

Series : ONS/2

कोड नं. **57/2/1**
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 जायेगा । 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

अधिकतम अंक : 70

Time allowed : 3 hours

Maximum Marks : 70

सामान्य निर्देश :

- (i) प्रश्न-पत्र में पाँच खण्डों में 26 प्रश्न दिए गए हैं । सभी प्रश्न अनिवार्य हैं ।
- (ii) खण्ड – क में प्रश्न संख्या 1 से 5 अति लघु-उत्तरीय प्रश्न हैं । प्रत्येक प्रश्न एक अंक का है ।
- (iii) खण्ड – ख में प्रश्न संख्या 6 से 10 लघु-उत्तरीय प्रश्न I प्रकार के हैं, प्रत्येक प्रश्न दो अंकों का है ।
- (iv) खण्ड – ग में प्रश्न संख्या 11 से 22 लघु-उत्तरीय प्रश्न II प्रकार 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 ।

57/2/1

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[P.T.O.]

General Instructions :

- (i) There are a total of **26** questions and **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 **three** questions of **five** marks. An examinee is to attempt any **one** of the questions out of the **two** given in the question paper with the same question number.

खण्ड – क
SECTION – A

1. दो जंतुओं के नाम बताइए जिनमें मद चक्र प्रदर्शित होता है । 1
Name two animals that exhibit Oestrus cycle.
2. बिंदु उत्परिवर्तन क्या होता है ? एक उदाहरण दीजिए । 1
What is point mutation ? Give one example.
3. एक एक्सॉन से एक इन्ट्रॉन में भेद करने के लिए एक अंतर बताइए । 1
Mention one difference to distinguish an exon from an intron.
4. एक संदिग्ध AIDS के रोगी में HIV का पता लगाने के लिए आण्विक नैदानिक क्रियाविधि का सुझाव दीजिए । 1
Suggest a molecular diagnostic procedure that detects HIV in a suspected AIDS patient.
5. किसी स्पीशीज़ के लिए प्रकृति की वहन क्षमता किस बात का संकेत देती है ? 1
What does nature's carrying capacity for a species indicate ?

खण्ड – ख

SECTION – B

6. पेशीस्तर और अंतःस्तर की स्थिति एवं उनके कार्यों की चर्चा कीजिए । 2

Write the location and functions of Myometrium and Endometrium.

7. परीक्षार्थ क्रॉस (संकरण) से एक व्यष्टि के जीन प्ररूप का निर्धारण करने में कैसे मदद मिलती है ? 2

अथवा

डी.एन.ए. बहुरूपता के दो अनुप्रयोग लिखिए ।

How does a test cross help to determine the genotype of an individual ?

OR

Mention two applications of DNA polymorphism.

8. मधुमक्खी पालन करने के लिए किस प्रकार के क्षेत्र उपयुक्त होते हैं ? इस कार्य के लिए आमतौर से पाली जाने वाली किस्म का वैज्ञानिक नाम लिखिए । 2

What kind of areas are suitable for practicing apiculture ? Write the scientific name of the variety commonly reared for the purpose.

9. संकटापन्न जैव विविधता के संरक्षण के लिए चार उन्नत स्व-स्थाने विधियों का सुझाव दीजिए । 2

Suggest four advanced *ex-situ* methods to conserve threatened biodiversity.

10. किसी जल निकाय का निम्न BOD स्वच्छ पानी वाले जलीय जीवों की वापसी को सहायता देते हैं । व्याख्या कीजिए । 2

Lower BOD of a water body helps reappearance of clean-water organisms. Explain.

खण्ड – ग

SECTION – C

11. औद्योगिकीकरण के पश्चात्, इंग्लैंड में सफेद पंखों वाले शलभों के स्थान पर मेलानिनी शलभों की समष्टि की वृद्धि हो गयी । इस कथन की व्याख्या कीजिए । 3

“Post-industrialization, the population of melanised moth increased in England at the expense of white-winged moths.” Provide explanations.

12. पुनर्योगज DNA का पता लगाने के लिए 'अंतर्विष्ट निष्क्रियण' विधि को 'प्रतिजैविक प्रतिरोधी' क्रियाविधि की जगह क्यों वरीयता दी जाती है ? 3

Why does the 'insertional inactivation' method to detect recombinant DNA is preferred to 'antibiotic resistance' procedure ?

13. पुनर्योगज DNA प्रौद्योगिकी में EcoRI एंजाइम की भूमिका की व्याख्या कीजिए । 3

Explain the role of the enzyme EcoRI in recombinant DNA technology.

