

रोल नं.

Roll No.

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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 :

- 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 I प्रकार के हैं, प्रत्येक प्रश्न दो अंकों का है ।
- खण्ड – ग में प्रश्न संख्या 11 से 22 लघु-उत्तरीय प्रश्न II प्रकार के हैं, प्रत्येक प्रश्न तीन अंकों का है ।
- खण्ड – घ में प्रश्न संख्या 23 मूल्य आधारित प्रश्न चार अंकों का है ।
- खण्ड – ङ में प्रश्न संख्या 24 से 26 दीर्घ-उत्तरीय प्रश्न हैं, प्रत्येक प्रश्न पाँच अंकों का है ।
- 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 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. 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.
2. एक एक्सॉन से एक इन्ट्रॉन में भेद करने के लिए एक अंतर बताइए । 1
Mention one difference to distinguish an exon from an intron.
3. 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 ?
4. आधार-शिफ्ट उत्परिवर्तन के दो कारण बताइए । 1
Mention two causes of frame-shift Mutation.
5. दो जंतुओं के नाम बताइए जिनमें मद चक्र प्रदर्शित होता है । 1
Name two animals that exhibit Oestrus cycle.

खण्ड – ख

SECTION – B

6. 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.

7. (a) पुष्पन काल के दौरान मधुमक्खियों की पेटिका को फसल वाले खेत में रखने के दो लाभ लिखिए ।
(b) मधुमक्खी का मोम एकत्रित करने के लिए एक वार्षिक और एक बहुवर्षी फसल की स्पीशीज़ों के नाम बताइए । 2

- (a) List two advantages of keeping beehives in a crop field during flowering season.
(b) Name one annual and one perennial crop species favourable to beeswax collection.

8. वाहितमल को अलवण-जल-निकाय में छोड़ने से मछली अधिक मात्रा में मरने लगती हैं । व्याख्या कीजिए । 2

Sewage discharge into a clean-water body leads to increased fish mortality. Explain.

9. परीक्षार्थ क्रॉस (संकरण) से एक व्यक्ति 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.

10. स्त्री की फैलोपी नली में शुक्राणु और अंडाणु के परस्पर संपर्क में आने के बाद होने वाली घटनाओं की व्याख्या कीजिए । 2

Explain the events that follow upto fertilization when the sperms come in contact with the ovum in the fallopian tube of a human female.

खण्ड – ग

SECTION – C

11. 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.

12. (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 ?
13. 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.
14. प्राक्केन्द्रकीय DNA में एक ऑपरेटर कहाँ स्थित होता है ? प्राक्केन्द्रकी में अनुलेखन स्तर जीन-अभिव्यक्ति को किस प्रकार नियमित करता है ? व्याख्या कीजिए । 3
- Where is an 'operator' located in a prokaryote DNA ? How does an operator regulate gene expression at transcriptional level in a prokaryote ? Explain.
15. DNA पुनर्योगज प्रौद्योगिकी में प्रतिबंधन (रेस्ट्रिक्शन) एंडोन्यूक्लियेज़ किस प्रकार मदद करता है ? 3
- How does a restriction endonuclease help in DNA recombinant technology ?
16. मानव रुधिर-वर्ग बहुविकल्पता और सहप्रभाविता का एक अच्छा उदाहरण है । युक्ति संगतता बताइए । 3
- Human blood group is a good example of multiple allelism and co-dominance. Justify.
17. 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 ?

18. 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 ऐलर्जी हो गयी ।
- (b) किसी ऐलर्जन 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.

19. (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.

20. 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 :

N_2O ; CFC; CO_2 ; C_2H_4 .

- (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 :

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.

21. सहविकास एक जंतु एवं एक पादप के बीच सहोपकारिता (mutualism) का एक लुभावना उदाहरण है । एक उदाहरण देते हुए सहविकास का वर्णन कीजिए । 3

Co-evolution is a spectacular example of mutualism between an animal and a plant. Describe co-evolution with the help of an example.

22. (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.

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.

