SET-1

Series GBM/2

कोड नं.
Code No. **57/2/1**

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 **8** हैं ।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **26** प्रश्न हैं ।
- **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें ।**
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।
- Please check that this question paper contains **8** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **26** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

जीव विज्ञान (सैद्धान्तिक)

BIOLOGY (Theory)

निर्धारित समय : 3 घण्टे *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 **A** में प्रश्न संख्या **1** से **5** अति लघु-उत्तरीय प्रश्न हैं, प्रत्येक प्रश्न **1** अंक का है ।*

(iii) *खण्ड **B** में प्रश्न संख्या **6** से **10** लघु-उत्तरीय प्रश्न I प्रकार के हैं, प्रत्येक प्रश्न **2** अंकों का है ।*

(iv) *खण्ड **C** में प्रश्न संख्या **11** से **22** लघु-उत्तरीय प्रश्न II प्रकार के हैं, प्रत्येक प्रश्न **3** अंकों का है ।*

(v) *खण्ड **D** में प्रश्न संख्या **23** मूल्य आधारित प्रश्न **4** अंकों का है ।*

(vi) *खण्ड **E** में प्रश्न संख्या **24** से **26** दीर्घ-उत्तरीय प्रश्न हैं, प्रत्येक प्रश्न **5** अंकों का है ।*

(vii) *प्रश्न-पत्र में समग्र पर कोई विकल्प 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 । 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 **1** mark each.*

(iii) *Section **B** contains questions number **6** to **10**, short-answer type I questions of **2** marks each.*

(iv) *Section **C** contains questions number **11** to **22**, short-answer type II questions of **3** marks each.*

(v) *Section **D** contains question number **23**, value based question of **4** marks.*

(vi) *Section **E** contains questions number **24** to **26**, long-answer type questions of **5** marks each.*

(vii) *There is no overall choice in the question paper, however, an internal choice is provided in one question of **2** marks, one question of **3** marks and all the three questions of **5** marks. In these questions, an examinee is to attempt any one of the two given alternatives.*

खण्ड A
SECTION A

1. (i) आलू, और (ii) *पिस्टिया* में कायिक प्रवर्ध्यों के नाम बताइए । *1*
Name the vegetative propagules in (i) Potato, and (ii) *Pistia*.

2. एक नर पक्षी एवं एक मादा पक्षी में लिंग गुणसूत्रों के समुच्चयों का उल्लेख कीजिए । *1*
Mention the combination(s) of sex chromosomes in a male and a female bird.

3. एक कोडिंग DNA रज्जुक (strand) के किसी भाग का न्यूक्लिओटाइड अनुक्रम निम्नलिखित है :

– A T G C –

(i) उसके द्वारा प्रतिकृत सिस्टर DNA खंड में, और (ii) उसके द्वारा अनुलेखित *m*-RNA पॉलिन्यूक्लिओटाइड में न्यूक्लिओटाइड अनुक्रम क्या होंगे ? *1*
A region of a coding DNA strand has the following nucleotide sequence :

– A T G C –

What shall be the nucleotide sequence in (i) sister DNA segment it replicates, and (ii) *m*-RNA polynucleotide it transcribes ?

4. *क्राई* जीनों के प्रकार की सूची बनाइए जो क्रमश: मक्का के पौधों और कपास के पौधों में लेपिडोप्टेरान्स (शल्कपंखी) कीटों के प्रति प्रतिरोध प्रदान करते हैं । *1*
List the type of *cry* genes that provide resistance to corn plants and cotton plants respectively against lepidopterans.

5. बहुत छोटे आकार के जन्तु ध्रुवीय क्षेत्रों में बहुत कम ही पाए जाते हैं । दो कारण बताइए । *1*
Very small animals are rarely found in polar regions. Give two reasons.

खण्ड B
SECTION B

6. मानव गर्भाशय में अंत:स्तर गर्भाशय में ल्यूटीनकारी हॉर्मोन की सांद्रता तथा उसे बनाए रखने में पारस्परिक सम्बन्ध बताइए । *2*
Mention the relationship between concentration of luteinising hormone and maintenance of endometrium in the human uterus.