14. भ्रूणीय अवस्था का नामांकित आरेख बनाइए जो स्त्री के गर्भाशय के भीतर अंतर्रोपित हो जाता है । दो नामांकित भागों के कार्य बताइए । 3

Draw a labelled diagram of the embryonic stage that gets implanted in the human uterus. State the functions of the two parts labelled.

15. (a) एक परिपक्व 7-कोशिका तथा 8-न्यूक्लियस वाले भ्रूण-कोश का नामांकित आरेख बनाइए ।
(b) भ्रूण-कोश की कौन सी एक कोशिका दोहरे निषेचन के बाद एंडोस्पर्म बनाती है ? 3
(a) Draw a labelled sketch of a mature 7-celled, 8-nucleate embryo-sac.
(b) Which one of the cell in an embryo-sac produce endosperm after double fertilization ?

16. जैव विविधता संरक्षण के समर्थन में संकीर्णतः उपयोगी तर्क दिए जाते हैं । इसी उद्देश्य के समर्थन में दिए जाने वाले दो अन्य तर्कों की भी व्याख्या कीजिए । 3

Narrowly utilitarian arguments are put forth in support of biodiversity conservation. Explain the other two arguments that are put forth in support of the same cause.

17. किसी पहाड़ी स्थान की सैर करने पर आपके एक मित्र की तबियत अचानक खराब हो गयी और उसे बैचेनी महसूस होने लगी ।
(a) कोई ऐसे दो रोग लक्षण बताइए जिसके कारण यह एलर्जी हो गयी ।
(b) किसी एलर्जन के प्रति होने वाली शरीर की अनुक्रिया की व्याख्या कीजिए ।
(c) तात्कालिक आराम देने के लिए किन्हीं दो औषधियों के नाम बताइए । 3

On a visit to a Hill station, one of your friend suddenly became unwell and felt uneasy.

- (a) List two symptoms you would look for to term it to be due to allergy.
- (b) Explain the response of the body to an allergen.
- (c) Name two drugs that can be recommended for immediate relief.

18. (a) हर्शे और चेज़ ने अपने प्रयोग में रेडियो सक्रिय सल्फर और रेडियो सक्रिय फ़ॉस्फ़ोरस का उपयोग क्यों किया ?

(b) अंत में वे किस निष्कर्ष पर पहुँचे ? और कैसे ? चर्चा कीजिए । 3

(a) Why did Hershey and Chase use radioactive sulfur and radioactive phosphorus in their experiment ?

(b) Write the conclusion they arrived at and how.

19. (a) अपने परभक्षियों से बचने के लिए पौधों द्वारा विकसित किन्हीं दो प्रतिरक्षा प्रणाली की व्याख्या कीजिए ।

(b) परभक्षण और परजीवता में अंतर बताइए । 3

(a) Explain any two defence mechanisms plants have evolved against their predators.

(b) How does predation differ from parasitism ?

20. मानव रुधिर-वर्ग बहुविकल्पता और सहप्रभावता का एक अच्छा उदाहरण है । युक्ति संगतता बताइए । 3

Human blood group is a good example of multiple allelism and co-dominance. Justify.

21. (a) जीन-उपचार क्या होता है ?

(b) उस क्रियाविधि का वर्णन कीजिए जिसके द्वारा इस प्रकार के किसी रोग का स्थायी रूप से उपचार किया जा सकता है । इस रोग का नाम लिखिए । 3

(a) What is Gene therapy ?

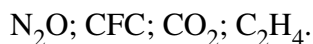
(b) Describe the procedure of such a therapy that could be a permanent cure for a disease. Name the disease.

22. समुद्र में जीवसंहति के पिरैमिड एवं ऊर्जा के पिरैमिड के आरेख बनाइए । बनाए गए पिरैमिडों के प्रकारों पर अपने विचार प्रकट कीजिए ।

3

अथवा

- (a) निम्नलिखित ग्रीनहाउस गैसों को उनके सकल वैश्विक ऊष्मण में आपेक्षिक योगदान के वृद्धिमान क्रम में लिखिए :

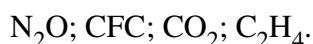


- (b) वैश्विक ऊष्मण का ध्रुवीय बर्फीली चोटियों पर क्या प्रभाव पड़ता है ? इसके संभावी पारिस्थितिकीय प्रभाव की चर्चा कीजिए ।

Draw a pyramid of biomass and pyramid of energy in sea. Give your comments on the type of pyramids drawn.

OR

- (a) Rearrange the following greenhouse gases in increasing order of their relative contribution to the total global warming :



- (b) What is the effect of global warming on polar ice-caps ? Comment on its possible ecological impact.