खण्ड – ड
SECTION – E

24. थैलेसीमिया और हीमोफीलिया दोनों ही मेन्डेलीयन विकार हैं जिनका संबंध रुधिर से है। इन रोगों के लक्षण लिखिए। क्रॉस बनाकर इन दो रोगों के वंशागति पैटर्न में अंतर की व्याख्या कीजिए।

अथवा

- (a) फॉसिल (जीवाश्म) क्या होते हैं? विकास के लिए वे एक प्रमाण किस प्रकार प्रस्तुत करते हैं?
- (b) “मानवजनित क्रिया के कारण विकास हो सकता है।” एक उदाहरण देते हुए व्याख्या कीजिए। **5**

Thalassemia and Haemophilia are both Mendelian disorders related to blood. Write the symptoms of the diseases. Explain with the help of crosses the difference in the inheritance pattern of the two diseases.

OR

- (a) What are fossils? How are they an evidence for evolution?
- (b) “Anthropogenic action can lead to evolution.” Explain with the help of an example.
25. (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.

26. (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.

Question Paper Code 57/2/3

SECTION – A

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

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

Ans. PCR / ELISA = 1

[1 Mark]

2. 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]

3. 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]

4. Mention two causes of frame- shift Mutation.

Ans. Insertion , deletion of three bases / one codon or multiple of three bases / multiple codon (hence one or more amino acid) (reading frame remains unaltered from that point onwards) = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

5. Name two animals that exhibit Oestrus cycle.

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

[1Mark]

SECTION – B

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

6. 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]

7. (a) List two advantages of keeping beehives in a crop field during flowering season.

(b) Name one annual and one perennial crop species favourable to beeswax collection.

Ans. (a) Bees help in increasing pollination efficiency , leading to improved yield = $\frac{1}{2} + \frac{1}{2}$

(b) Annual : Sunflower / Brassica or any other correct example = $\frac{1}{2}$

Perennial : Apple / pear or any other correct example = $\frac{1}{2}$

[2 Marks]

8. Sewage discharge into a clean-water body leads to increased fish mortality. Explain.

Ans. Leads to increase in nutrients , promotes algal growth , increases BOD reduces dissolved oxygen

(aquatic animals deprived of oxygen leading to death) , some bloom farming algae are extremely toxic to fish / other pollutants of sewage = $\frac{1}{2} \times 4$

[2 Marks]

9. 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]

10. Explain the events that follow upto fertilization when the sperms come in contact with the ovum in the fallopian tube of a human female.

Ans. The secretion of the acrosome help the sperm enter into the cytoplasm of ovum through zona pellucida and the plasma membrane , this induces the completion of second meiotic division of the secondary oocyte , forming second polar body and a haploid ovum , soon the haploid nucleus of the sperm and that of the ovum fuse together to form a diploid zygote = $\frac{1}{2} \times 4 = 2$

[2 Marks]

SECTION – C

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

11. 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 = $\frac{1}{2}$

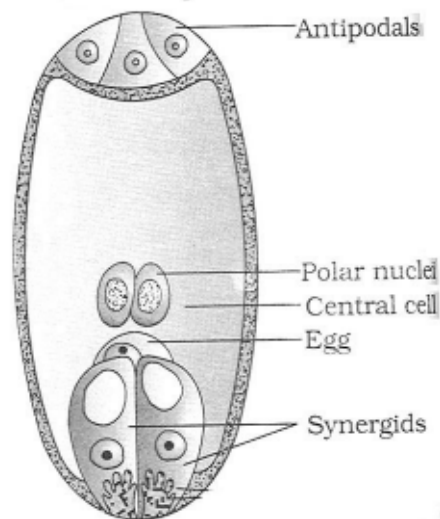
Philosophical / spiritual / moral duty towards future generations = $\frac{1}{2} \times 2 = 1$

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

[3 Marks]

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

Ans. (a)



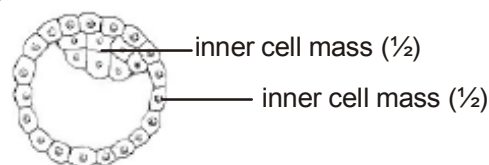
$$= \frac{1}{2} \times 5 = 2\frac{1}{2}$$

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

[3 Marks]

13. Draw a labelled diagram of the embryonic stage that get 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]

14. Where is an 'operator' located in a prokaryote DNA ? How does an operator regulate gene expression at transcriptional level in a prokaryote ? Explain.