7. एक उदाहरण की सहायता से सहप्रभाविता की व्याख्या कीजिए । *2*

अथवा

जैव विकास के संदर्भ में ह्वेलों, चमगादड़ों और चीते के अग्रपाद क्या व्यक्त करते हैं ? पौधों में इसी प्रकार का एक उदाहरण दीजिए । *2*

Explain codominance with the help of one example.

OR

What do the forelimbs of whales, bats and cheetah with respect to evolution signify ? Provide one such example in plants.

8. बहि:प्रजनन क्या होता है ? किन्हीं दो विधियों का उल्लेख कीजिए जिनके द्वारा यह प्रक्रिया संपन्न होती है । *2*

What is outbreeding ? Mention any two ways it can be carried out.

9. उल्लेख कीजिए कि जैव विविधता की सुरक्षा में *परस्थाने* (*ex-situ*) संरक्षण किस प्रकार सहायता करता है । *2*

State how does *ex-situ* conservation help in protecting biodiversity.

10. हरित गृह (ग्रीन हाउस) गैसों और वैश्विक उष्मण के बीच सम्बन्ध की व्याख्या कीजिए । *2*

Explain the relationship between green house gases and global warming.

खण्ड C
SECTION C

11. पौधों में असंगजनन अलैंगिक जनन से मिलता-जुलता है और साथ ही लैंगिक जनन के सदृश होता है । उपयुक्त उदाहरण की सहायता से व्याख्या कीजिए । *3*

Apomixis resembles asexual reproduction, as well as mimics sexual reproduction in plants. Explain with the help of a suitable example.

12. मानवों में युग्मनज के भ्रूणीय परिवर्धन का उसके अंतर्रोपण तक का वर्णन कीजिए । *3*

Describe the embryonic development of a zygote upto its implantation in humans.

13. मानवों में गुणसूत्री विकारों के कारण की व्याख्या कीजिए । (i) अलिंगसूत्रों, और (ii) लिंग गुणसूत्रों पर एक-एक उदाहरण की सहायता से ऐसे विकारों के प्रभाव का वर्णन कीजिए । *3*

Explain the cause of chromosomal disorders in humans. Describe the effect of such disorders with the help of an example each involving (i) autosomes, and (ii) sex chromosomes.

14. उन प्रयोगों का वर्णन कीजिए जिनके कारण ग्रिफ़िथ के 'रूपांतरण नियमों' की पहचान स्थापित हुई । *3*

Describe the experiments that established the identity of 'transforming principles' of Griffith.

15. पृथ्वी पर जीवन के उद्भव को समझने में लुई पाश्चर के योगदान का उल्लेख कीजिए । उस प्रक्रिया की व्याख्या कीजिए जिसे उन्होंने अपने निष्कर्ष पर पहुँचने के लिए अपनाया । *3*

State the contribution of Louis Pasteur in understanding the origin of life on earth. Explain the procedure that he followed to arrive at his conclusion.

16. अपने खेत में काम करते हुए किसी किसान को एक विषैले साँप ने काट लिया । खेत में काम करते हुए लोगों ने उसे तुरंत पास के स्वास्थ्य केन्द्र पर पहुँचा दिया जहाँ चिकित्सक ने उसका जीवन बचाने के लिए उसे शीघ्र ही एक इंजेक्शन लगा दिया । चिकित्सक ने उसे किस औषधि का इंजेक्शन लगाया और क्यों ? व्याख्या कीजिए । *3*

A farmer while working on his farm was bitten by a poisonous snake. The workers in the farm immediately rushed him to the nearby health centre. The doctor right away gave him an injection to save his life. What did the doctor inject and why ? Explain.

17. किसी जीव के आनुवंशिकीय रूपांतरण के दौरान लिए जाने वाले तीन मूलभूत चरणों की व्याख्या कीजिए । *3*

Explain three basic steps to be followed during genetic modification of an organism.

18. एक वांछित विदेशी जीन उत्पाद को प्राप्त करने के लिए किसी बायोरिऐक्टर से इष्टतम अवस्था पर कार्य कैसे लिया जा सकता है ? व्याख्या कीजिए । *3*

How can a bioreactor be made to function at optimal state in order to obtain a desired foreign gene product ? Explain.