खण्ड – घ

SECTION – D

23. आपका/आपकी एक मित्र है जिसके माँ-बाप उसके दिन-प्रतिदिन के मामलों में बहुत दखल देते हैं । वे उसे अभी तक बच्चा ही समझते हैं जिसके कारण वह दुःखी हो जाता/जाती है और हर समय परेशान रहता/रहती है । वह सोचता/सोचती है कि उसके माँ-बाप उसे कुछ मामलों में स्वतंत्र निर्णय लेने का अवसर दें ।

- (a) क्या आप अपने मित्र का समर्थन करते हैं और क्यों ?
(b) इस आयु-वर्ग की विशिष्टताएँ लिखिए ।
(c) दो नैदानिक उपाय बताइए ।

4

You have a friend whose parents are too indulgent in his/her daily affairs. They think him/her to be still young which makes him/her sad and is upset all the time. As he/she feels that the parents should give him/her opportunity to take independent decision on some issues.

- (a) Would you support your friend and why ?
(b) Write the characteristics of this age group.
(c) List two curative measures.

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खण्ड – ड

SECTION – E

24. (a) एक मानव प्रतिरक्षा न्यूनता वायरस (HIV) किस प्रकार परपोषी के भीतर प्रतिकृतियन करता है ?
(b) HIV से संक्रमित रोगी अपनी प्रतिरक्षता किस प्रकार खो बैठता है ?
(c) इस रोग के कोई दो लक्षण बताइए ।

5

अथवा

अपशिष्ट जल उपचार की प्रक्रिया का वर्णन निम्नलिखित शीर्षकों के अंतर्गत कीजिए :

- (a) प्राथमिक उपचार
(b) द्वितीयक उपचार

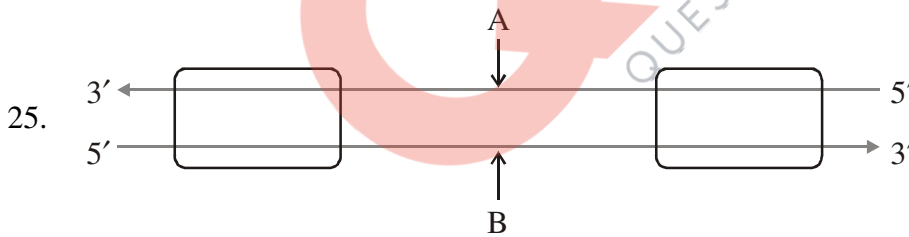
2 + 3

- (a) How does a Human Immunodeficiency Virus (HIV) replicate in a host ?
(b) How does an HIV-infected patient lose immunity ?
(c) List any two symptoms of this disease.

OR

Describe the process of waste-water treatment under the following heads :

- (a) Primary treatment.
(b) Secondary treatment.

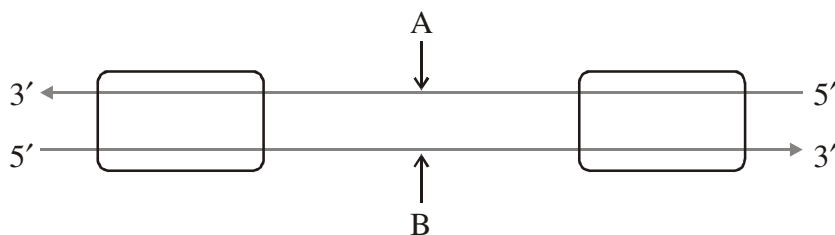


- (a) ऊपर दिए गए प्रतिकृतियन यूनिट के आरेख में 'A' और 'B' वलयकों को पहचानिए तथा बताइए कि किस आधार पर आपने उन्हें पहचाना है ।
(b) एक बैक्टीरियम में होने वाली प्रतिकृतियन प्रक्रिया में सिग्मा कारक तथा Rho कारक के क्या कार्य हैं ?
(c) सुकेन्द्रकियों में RNA पॉलीमरेज़ I और RNA पॉलीमरेज़ III के कार्य लिखिए ।

5

अथवा

एक प्राक् केन्द्रकीय कोशिका में तथा एक सुकेन्द्रकीय केन्द्रक में DNA हेलिक्स की पैकेजिंग का वर्णन कीजिए ।



- (a) Identify strands 'A' and 'B' in the diagram of transcription unit given above and write the basis on which you identified them.
- (b) State the functions of Sigma factor and Rho factor in the transcription process in a bacterium.
- (c) Write the functions of RNA polymerase-I and RNA polymerase-III in eukaryotes.

