechanism (prevent the pollen germination on the stigma of the same flower)

(iv) Production of unisexual flowers / dioecious plants, cross pollination ensured.

(any three) = (½ x 6)

[3 marks]

OR

Why are angiosperm anthers called dithecous? Describe the structure of its microsporangium.

Ans. • Anther bilobed, each lobe of anther has two theca. = ½+½

• Microsporangium surrounded by four wall layers / epidermis, endothecium, middle layer and tapetum. = 1

• In young anther a group of compactly arranged homogenous cells called sporogenous tissue occupies the centre of each microsporangium which produce microspores / pollen grains. = 1

[3 marks]

27. (a) State how the constant internal environment is beneficial to organisms

(b) Explain any two alternatives by which organisms can overcome stressful external conditions.

Ans. (a) Permits all biochemical reactions to proceeds with maximal efficiency, enhances fitness of species. = ½+½

(b) i. Regulation, Maintaining internal environment by maintaining constant body temperature / osmotic concentration. = ½+½

ii. Suspend (conform), By suspending metabolic activities through hibernation / aestivation / diapause. = ½+½

iii. Migration, Organisms migrate temporarily to more hospitable areas. = ½+½

(any two) = ½×4=2 [3 marks]

SECTION D

28. Explain the process of sewage water treatment before it can be discharge into natural water bodies. Why is this treatment essential?

Ans. Primary treatment - physical removal of particles, filtration / sequential filtration for floating debris, sedmentation for grit / soil & small pebbles, settled solids form Primary sludge and Supernatant forms is effluent. = ½×4=2

Secondary treatment / Biological treatment – Effluent passed in aeration tank and agitated mechanically, air is pumped, vigrous growth of aerobic microbes consuming organic matter, BOD reduced. = ½×4

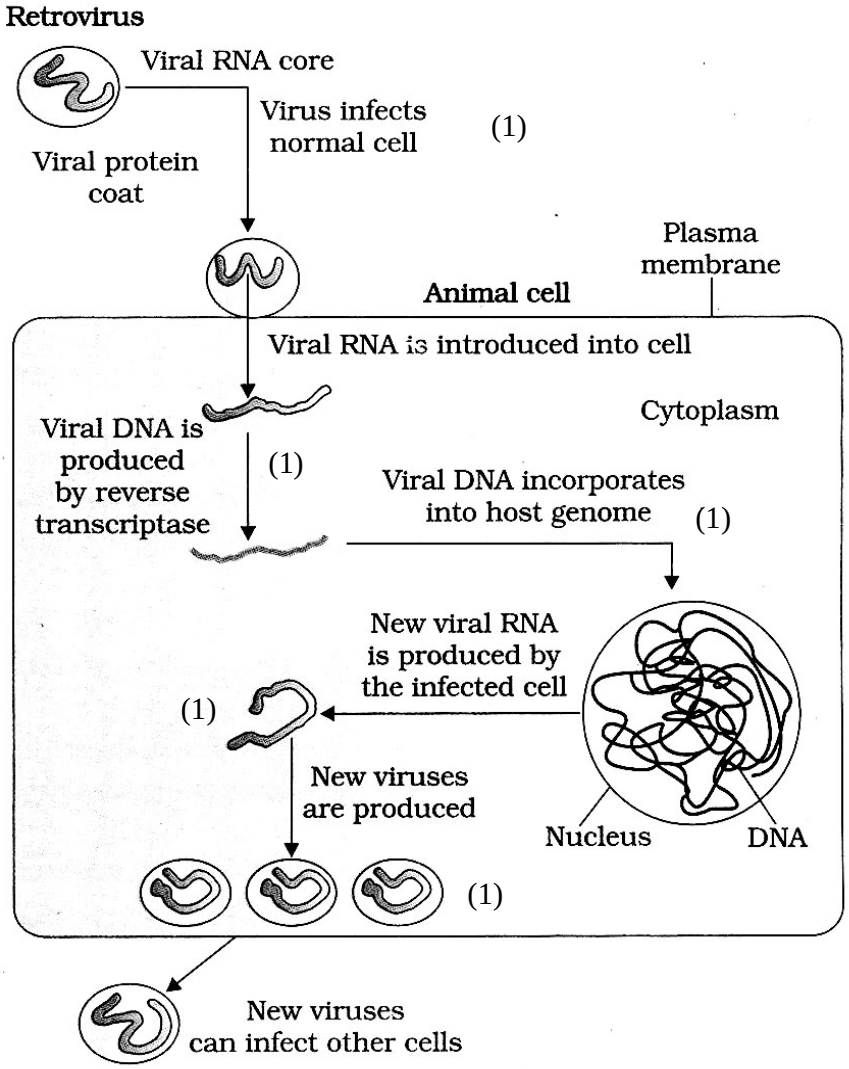
Essential to control pollution in natural water bodies, to check water borne diseases / pathogenic organism. =½+½