19. β-गैलेक्टोसिडेस कोडिंग अनुक्रम एक वरणयोग्य चिह्नक के रूप में किस प्रकार कार्य करता है ? व्याख्या कीजिए । प्रतिजैविक प्रतिरोधी जीनों के लिए इसे वरीय वरणयोग्य चिह्नक क्यों माना जाता है ? *3*

How does β-galactosidase coding sequence act as a selectable marker ? Explain. Why is it a preferred selectable marker to antibiotic resistance genes ?

20. दो जीवों के बीच के सम्बन्ध को किन परिस्थितियों में सहोपकारी, स्पर्धी और परजीवी के रूप में वर्णित किया जाता है ? प्रत्येक का एक-एक उदाहरण दीजिए । *3*

When do you describe the relationship between two organisms as mutualistic, competitive and parasitic ? Give one example of each type.

21. प्राकृतिक पारितंत्र-चक्रों पर, कार्बन-चक्र के विशिष्ट संदर्भ में, मानव क्रियाकलापों द्वारा होने वाले प्रभावों का वर्णन कीजिए । *3*

Describe the effects of human activities in influencing natural ecosystem cycles with special reference to carbon cycle.

22. जैव विविधता हानि के लिए विजातीय स्पीशीज़ों के सह-विलोपन और निवेशन उत्तरदायी हैं । व्याख्या कीजिए, कैसे । *3*

अथवा

एक जलीय खाद्य शृंखला में DDT का जैव-आवर्धन किस प्रकार घटित होता है, व्याख्या कीजिए । *3*

Co-extinction and introduction of alien species too are responsible for the loss of biodiversity. Explain, how.

OR

Explain how biomagnification of DDT occurs in an aquatic food chain.

खण्ड D
SECTION D

23. अन्य स्कूलों की खेल-कूद टीमों के साथ आपके स्कूल की खेल-कूद टीम भी, उस स्थान पर जहाँ अंत: ज़िला स्कूली खेल-कूद प्रतियोगिता होनी थी, दो दिन पहले ही पहुँच गयी । प्रतियोगिता से एक दिन पहले, अधिकारियों का एक दल (ग्रुप) वहाँ पहुँचा और खेल-कूद प्रतियोगिता में भाग लेने वाले सभी बच्चों से अपना रुधिर और मूत्र के नमूने देने को कहा ।

(a) इस प्रकार के नमूने एकत्र करने के उद्देश्य को क्या आप समर्थन देंगे अथवा नहीं ? अपने उत्तर की व्याख्या कीजिए ।

(b) इन अधिकारियों के इस प्रकार आने के उद्देश्य के बारे में एक टिप्पणी लिखिए जिसे आप अपने सहभागियों को पढ़ाना चाहेंगे । *4*

Your school's athletic team along with the athletic teams from different schools reach the venue two days before the inter district school athletic event was to be held. A day before the competition, a team of officials from an agency arrive and ask for blood and urine samples from all the participating athletes.

(a) Would you support or object to this sample collection ? Provide explanation to your answer.

(b) Write a note that you would like to read out to your team-mates to explain the purpose of this visit of these officials.

खण्ड E
SECTION E

24. (a) पादप प्रजनन प्रयोगों के लिए एकलिंगाश्रयी (पृथकलिंगी) पादप स्पीशीज़ के चुनने के क्या लाभ हैं ?

(b) उभयलिंगाश्रयी फूल के पर-परागण करने के लिए आप क्या कार्यवाही करेंगे ?

(c) एक ऐंजियोस्पर्म के परागकोश की अनुप्रस्थ-काट का नामांकित योजनाबद्ध आरेख बनाइए । *1+2+2=5*

अथवा

(a) मानवों में शुक्राणुजनन के हॉर्मोनी नियमन की व्याख्या कीजिए ।

(b) मानव शुक्राणु का एक आरेख बनाइए । उसके सिर (शीर्ष) के घटकों का नामांकन कीजिए तथा उनके कार्य लिखिए । *3+2=5*

(a) What are the benefits of choosing a dioecious plant species for plant breeding experiments ?

(b) How would you proceed to cross-pollinate a monoecious flower ?

(c) Draw a labelled schematic diagram of T.S. of an anther of an angiosperm.

OR

(a) Explain the hormonal regulation of spermatogenesis in humans.