OR

Describe the packaging of DNA helix in a prokaryotic cell and an eukaryotic nucleus.

26. (a) मानव वृषणों में शुक्राणुजनन कहाँ होता है ? शुक्राणुओं के बनने तक शुक्राणुजनन की प्रक्रिया का वर्णन कीजिए ।
- (b) शुक्राणु के स्खलन वाहिनी तक पहुँचने का मार्ग बताइए ।

5

अथवा

परागकण के अपने संगत वर्तिकाग्र तक पहुँचने के बाद निषेचन होने तक की फूल में होने वाली घटनाओं की व्याख्या कीजिए ।

- (a) Where does spermatogenesis occur in human testes ? Describe the process of spermatogenesis upto the formation of spermatozoa.
- (b) Trace the path of spermatozoa from the testes upto the ejaculatory duct only.

OR

Explain the events upto fertilization that occur in a flower after the pollengrain has landed on its compatible stigma.

Question Paper Code 57/2/1

SECTION – A

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

1. Name two animals that exhibit Oestrus cycle.

Ans. cow / sheep / rat / deer / dog / tiger / anyother (correct example) = $\frac{1}{2} \times 2$

[1Mark]

2. What is point mutation? Give one example.

Ans. Arising due to change in a single base pair of DNA , sickle cell anemia = $\frac{1}{2} \times 2$

[1 Mark]

3. Mention one difference to distinguish an exon from an intron.

Ans. Exon : coded / expressed sequence of nucleotides in mRNA , = $\frac{1}{2}$

Intron : Intervening sequence of nucleotides not appearing in processed mRNA = $\frac{1}{2}$

[1 Mark]

4. Suggest a molecular diagnostic procedure that detects HIV in a suspected AIDS patient.

Ans. PCR / ELISA = 1

[1 Mark]

5. What does nature's carrying capacity for a species indicate ?

Ans. (In nature) a given habitat has enough (limited) resources to support a maximum possible number , no further growth in population is possible = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

SECTION – B

Q. Nos. 6-10 are of two marks each

6. Write the location and functions of Myometrium and Endometrium.

Ans. Myometrium : middle layer of uterus , contractions of the uterus during delivery / child birth / parturition = $\frac{1}{2} + \frac{1}{2}$

Endometrium : Inner layer of uterus , cyclic changes during menstruation / implantation of embryo = $\frac{1}{2} + \frac{1}{2}$

[2 Marks]

7. How does a test cross help to determine the genotype of an individual ?

Ans. Individual of unknown genotype crossed with recessive parent , = 1

All dominant in progeny - Homozygosity , dominant to recessive ratio 1:1 in progeny - Heterozygosity = $\frac{1}{2} + \frac{1}{2}$

[2 Marks]

OR

Mention two applications of DNA polymorphism.

Ans. Genetic mapping , DNA finger printing = 1 + 1

[2 Marks]

8. What kind of areas are suitable for practicing apiculture? Write the scientific name of the variety commonly reared for the purpose.

Ans. (Bee pastures of) wild shrub , fruit orchards , cultivated crop (any two) = $\frac{1}{2} + \frac{1}{2}$

Apis indica = 1

[2 Marks]

9. Suggest four advanced ex-situ methods to conserve threatened biodiversity.

Ans. Cryopreservation , in vitro fertilisation , tissue culture , seed banks = $\frac{1}{2} \times 4$

[2 Marks]

10. Lower BOD of a water body helps reappearance of clean-water organisms. Explain.

Ans. Lowering of BOD results in decreased biodegradable material → reduced microbial decomposition → oxygen utilisation reduced → more Dissolved Oxygen (DO) available (clean water - organisms reappear) = $\frac{1}{2} \times 4$

[2 Marks]

SECTION – C

Q. Nos. 11-22 are of three marks each

11. “Post-industrialization, the population of melanised moth increased in England at the expense of white-winged moths.” Provide explanations.

Ans. Pre Industrialisation had more white winged moth against grey lichens on tree trunk, industrialisation led to deposition of soot & smoke on tree bark , making bark of trees dark , against the dark background white moth could easily be preyed upon , melanised moth could camouflage against dark bark , increased in number (through reproduction) / natural selection = $\frac{1}{2} \times 6$

[3 Marks]

12. Why does the ‘insertional inactivation’ method to detect recombinant DNA is preferred to ‘antibiotic resistance’ procedure?