Ans. The operator region is located adjacent to promoter elements / prior to structural gene = $\frac{1}{2}$

In regulation of gene expression

switch off - the repressor binds to the operator region , & prevents transcription = $\frac{1}{2} + \frac{1}{2}$

switch on - In the presence of inducer the repressor is inactivated , (by the interaction with the inducer) and operator allows RNA polymerase access to the promoter , & transcription proceeds = $\frac{1}{2} \times 3$

[3 marks]

15. How does a restriction endonuclease help in DNA recombinant technology ?

Ans. Restriction endonuclease(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]

16 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]

17. 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]

18. 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.

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]

19. (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 = $\frac{1}{2}$

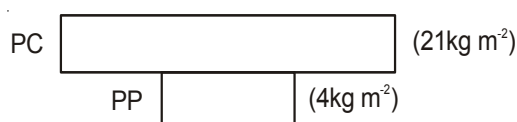
Bacteria which were infected with viruses having radioactive protein coat were not found to contain radioactivity = $\frac{1}{2}$

Conclusion - DNA is the genetic material = 1

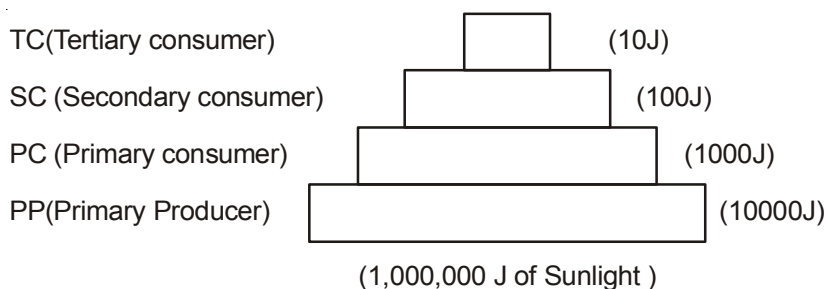
[3 Marks]

20 Draw a pyramid of biomass and pyramid of energy in sea. Give your comment 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 green house 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]

- 21. Co-evolution is a spectacular example of mutualism between an animal and a plant. Describe co-evolution with the help of an example.**

Ans. Fig & wasp = 1

The female wasp uses the fruit for oviposition / egg laying , uses seeds within the fruit (developing seeds) for nourishing its larvae , the wasp pollinates the fig inflorescence, the given fig species can be pollinated by its 'partner' wasp species & no other species = $\frac{1}{2} \times 4 = 2$

or any other correct example

[3 marks]

- 22. (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]

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

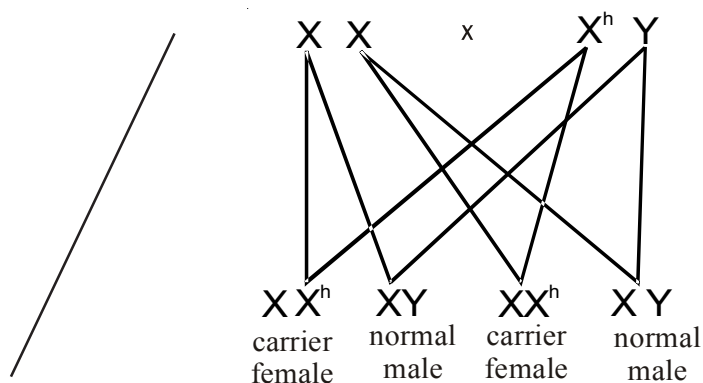
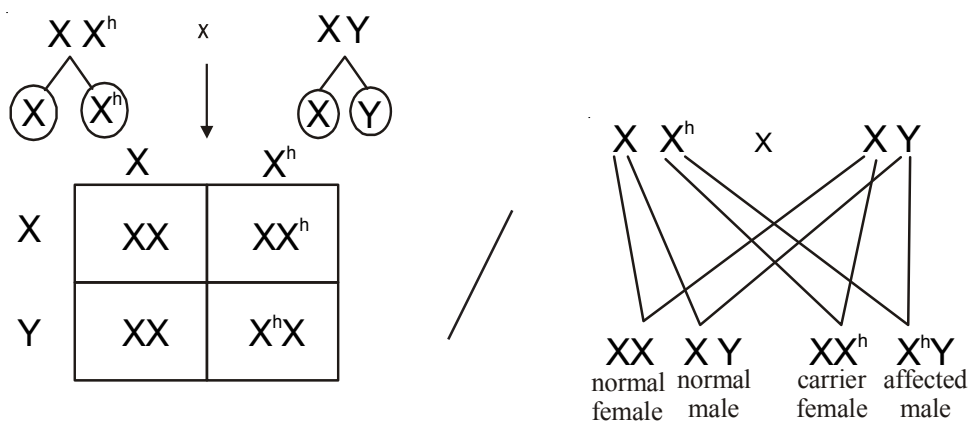
Q. Nos. 24 - 26 are of five marks each