(b) Draw the diagram of a human sperm. Label and write the functions of the components of its head.

25. मॉर्गन और उनके सहयोगियों द्वारा *ड्रॉसोफिला मेलानोगेस्टर* पर किए गए द्विसंकर क्रॉस का वर्णन कीजिए । अपने प्रेक्षणों के आधार पर उन्होंने सहलग्नता, पुनर्योजन और जीन मैपिंग की व्याख्या किस प्रकार की ? *5*

अथवा

स्थानान्तरण की घटनाओं के दौरान *t*-RNA, *m*-RNA और राइबोसोम्स की पारस्परिक क्रिया का वर्णन कीजिए । *5*

Describe the dihybrid cross carried on *Drosophila melanogaster* by Morgan and his group. How did they explain linkage, recombination and gene mapping on the basis of their observations ?

OR

Describe the interaction of *t*-RNA, *m*-RNA and ribosomes during the events of translation.

26. (a) लसीका ग्रंथियाँ और थाइमस किस प्रकार के लसीकाभ अंग हैं ? प्रतिरक्षा अनुक्रिया उत्पन्न करने में उनकी भूमिका की व्याख्या कीजिए ।

(b) सहज प्रतिरक्षा और उपार्जित प्रतिरक्षा के बीच अंतर स्पष्ट कीजिए । *3+2=5*

अथवा

(a) *ब्रैसिका* और फल वृक्षों की सुरक्षा के लिए *बैसिलस थुरिंजिएंसिस* किस प्रकार एक जैवनियंत्रक कारक के रूप में कार्य करता है ? समझाकर बताइए ।

(b) (i) गोबर गैस (बायोगैस) के घटकों की सूची बनाइए ।

(ii) बायोगैस उत्पादन के लिए मेथैनोजन एक उपयुक्त स्रोत क्यों है ? *3+2=5*

(a) Name the types of lymphoid organs lymph nodes and thymus are. Explain the role played by them in causing immune response.

(b) Differentiate between innate immunity and acquired immunity.

OR

(a) How does *Bacillus thuringiensis* act as a biocontrol agent for protecting *Brassica* and fruit trees ? Explain.

(b) (i) List the components of biogas.

(ii) What makes methanogens a suitable source for biogas production ?

Question Paper Code 57/2/1

SECTION – A

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

1. Name the vegetative propagules in (i) Potato, and (ii) *Pistia.*

Ans. i) Eye / Eye buds = ½ ii) Offset = ½ [1 Mark]

2. Mention the combination(s) of sex chromosomes in a male and a female bird.

Ans. Male-ZZ = ½ , Female-ZW = ½ [1 Mark]

3. A region of a coding DNA strand has the following nucleotide sequence :

-ATGC-

What shall be the nucleotide sequence in (i) sister DNA segment it replicates, and (ii) m-RNA polynucleotide it transcribes ?

Ans. i) -TACG- = ½ , ii) -AUGC - = ½ [1 Mark]

4. List the type of *cry* genes that provide resistance to corn plants and cotton plants respectively against lepidopterans.

Ans. cryIAc/ cryIIAb- cotton = ½

cryIAb -corn = ½ [1 Mark]

5. Very small animals are rarely found in polar regions. Give two reasons.

Ans. Small animals have larger surface area relative to their volume// loose heat very fast, due to small size, expend much energy to generate body heat through metabolism. [1 Mark]

SECTION –B

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

6. Mention the relationship between concentration of luteinising hormone and maintenance of endometrium in the human uterus.

Ans. (Mid cycle) LH surge → formation of corpus luteum → progesterone, maintain the growth of endometrium [½ × 4 = 2 Marks]

7. Explain codominance with the help of one example.

Ans. When the dominant alleles of the same gene which are contributed by both parents are expressed is (called codominance) // F_1 genration resembles both the parentss = ½

In human blood group = ½

Parents $I^A I^A$ $I^B I^B$ = ½

Gametes (I^A) (I^B)

F_1 - $\boxed{I^A I^B}$ = ½

In human red blood cells, alleles I^A and I^B of gene I are both dominant , when I^A & I^B are present together in an individual both are expressed as $I^A I^B$

(AB blood group) = ½ + ½ + ½

[½ × 4 =2 Marks]

OR

What do the forelimbs of whales, bats and cheetah with respect to evolution signify ? Provide one such example in plants.