Ans. The presence of a chromogenic substrate gives blue coloured colonies , in absence of an insert / in non-transformants , presence of an insert (in the enzyme site) , results into (insertional inactivation of the β -galactosidase) colonies which do not produce colour = $\frac{1}{2} \times 4$

Antibiotic resistance method requires duplicate plating / cumbersome procedure = 1

[3 Marks]

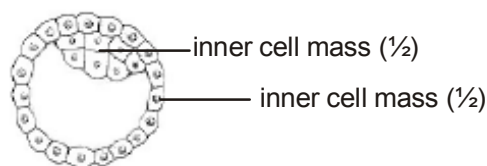
13. Explain the role of the enzyme EcoRI in recombinant DNA technology.

Ans. EcoRI inspects length of DNA and recognises specific palindromic nucleotide sequence , binds with DNA , cuts each of the two strands of double helix at specific points = 1×3

[3 Marks]

14. Draw a labelled diagram of the embryonic stage that gets implanted in the human uterus. State the functions of the two parts labelled.

Ans.



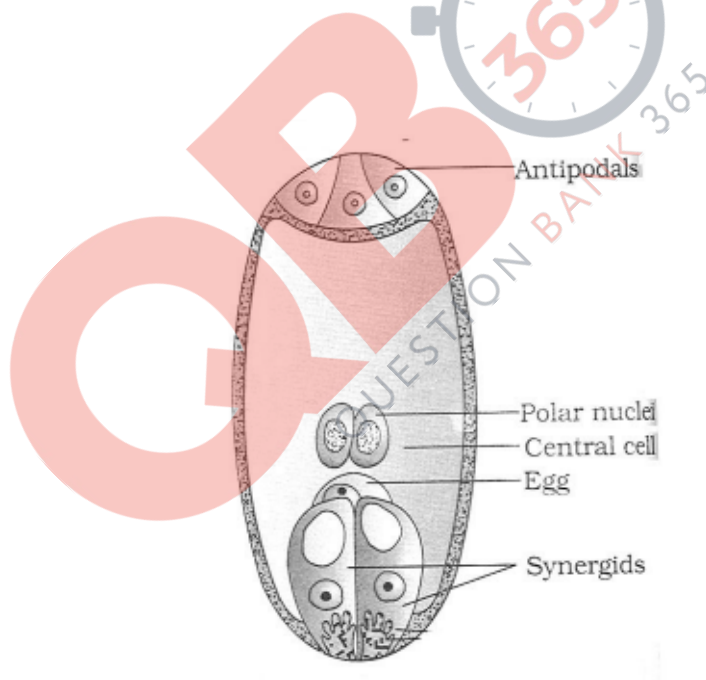
-Trophoblast - helps in implantation / attachment to endometrium / attachment to uterus = 1

-Inner cell mass - gets differentiated into an embryo = 1

[3 Marks]

15. (a) Draw a labelled sketch of a mature 7-celled,8-nucleate embryo-sac.
(b) Which one of the cell in an embryo-sac produce endosperm after double fertilization?

Ans. (a)



$$= \frac{1}{2} \times 5 = 2\frac{1}{2}$$

(b) Central cell = $\frac{1}{2}$

[3 Marks]

16. Narrowly utilitarian arguments are put forth in support of biodiversity conservation. Explain the other two arguments that are put forth in support of the same cause.

Ans. - Broadly utilitarian = $\frac{1}{2}$

Ecosystem services - Purify air, cycling of nutrients, habitat for wildlife, pollinating crops, aesthetic pleasure (any two) = $\frac{1}{2} \times 2 = 1$

- Ethical = $\frac{1}{2}$

Philosophical / spiritual / moral duty towards future generations = $\frac{1}{2} \times 2 = 1$

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

[3 Marks]

17. On a visit to a Hill station, one of your friend suddenly become unwell and felt uneasy.

- (a) List two symptoms you would look for to term it to be due to allergy.**
- (b) Explain the response of the body to an allergen.**
- (c) Name two drugs that can be recommended for immediate relief.**

Ans. (a) sneezing , watery eyes, running nose , difficulty in breathing (any two) = $\frac{1}{2} + \frac{1}{2}$

(b) body releases antibodies , IgE type = $\frac{1}{2} + \frac{1}{2}$

(c) Antihistamine , adrenalin , steroids (any two) = $\frac{1}{2} + \frac{1}{2}$

[3 Marks]

18. (a) Why did Hershey and Chase use radioactive sulfur and radioactive phosphorus in their experiment ?

(b) Write the conclusion they arrived at and how.

