

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 :

- 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. 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 ?
2. 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.
3. दो जंतुओं के नाम बताइए जिनमें मद चक्र प्रदर्शित होता है । 1
Name two animals that exhibit Oestrus cycle.
4. एक एक्सॉन से एक इन्ट्रॉन में भेद करने के लिए एक अंतर बताइए । 1
Mention one difference to distinguish an exon from an intron.
5. उत्परिवर्तजन क्या होता है ? किसी भौतिक कारक का नाम बताइए जो उत्परिवर्तजन हो सकता है । 1
What is a Mutagen ? Name a physical factor that can be a Mutagen.

खण्ड – ख
SECTION – B

6. हमारे देश में E-अवशिष्टों का निपटान किस प्रकार किया जाता है ? इस अवशिष्ट के निपटान का सही तरीका बताइए । 2

How e-wastes are being handled in our country ? Write the correct solution for treating this waste.

7. 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.

8. प्रसव में ऑक्सीटोसिन की भूमिका बताइए । पिट्यूटरी ग्रंथि से इसके रिसाव को कौन प्रेरित करता है ? 2
State the role of Oxytocin in parturition. What triggers its release from the pituitary ?

9. (a) फसलों के पुष्टीकरण की आज आवश्यकता है । दो कारण बताइए ।
(b) निम्नलिखित में से अलवण जलीय मछली और समुद्री मछली पहचानिए ।
झींगा, केटला, मैकेरल, लॉब्सटर 2

- (a) “Fortification of crops is the need of the hour.” Give two reasons.
(b) Select one fresh-water and one marine fish from the following :

Prawn; Catla; Mackerel; Lobster

10. 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.

खण्ड – ग
SECTION – C

11. प्रतिबंधन एंडोन्यूक्लिऐज़ और एक विलोमानुक्रमी न्यूक्लियोटाइड अनुक्रम के बीच संबंध की व्याख्या उदाहरण सहित कीजिए । **3**

Explain with the help of an example the relationship between restriction endonuclease and a palindromic nucleotide sequence.

12. 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.

13. (a) ओपेरिन-हाल्डेन परिकल्पना बताइए ।
(b) एस.एल. मिलर द्वारा किए गए प्रयोग ने इसका समर्थन किस प्रकार किया ? **3**
(a) State Oparin-Haldane's hypothesis.
(b) How does S.L. Miller's experiment supports it ?

14. (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 ?

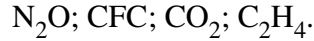
15. जैव विविधता संरक्षण के समर्थन में संकीर्णतः उपयोगी तर्क दिए जाते हैं । इसी उद्देश्य के समर्थन में दिए जाने वाले दो अन्य तर्कों की भी व्याख्या कीजिए । **3**

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.

16. 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 :

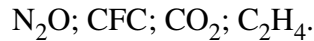


- (b) वैश्विक ऊष्मण का ध्रुवीय बर्फीली चोटियों पर क्या प्रभाव पड़ता है ? इसके संभावी पारिस्थितिकीय प्रभाव की चर्चा कीजिए ।

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.

17. (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.

18. 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.

19. 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.

20. (a) किसी परजीवी को जीवित बने रहने के लिए एक परपोषी के भीतर अनुकूलित होने की आवश्यकता होती है। विभिन्न परजीवी अनुकूलनों की चर्चा कीजिए।
 (b) कोयल और कौवे के बीच पाए जाने वाली शाव परजीविता को दर्शाने वाले अनुकूलन लक्षण की चर्चा कीजिए। 3
- (a) A parasite has to adapt to be able to live in a host. Write the various parasitic adaptations.
 (b) Mention an adaptive feature exhibited in brood parasitism in Koel and Crow.
21. (a) हर्श और चेज़ ने अपने प्रयोग में रेडियो सक्रिय सल्फर और रेडियो सक्रिय फॉस्फोरस 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.
22. 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 ?

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। 4
- (a) क्या आप अपने मित्र का समर्थन करते हैं और क्यों ?
 (b) इस आयु-वर्ग की विशिष्टताएँ लिखिए।
 (c) दो नैदानिक उपाय बताइए।
- 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. (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.

25. (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.

26. (a) मानवों में रंगांधता का कारण और रोग लक्षण बताइए ।
(b) सांख्यिकी आँकड़ों से पता चलता है कि रंगांधता 8 प्रतिशत पुरुषों में पायी जाती है जबकि स्त्रियों में केवल 0.4 प्रतिशतता में रंगांधता पायी जाती है । कारण बताते हुए व्याख्या कीजिए ।

अथवा

- (a) हार्डी-वाइनबर्ग के सिद्धांत का वर्णन कीजिए ।
(b) विविधता से जाति उद्भवन की प्रेरणा मिलती है ?
(c) विविधता से प्रेरित जाति उद्भवन द्वारा आनुवंशिक साम्य पर किस प्रकार प्रभाव पड़ता है ? **5**
- (a) State the cause and symptoms of colour-blindness in humans.
(b) Statistical data has shown that 8% of the human males are colour-blind whereas only 0.4% of females are colour-blind. Explain giving reasons how is it so.