[5 marks]

OR

Explain the process of replication of a retrovirus after it gains entry into the human body.

Ans.



[5 marks]

//

Virus enters and infect the normal cell, viral RNA forms viral DNA with the enzyme reverse transcriptase, viral DNA incorporates into host genome, new viral RNA is produced by the infected cell, new viruses are produced which infect other cells. = 1×5

[5 marks]

29. (a) Where does fertilization occur in humans? Explain the events that occur during this process

(b) A couple where both husband and wife are producing functional gametes, but the wife is still unable to conceive, is seeking medical aid. Describe any one method that you can suggest to this couple to become happy parents.

Ans. a) i. Ampullary Isthmic junction in fallopian tube / fallopian tube = ½

ii. The sperms come in contact with zona pellucida = ½

iii. Induces change in the membrane = ½

iv. Blocks entry of other sperms / ensures only one sperm fertilizes the ovum / prevents polyspermy. = ½

v. The secretion of acrosome helps the sperm to enter the cytoplasm = ½

vi. Entry of sperm induces completion of second meiotic division forming ovum and 2nd polar body = ½

vii. The haploid nucleus of Sperm and that of ovum fuses = ½

viii. Formation of diploid Zygote, fertilisation completed. = ½ (½×8=4)

b) Methods IVF / ZIFT / AI = ½

IVF : Ova from wife and sperm from the husband is collected

It is induced to formed zygote under laboratory conditions = ½

//

ZIFT : Zygote or early embryo are then transferred to the fallopian tube (ZIFT) or into uterus (IUT) to complete further development = ½

//

AI : Semen collected from the husband is artificially introduced either into the vagina or into the uterus (IUI) of the wife = ½

[5 marks]

OR

(a) Explain the different ways spomictic seeds can develop. Give an example of each.

(b) Mention one advantage of apomictic seeds to farmers.

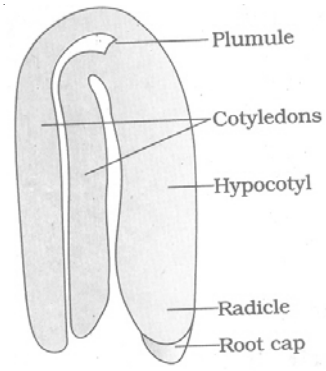
(c) Draw a labeled mature stage of a dicotyledonous embryo.

Ans. (a) (i) Diploid egg cell is formed without reduction division and develops into embryo without fertilisation, eg. *Asteraceae* / grasses. = ½+½

(ii) In citrus / mango, some of the diploid nucellar cells surrounding the embryo sac start dividing, protrude into embryo sac & develop into a embryo = ½+½.

(b) No segregation of character in hybrid seeds, economically beneficial / desired varieties are cultivated. =1

(c)



(any four labelling) = ½×4=2

[5 marks]

30. (a) Describe the various steps of Griffith's experiment that led to the conclusion of the 'Transforming principle' .