Ans. Homologous organs // divergent evolution = 1

Thorns of Bougainvillea and tendrils of cucurbita/ any other suitable correct example = 1

[2 Marks]

8. What is outbreeding ? Mention any two ways it can be carried out.

Ans. Breeding of unrelated animals , if from the same breed having no common ancestors for 4-6 generations = ½ + ½

Outcrossing / cross breeding / interspecific hybridisation (any two) = ½ + ½ [2 Marks]

9. State *how* does *ex-situ* conservation help in protecting biodiversity.

Ans. Threatened animals and plants are taken out from their natural habitat and placed in special settings / by cryopreservation technique / in vitro fertilisation of eggs / tissue culture / seedbanks (any four) [½ × 4 = 2 Marks]

10. Explain the relationship between green house gases and global warming.

Ans. Green house gases absorb a major fraction of infra red radiation , emitted by earth , and do not allow it to escape into space and reflects it back to earth, leading to considerable heating of earth and its atmosphere causing global warming = ½ × 4

[2 Marks]

SECTION –C

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

11. Apomixis resembles asexual reproduction, as well as mimics sexual reproduction in plants. Explain with the help of a suitable example.

Ans. Since there is no fertilisation in apomixis it resemble asexual reproduction , and development of embryo / seed / fruit formation is mimicing sexual reproduction , ½ + ½ = 1

In Citrus/ Mango some of the nucellar cells surrounding the embryo sac , act as diploid egg cell , which are formed without reduction division , and develop into embryo , without fertilisation ½ × 4 = 2 [1 + 2 = 3 Marks]

12. Describe the embryonic development of a zygote upto its implantation in humans.

Ans. Zygote moves through isthmus and undergoes cleavage (forming morula) , morula continues to divide and transform into blastocyst (as it moves further into uterus) , Blastomeres in the blastocyst are arranged into an outer layer trophoblast , and inner cell mass , the trophoblast layer gets attached to endometrium , uterine cells divide and cover the blastocyst = ½ × 6

[3 Marks]

13. Explain the cause of chromosomal disorders in humans. Describe the effect of such disorders with the help of an example each involving (i) autosomes, and (ii) sex chromosomes.

Ans. Gain or loss of a chromosome (due to non disjunction) =1

i) Down Syndrome- Additional copy of 21st chromosome/ trisomy of 21 = ½ + ½

ii) Klinefelter's Syndrome- presence of an additional copy of X chromosome leading to XXY // Turner's Syndrome- absence of one of the X chromosome i.e. 45 with XO = ½ + ½

[3 Marks]

14. Describe the experiments that established the identity of 'transforming principles' of Griffith.

Ans. - Purification of biochemicals like Proteins, RNA & DNA from S cells (heat killed) , = ½

- Presence of Protein & RNA in medium did not affect transformation , = ½ + ½
- DNA alone from S Bacteria caused R Bacteria to transform , = ½
- Digestion with DNAase did inhibit transformation , = ½

Conclusion: DNA is the transforming chemical / biochemical , = ½

[3 Marks]

15. State the contribution of Louis Pasteur in understanding the origin of life on earth. Explain the procedure that he followed to arrive at his conclusion.

Ans. - Pasteur in his experiment took a flask containing sugar solution and added yeast to it , then boiled the contents of the flask so that yeast got killed . = ½ + ½

In presterlized sealed flask , life did not come from killed yeast = ½ + ½

- In open flask (open to air) life comes from pre existing life , new living organisms arose in presence of killed yeast = ½ + ½

[3 Marks]

16. A farmer while working on his farm was bitten by a poisonous snake. The workers in the farm immediately rushed him to the nearby health centre. The doctor right away gave him an injection to save his life. What did the doctor inject and why ? Explain.