OR

- (a) Describe Hardy-Weinberg's principle.
(b) How do variation lead to speciation ?
(c) How is the genetic equilibrium affected by the variations leading to speciations ?

Question Paper Code 57/2/2

SECTION – A

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

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

[1Mark]

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

Ans. PCR / ELISA = 1

[1 Mark]

3. Name two animals that exhibit oestrus cycle.

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

[1 Mark]

4. 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]

5. What is a Mutagen ? Name a physical factor that can be a Mutagen.

Ans. All the physical and chemical factors that induce mutation , UV radiation / X rays = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

SECTION – B

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

6. How e-wastes are being handled in our country ? Write the correct solution for treating this waste.

Ans. E-wastes are being buried in landfills , or incinerated (manually) = $\frac{1}{2} + \frac{1}{2}$

Recycling , in the environment friendly manner = $\frac{1}{2} + \frac{1}{2}$

[2 Marks]

7. 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]

8. State the role of Oxytocin in parturition. What triggers its release from the pituitary ?

Ans. Oxytocin acts on uterine muscle , and cause stronger uterine contraction , leading expulsion of the foetus / baby out of uterus = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

The signals from fully formed foetus and the placenta which induce mild uterine contraction / foetal ejection reflex triggers release of oxytocin = $\frac{1}{2}$

[2 Marks]

9. (a) “Fortification of crops is the need of the hour.” Give two reasons.

(b) Select one fresh-water and one marine fish from the following :

Prawn; Catla; Mackerel; Lobster

Ans. (a) To improve the nutritional quality , in order to improve public health / to prevent malnutrition = $\frac{1}{2} + \frac{1}{2}$

(b) Fresh water : Catla = $\frac{1}{2}$

Marine fish : Mackerel = $\frac{1}{2}$

[2 Marks]

10. 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]

SECTION – C

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

11. Explain with the help of an example the relationship between restriction endonuclease and a palindromic nucleotide sequence.

Ans. Restriction endonuclease recognises a specific palindromic nucleotide sequence , in the DNA , Restriction endonuclease cuts the strand of DNA a little away from the centre of palindromic nucleotide sequence but between the same two bases on the opposite strands , leaving single stranded portions at the end / sticky ends = $\frac{1}{2} \times 4$

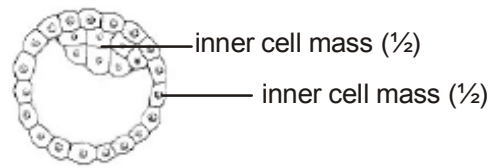


(No mark , if polarity is not shown or if only one strand is shown)

[3 Marks]

12. 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]

13. (a) State Oparin- Haldane's hypothesis ?

(b) How does S.L. Miller's experiment supports it ?

Ans. (a) Life could have come from pre-existing non-living organic molecules , and that formation of life was preceded by chemical evolution = $\frac{1}{2} + \frac{1}{2}$

(b) (S. L. Miller created condition similar to prehistoric earth in the laboratory) He created electric discharge in a closed flask , containing CH_4 H_2 NH_3 and water vapour , at 800°C , observed formation of amino acid (organic molecules) = $\frac{1}{2} \times 4$