Ans. (a) In order to label protein coat of virus with radioactive sulfur , label DNA with radioactive phosphorus = $\frac{1}{2} + \frac{1}{2}$

(b) Bacteria which were infected with viruses having radioactive DNA were found to contain radioactive DNA later on = $\frac{1}{2}$

Bacteria which were infected with viruses having radioactive protein coat were not found to contain radioactivity = $\frac{1}{2}$

Conclusion - DNA is the genetic material = 1

[3 Marks]

19. (a) Explain any two defence mechanisms plants evolved against their predators.

(b) How does predation differ from parasitism?

Ans. (a) (i) Thorns are (morphological) means of defence = 1

(ii) produce / store chemicals which inhibit digestion / disrupts reproduction / kill // Calotropis produces highly poisonous cardiac glycosides // plants may produce chemicals such as nicotine / caffeine / quinine / strychnine / opium are produced as defence = 1

(b) Parasitism

- Lives & feed on the host

- host specific

- Co-evolve with the host

Predation

Only feeds on prey

prudent / not prey specific

Control / check prey population

(any one difference) = 1

[3 Marks]

20. Human blood group is a good example of multiple allelism and co-dominance. Justify.

Ans. **Multiple allelism** : Generally in an individual / population , only two alleles of a trait govern the character , but in case of ABO blood group , three alleles I^A , I^B and i are found to govern blood group in human population = $\frac{1}{2} \times 4 = 2$

Co-dominance : Allele I^A and I^B when present in an individual , both being dominant express their own types of sugars / traits (no marks for the second step if two alleles are not given correctly)
= $\frac{1}{2} \times 2 = 1$

[3 Marks]

21. (a) What is Gene therapy?

(b) Describe the procedure of such a therapy that could be a permanent cure for a disease. Name the disease.

Ans. (a) (Collection of) methods that allows correction of gene defect that has been diagnosed in a child / embryo // Genes are inserted into a person's cells and tissues to treat a disease , this involves delivery of a normal gene into the individual / embryo to take over the function of and compensate for non-functional / a defective gene = 1

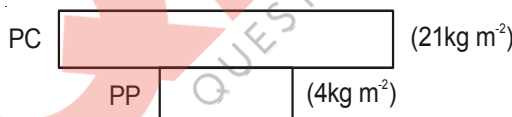
(b) If the desired gene is isolated and introduced into cells at early embryonic stages it can provide a permanent cure = 1

ADA / Adenosine deaminase deficiency = 1

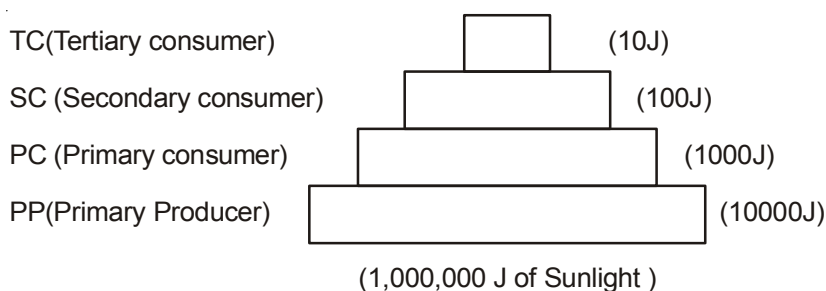
[3 Marks]

22. Draw a pyramid of biomass and pyramid of energy in sea. Give your comments on the type of Pyramids drawn.

Ans.



Pyramid of biomass in sea = 1



Pyramid of energy in sea = 1

The pyramid of biomass in sea is inverted = $\frac{1}{2}$

The pyramid of energy in sea is upright = $\frac{1}{2}$

[3 Marks]

OR

- (a) Rearrange the following greenhouse gases in increasing order of their relative contribution to the total global warming:

N_2O ; CFC; CO_2 ; C_2H_4 .

- (b) What is the effect of global warming on polar ice-caps? Comment on its possible ecological impact.

Ans. (a) $\text{C}_2\text{H}_4 \rightarrow \text{N}_2\text{O} \rightarrow \text{CFC} \rightarrow \text{CO}_2$ / $\text{N}_2\text{O} \rightarrow \text{CFC} \rightarrow \text{CH}_4 \rightarrow \text{CO}_2$ (Highest) = 1

Note - Ignore $\text{C}_2\text{H}_4/\text{CH}_4$ and give one mark for remaining three greenhouse gases if sequence is correct

- (b) (Global warming) \rightarrow Rise in Atmospheric temperature \rightarrow polar ice melts \rightarrow increase in sea level \rightarrow coastal land mass submerge = $\frac{1}{2} \times 4 = 2$

[3 Marks]

SECTION -D

Q No. 23 is of four mark

23. You have a friend whose parents are too indulgent in his/her daily affairs. They think him/her to be still young which makes him/her sad and is upset all the time. As he/she feels that the parents should give him/her opportunity to take independent decision on some issues.