(b) How did the chemical nature of the 'Transforming principle' get established ?

Ans. (a) *Streptococcus pneumonia* = ½

S - Strain 'inject into mice' mice die = ½

R - strain 'inject into mice' mice alive = ½

S - strain (heat killed) 'inject into mice' mice alive = ½

R - strain (alive) + S (heat killed) strain 'inject into mice' mice die = ½

R strain transformed into virulent = ½

(b) Purified biochemicals (protein, DNA, RNA) from heat killed S - Strain = ½

Treated with protease - did not affect transformation = ½

Treated with RNase - did not affect transformation = ½

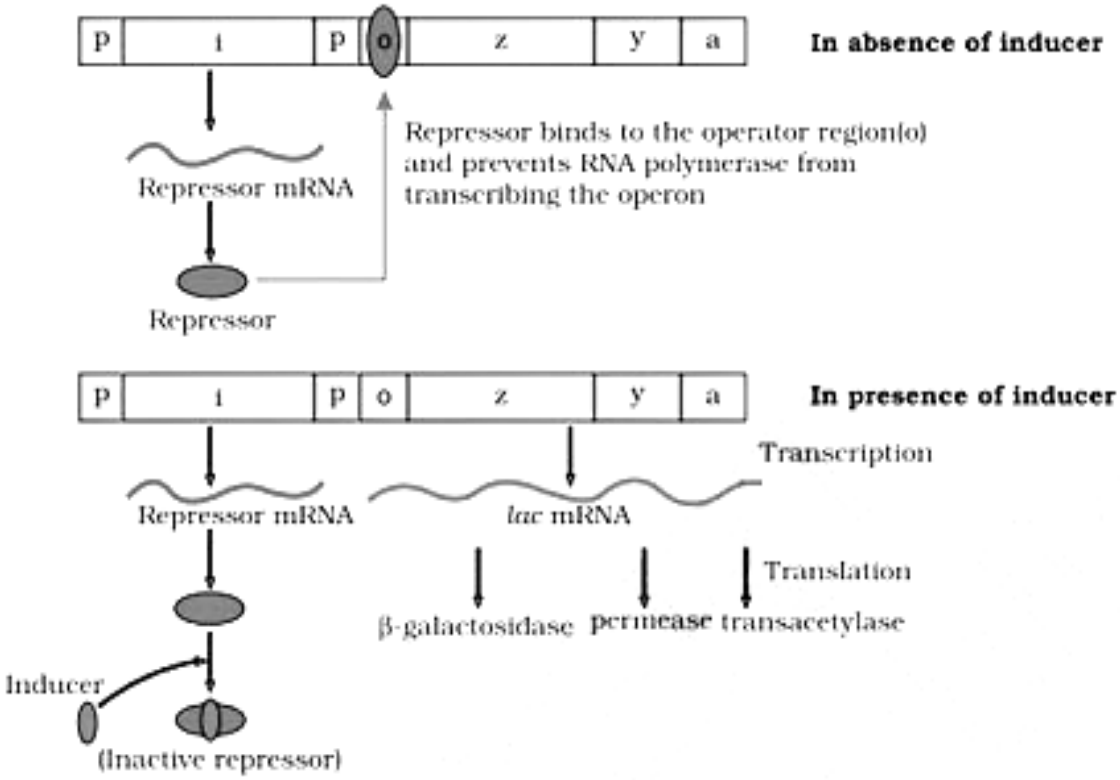
Treated with DNase - transformation affected = ½ (½×10=5)

[5 marks]

OR

Describe how the lac operon operates, both in the presence and absence of an inducer in E.coli.

Ans.



i. structural gene zya = ½

ii. operator = ½

iii. i = ½

iv. repressor = ½

v. binding = ½

vi. Operon shut = ½

vii. inducer = ½

viii inducer + binding = ½

ix. operator free = ½

x. enzymes / operator = ½ (½×10=5)

[5 marks]