//

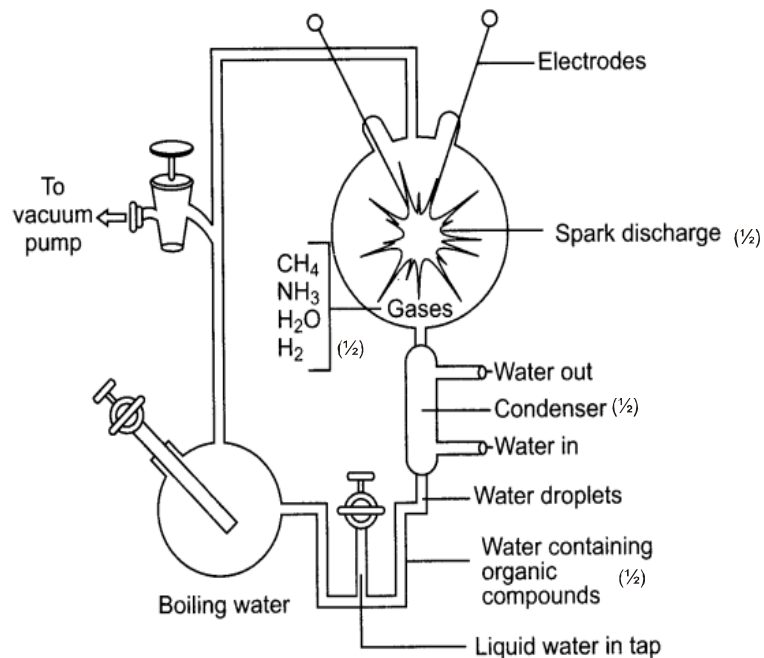


Diagram showing Miller's experiment

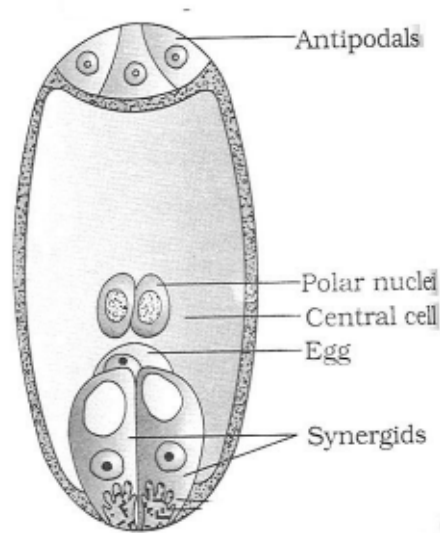
(All four contents in flask to be mentioned otherwise no marks)

[3 Marks]

14. (a) Draw the 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. Ans. (a)



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

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

[3 Marks]

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

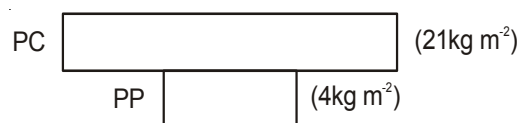
Philosophical / spiritual / moral duty towards future generations = $\frac{1}{2} \times 2 = 1$

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

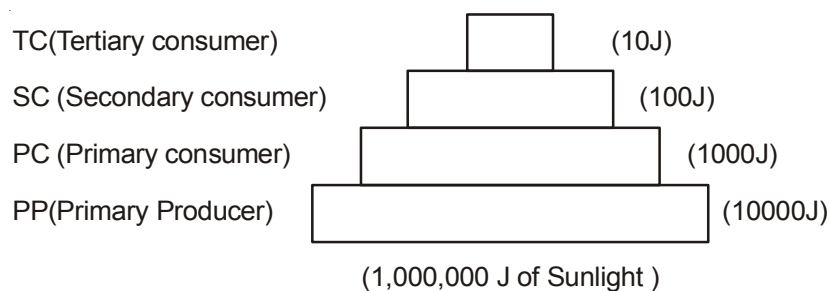
[3 Marks]

16. 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 = ½

The pyramid of energy in sea is upright = ½

[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) $C_2H_4 \rightarrow N_2O \rightarrow CFC \rightarrow CO_2 / N_2O \rightarrow CFC \rightarrow CH_4 \rightarrow CO_2$ (Highest) = 1

Note - Ignore C_2H_4/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 = ½ \times 4 = 2

[3 Marks]

17. (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]

18. 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]

19. **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]

20. (a) **A parasite has to adapt to be able to live in the host. Write the various parasitic adaptations.**

(b) **Mention an adaptive feature exhibited in brood parasitism in Koel and Crow.**

Ans. (a) - Loss of unnecessary sense organs /
- Adhesive organs or suckers to cling on to the host /
- Loss of digestive system /
- High reproductive capacity /
- Loss of chlorophyll and leaves (**any four**) = $\frac{1}{2} \times 4$
(b) The eggs of the parasitic bird (Koel) resemble the host's egg (Crow) in size and colour to reduce the chances of the host bird detecting the foreign eggs and ejecting them out from the nest = 1

[3 Marks]

21. (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]

22. 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]

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]

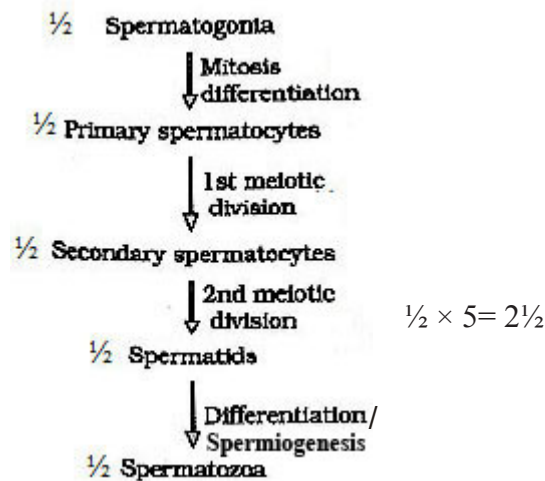
SECTION – E

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

24. (a) 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) $\frac{1}{2}$ 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