Ans. - Antitoxin / Antivenoms / Preformed antibodies = 1

- Whenever quick immune response is required we need to directly inject preformed antibodies / Antitoxins = ½ + ½
- To neutralize snake venom quickly , passive immunity is provided = ½ + ½

[1 × 3 = 3 Marks]

17. Explain three basic steps to be followed during genetic modification of an organism.

Ans. (i) Identification of DNA with desirable genes , so that the genetically modifed organism has largely desirable genes = ½ + ½

(ii) Introduction of the DNA with desirable genes , into the host using vector = ½ + ½

(iii) Maintenance of introduced DNA in the host , and transfer of the DNA to its progeny through cloning = ½ + ½

[1× 3= 3 Marks]

18. How can a bioreactor be made to function at optimal state in order to obtain a desired foreign gene product ? Explain.

Ans. By providing optimum growth conditions :

Temperature , pH , substrate , salts , vitamins , oxygen

[½ × 6 = 3 Marks]

19. How does β-galactosidase coding sequence act as a selectable marker ? Explain. Why is it a preferred selectable marker to antibiotic resistance genes ?

Ans. (i) Presence of a chromogenic substrate gives blue colour , if the plasmid in the bacteria does not have an insert (non-recombinants) = ½ + ½

(ii) With the insert do not produce any colour , recombinant colonies = ½ + ½

(iii) Selection of recombinants due to inactivation of antibiotics , requires simultaneous plating on two plates having different antibiotics / process is more cumbersome = ½ + ½

[1 × 3= 3 Marks]

20. When do you describe the relationship between two organisms as mutualistic, competitive and parasitic ? Give one example of each type.

Ans. Mutualistic - Both the interacting organisms are benefitted from each other e.g. Lichens- Algae and fungi mutually help each other or any other appropriate example = ½ + ½

Competition - When two organisms belonging to closely related species/ unrelated groups compete for the same resources that are limiting both are losers , e.g. superior barnacle dominates and excludes the small barnacles / in some South American lakes visiting flamingoes and resident fishes compete for their common food (zooplankton) in the lake / any other appropriate example = ½ + ½

Parasitic - One of the two organisms is dependent on the other(host) for nutrition and support / the host is harmed and the parasite is benefitted . e.g. Malarial parasite and human / Cuscuta on host plant / or any other appropriate example = ½ + ½

[1 + 1 + 1 = 3 Marks]

21. Describe the effects of human activities in influencing natural ecosystem cycles with special reference to carbon cycle.

Ans. Rapid deforestation , massive burning of fossil fuel , have significantly increased the rate of release of carbon dioxide , polluting atmosphere , this green house gas , contributes to global warming

[½ × 6 = 3 Marks]

22. Co-extinction and introduction of alien species too are responsible for the loss of biodiversity. Explain, how.

Ans. Co-extinction- When a species becomes extinct, the plant and animal species associated with it in the obligatory way , also becomes extinct = ½ × 3 = 1½

Introduction of alien species - When alien species are introduced, some of them turn invasive (because of not having their predator there) , and hence cause decline / extinction of indigenous species = ½ × 3 = 1½

[1½ + = 1½ = 3 Marks]

OR

Explain how biomagnification of DDT occurs in an aquatic food chain.

Ans. DDT in water taken up by an organism cannot be metabolised or excreted and thus passed on to successive trophic level in higher concentration = ½

Water 0.003 ppm → Zooplankton 0.04 ppm → Small fish 0.5 ppm → Large fish 2 ppm → Fish eating birds 25 ppm = ½ × 5 = 2½

[3 Marks]

SECTION –D

Q Nos. 23 is of four marks each

23. Your school's athletic team along with the athletic teams from different schools reach the venue two days before the inter district school athletic event was to be held. A day before the competition, a team of officials from an agency arrive and ask for blood and urine samples from all the participating athletes.

(a) Would you support or object to this sample collection ? Provide explanation to your answer.

(b) Write a note that you would like to read out to your team-mates to explain the purpose of this visit of these officials.

Ans. (a) Yes I support = ½

- Many times children take drugs , to improve their performance in sports out of curiosity / anxiety / intentionally = ½ + ½ + ½
- To test the fact that performance of child in the sports is natural or drug induced , to be fair on everybody's part this test is essential = ½ + ½

(b) A team of officials from an agency have asked for blood and urine samples from all participants because these samples when analysed will show the presence of drugs , if anybody has taken , this is as per the rule all over the world for any sports competition = ½ + ½

[½ +1 ½ + 1 + 1 = 4 Marks]

SECTION –E

Q Nos. 24-26 are of five marks each

24. (a) What are the benefits of choosing a dioecious plant species for plant breeding experiments ?