- (a) Would you support your friend and why ?
(b) Write the characteristics of this age group.
(c) List two curative measures.

Ans. (a) Yes , because of peer understanding = $\frac{1}{2} + \frac{1}{2} = 1$

- (b) Curious , adventurous , look for excitement , experimentation = $\frac{1}{2} \times 4 = 2$

- (c) Avoid undue peer pressure / education & counselling / help from parents & peers / identifying the danger signs / professional and medical help or any other appropriate measures (**any two**) = $\frac{1}{2} + \frac{1}{2} = 1$

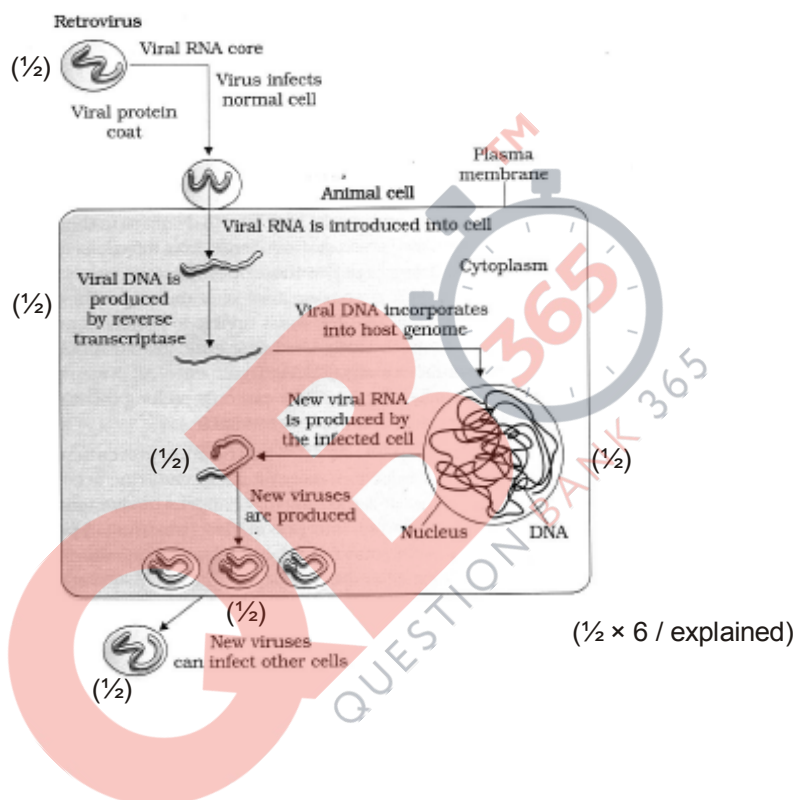
[4 Marks]

SECTION –E

Q Nos. 24-26 are of five marks each

24. (a) How does a Human Immunodeficiency Virus(HIV) replicate in a host ?
(b) How does an HIV-infected patient lose immunity ?
(c) List any two symptoms of this disease.

Ans. (a)



- (b) Loss of T-lymphocytes = 1
(c) Fever / diarrhoea / susceptibility to other diseases , prone to microbial infection (**any two**)
= $\frac{1}{2} + \frac{1}{2}$

[5 Marks]

OR

Describe the process of waste- water treatment under the following heads:

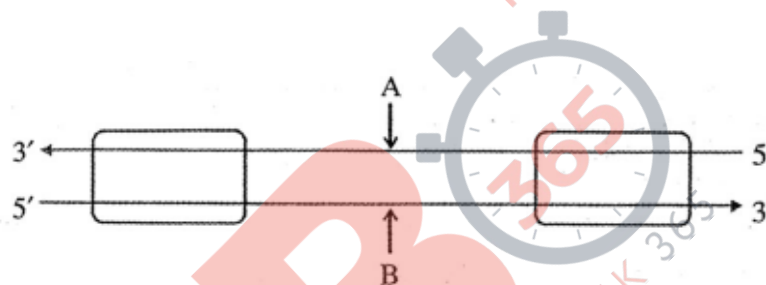
- (a) **Primary treatment.**
(b) **Secondary treatment.**

Ans. (a) Primary treatment

1. Physical removal of particles through filtration , sedimentation in stages = $\frac{1}{2} + \frac{1}{2}$
 2. Solids settle to form primary sludge , the supernatants form the effluent = $\frac{1}{2} + \frac{1}{2}$
- (b) Secondary Treatment
- Effluent passed into aeration tanks = $\frac{1}{2}$
 - Vigorous growth of useful aerobic microbes into flocs = $\frac{1}{2}$
 - Significant reduction of BOD = $\frac{1}{2}$
 - Effluent passed on to settling tanks where bacterial flocs settle to form activated sludge = $\frac{1}{2}$
 - Activated sludge is passed on to anaerobic sludge digester , where bacteria and fungi are anaerobically digested = $\frac{1}{2} + \frac{1}{2}$
- = $\frac{1}{2} \times 10$

[5 Marks]

25.