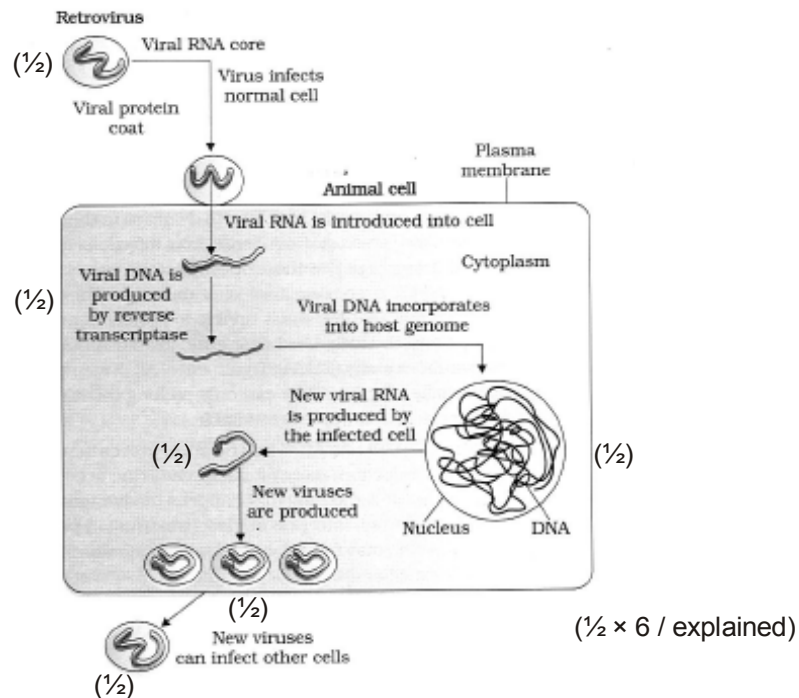
Explain the events upto fertilization that occur in a flower after the pollen grain has landed on its compatible stigma.

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]

25. (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.**

(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]

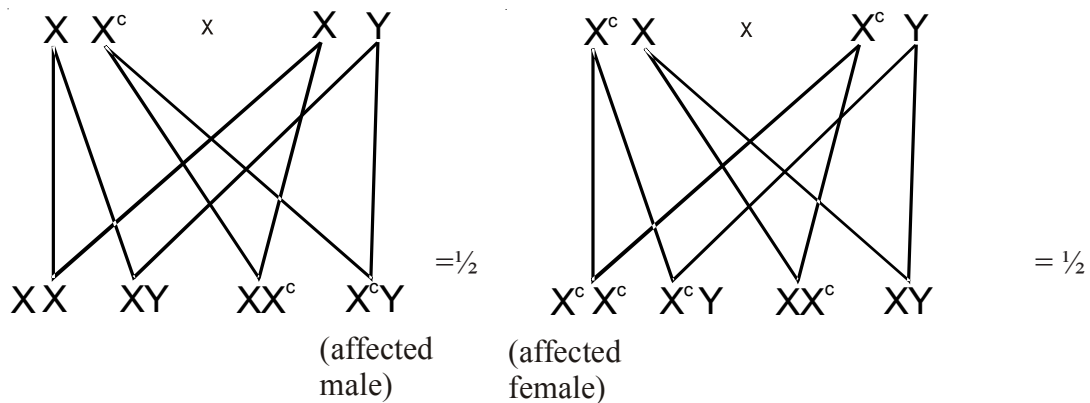
26. (a) State the cause and symptoms of colour-blindness in humans.

(b) Statistical data has shown that 8% of the human males are colour-blind whereas only 0.4% of females are colour-blind. Explain giving reasons how is it so.

Ans. (a) Cause - sex-linked recessive disorder = 1

Symptoms - failure to discriminate between red and green colour = 1

(b) Since males have only one X chromosome gene for colour blindness, if present in any one parent will always be expressed, whereas in female it will be expressed only if it is present on both the X chromosomes, when both parents are carrying gene for colour blindness = $\frac{1}{2} \times 4 = 2$



[5 Marks]

OR

(a) Describe Hardy-Weinberg's principle.

(b) How do variation lead to speciation ?

(c) How is the genetic equilibrium affected by the variations leading to speciation ?

Ans. (a) Allele frequencies in a population are stable and constant from generation to generation, sum total of all the allelic frequencies is 1 = $\frac{1}{2} + \frac{1}{2}$

(b) Accumulation of small and directional variation over the generations become heritable, enabling better survival, to reproduce and leave greater number of progeny, forming a new species = $\frac{1}{2} \times 4 = 2$

(c) As per genetic equilibrium the sum total of all the allelic frequencies in a population is 1, change of frequency of alleles in a population, due to variation causes, disturbance in the genetic equilibrium resulting in speciation (evolution) = $\frac{1}{2} \times 4$

[5 Marks]