(b) How would you proceed to cross-pollinate a monoecious flower ?

(c) Draw a labelled schematic diagram of T.S. of an anther of an angiosperm.

Ans (a) (Unisexual) self pollination avoided , emasculation not required = ½ + ½ = 1

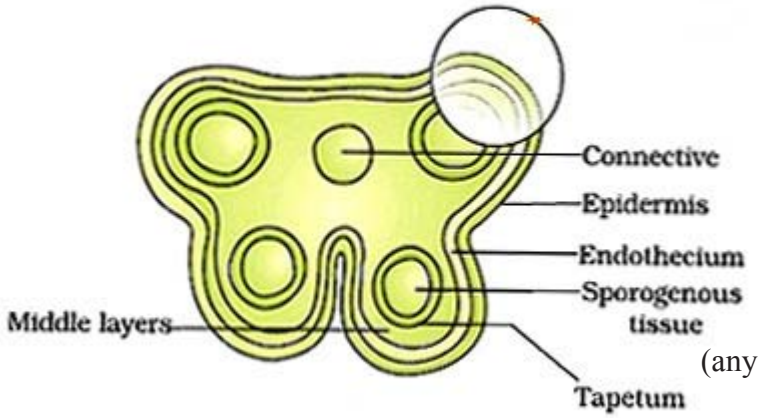
(b) - Emasculation

-Bagging

-Pollination by spraying desired pollen

-Rebagging = ½ × 4 =2

(c)



(any four labels) = ½ × 4 =2

[1 + 2 +2 = 5 Marks]

OR

(a) Explain the hormonal regulation of spermatogenesis in humans.

(b) Draw the diagram of a human sperm. Label and write the functions of the components of its head.

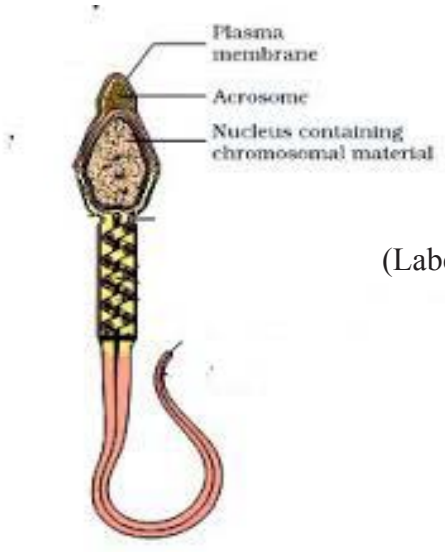
Ans. (a) - Initiation by GnRH from hypothalamus which acts on Anterior Pituitary to release FSH & LH (Gonadotropins) = 1

-LH acts on cells of Leydig / Interstitial cells to secrete androgens = ½

-Androgens in turn stimulate the process of spermatogenesis = ½

-FSH acts on Sertoli cells and stimulates the secretions of some factors that stimulate spermio genesis = 1

(b)



(Label any two parts of the head) = ½ + ½ = 1

Function of plasma membrane :Envelopes the whole body of sperm.

Acrosome- contains enzymes for fertilization

Nucleus : Contains haploid chromosomal material

(Any two =½ + ½ = 1) [5 Marks]

25. Describe the dihybrid cross carried on *Drosophila melanogaster* by Morgan and his group. How did they explain linkage, recombination and gene mapping on the basis of their observations ?