- 24. Thalassaemia and haemophilia are both Mendelian disorders related to blood. Write the symptoms of the diseases. Explain with the help of crosses the difference in the inheritance pattern of the two diseases.**

Ans. Thalassaemia - Anaemia = $\frac{1}{2}$

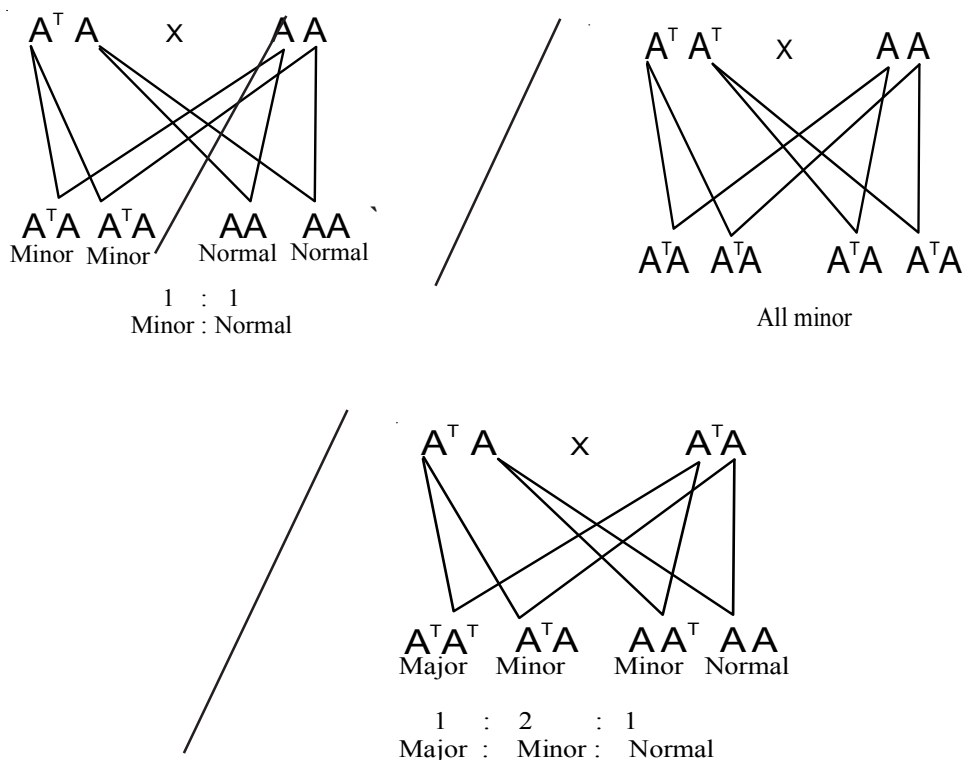
Haemophilia - Non stop bleeding = $\frac{1}{2}$

Haemophilia - Sex linked recessive disorder, is generally passed on from (carrier) mother to some of her sons / from affected father to daughter (carrier) = $\frac{1}{2} + \frac{1}{2}$



Note : - Any one cross, one mark to be given if the entire diagram (cross) is correct

Thalassaemia - Autosomal linked recessive blood disease, inheritance is like Mendelian inheritance pattern = $\frac{1}{2} + \frac{1}{2}$



Note : - Any one cross , one mark to be given if the entire diagram (cross) is correct

[1 + 1 + 1 + 1 + 1 = 5 marks]

OR

- (a) What are fossils ? How are they an evidence for evolution ?
- (b) “Anthropogenic action can lead to evolution.” Explain with the help of an example.