- (a) Identify strands 'A' and 'B' in the diagram of transcription unit given above and write the basis on which you identified them.
- (b) State the functions of Sigma factor and Rho factor in the transcription process in a bacterium.
- (c) Write the functions of RNA polymerase-I and RNA polymerase-III in eukaryotes.

Ans. (a) A - Template strand = 1

B - Coding strand = 1

Template strand has polarity $3' \rightarrow 5' = \frac{1}{2}$

Coding strand has polarity $5' \rightarrow 3' = \frac{1}{2}$

On the basis of polarity with respect to promoter = $\frac{1}{2} + \frac{1}{2}$

- (b) In initiation sigma factor associates with RNA polymerase to initiate transcription , Rho factor gets associated to RNA polymerase to terminate transcription = $\frac{1}{2} + \frac{1}{2}$
- (c) RNA polymerase I - Transcribes rRNAs = $\frac{1}{2}$
RNA polymerase III - Transcribes tRNA / 5srRNA / SnRNA = $\frac{1}{2}$

[5 Marks]

OR

Describe the packaging of DNA helix in a prokaryotic cell and an eukaryotic nucleus.

Ans. Prokaryotes : Negatively charged DNA , is held with positively charged proteins , in nucleoid , DNA in nucleoid is organised in large loops held by protein = $\frac{1}{2} \times 4$

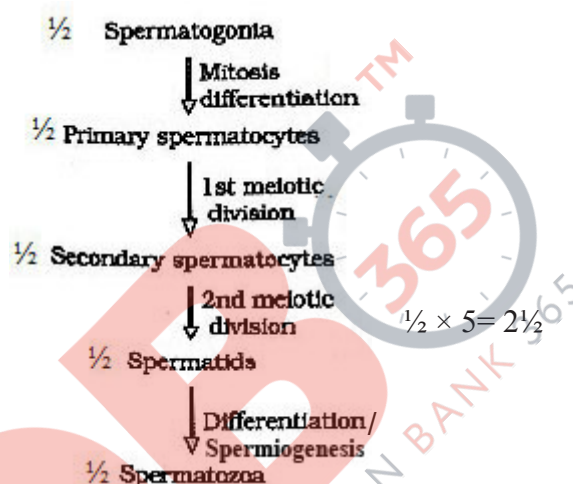
Eukaryotes :In nucleus the negatively charged DNA , is wrapped around positively charged histone octamer , to form nucleosome , nucleosomes are repeated , to constitute chromatin , at higher level additional set of non-histone chromosomal protein gets associated with chromatin = $\frac{1}{2} \times 6$

[5 Marks]

26. (a) Where does spermatogenesis occur in human testes ? Describe the process of spermatogenesis upto the formation of spermatozoa.

(b) Trace the path of spermatozoa from the testes upto the ejaculatory duct only.

Ans. (a) Seminiferous tubules = $\frac{1}{2}$



(b) Seminiferous tubules \rightarrow rete testis \rightarrow Vasa efferentia \rightarrow Epididymis \rightarrow vas deferens \rightarrow (ejaculatory duct)

[5 Marks]

OR

Explain the events upto fertilization that occur in a flower after the pollen grain has landed on its compatible stigma.

Ans. The pollen grain germinates , on the stigma to produce a pollen tube through one of the germ pores , the content of the pollen grain move into the pollen tube , pollen tube grows through the tissues of the stigma and style and reaches the ovary , the generative cell divides and forms two male gametes during the growth of pollen tube (in the stigma) , the pollen tube enters the ovule through micropyle, and then enters one of the synergids (through filiform apparatus) , the pollen tube releases the two male gametes (in the cytoplasm of synergids) , one of the male gamete fuses with egg cell to form zygote (2n) (syngamy) , the other male gamete fuses with two polar nuclei (in central cell) to form primary endosperm nucleus (PEN-3n)/PEC = $\frac{1}{2} \times 10$

[5 Marks]