Ans. (a) Fossil - remains / impression of hard parts of life-forms existed in past , found in rocks
= $\frac{1}{2} + \frac{1}{2}$

study of fossils in different sedimentary layers indicates the geological periods in which they existed , and showed that life forms varied over time = 1 + 1

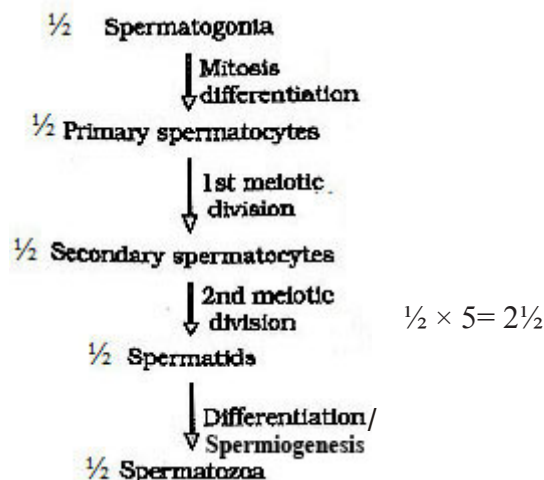
- (b) Excess use of herbicides & pesticides , in crop production , has resulted in selection of resistant varieties of pests , in a much lesser time scale // use of antibiotics or drugs , against microbes , leads to resistant organism , in lesser time scale = $\frac{1}{2} \times 4$

[5 Marks]

25. (a) Where does spermatogenesis occur in human testes ? Describe the process of spermatogenesis up to 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) $\frac{1}{2}$ Seminiferous tubules $\rightarrow$ $\frac{1}{2}$ rete testis $\rightarrow$ $\frac{1}{2}$ Vasa efferentia $\rightarrow$ $\frac{1}{2}$ Epididymis $\rightarrow$ vas deferens $\rightarrow$ (ejaculatory duct)

[5 Marks]

OR

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

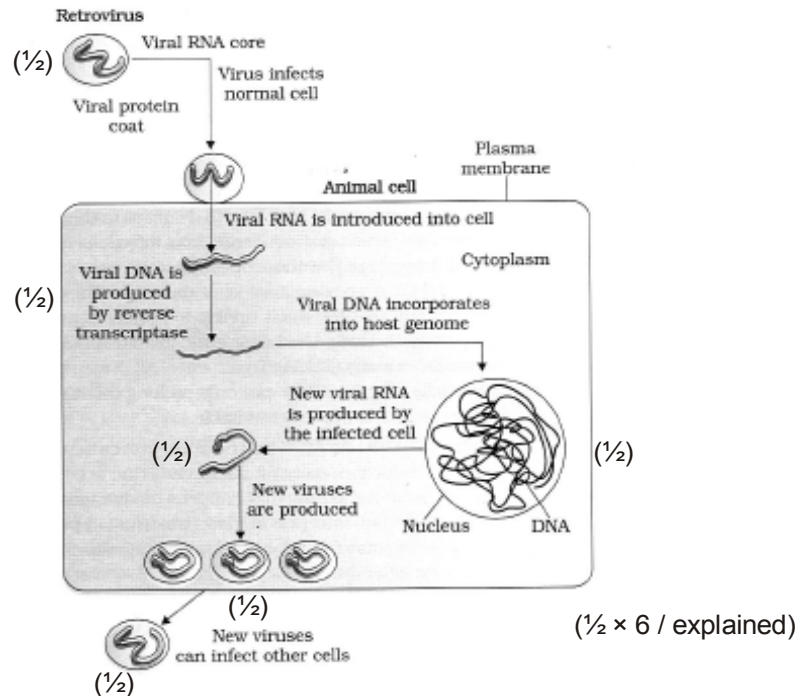
Ans. The pollen grain germinates, on the stigma to produce a pollen tube through one of the germ pores, the content of the pollen grain move into the pollen tube, pollen tube grows through the tissues of the stigma and style and reaches the ovary, the generative cell divides and forms two male gametes 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]

26. (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

- Physical removal of particles through filtration , sedimentation in stages = $\frac{1}{2} + \frac{1}{2}$
- 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]