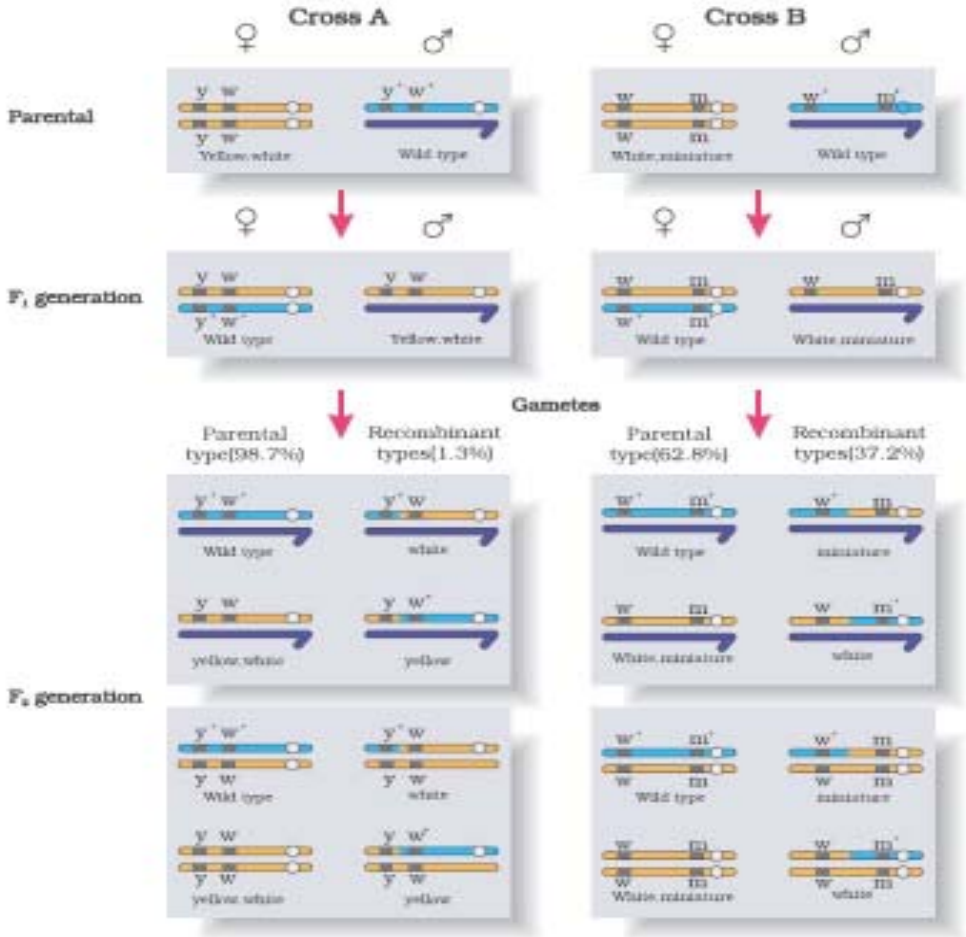
Ans. According to Morgan and his group if genes were very tightly linked they showed very low recombination = 1

(shown in cross A) = 1

If genes were loosely linked they showed very high recombination = 1

(shown in cross B) =1

The group used the frequency of recombination between gene pairs on the same chromosome as a measure of distance between genes and 'mapped' their position on the chromosome = 1



[1 × = 5 = 5 Marks]

OR

Describe the interaction of t-RNA, m-RNA and ribosomes during the events of translation.

Ans. - for initiation the ribosome binds to the mRNA at the start codon / AUG = 1

- charged tRNA binds to the appropriate codon on mRNA forming complementary base pairs on tRNA as anti codon in the ribosome = 2

- Ribosomes moves from codon to codon along mRNA , aminoacids are added one by one brought by tRNA , form the polypeptide chain = 2

[1 + 2 + 2 = 5 Marks]

26. (a) Name the types of lymphoid organs lymph nodes and thymus are. Explain the role played by them in causing immune response.

(b) Differentiate between innate immunity and acquired immunity.

Ans. a) Thymus- Primary lymphoid organ, immature lymphocytes differentiate here, into antigen-sensitive lymphocytes = ½ × 3 = 1½

Lymph nodes- secondary lymphoid organ , they seem to trap the microorganisms or other antigen , which are responsible for activation of lymphocytes present there (and cause immune response) = ½ × 3 = 1½

(b)

Innate Immunity	Acquired Immunity
- non-specific type of response	- pathogen specific defense
- present at the time of birth	- acquired by the body after birth
- provides barrier to the entry of foreign agents into our body	- characterised by memory
- four types (physical barriers , physiological barriers , cellular barriers , cytokine barriers)	- two types- primary & secondary (**any two differences**) 1 + 1 = 2

[3 + 2 = 5 Marks]

OR

(a) How does *Bacillus thuringiensis* act as a biocontrol agent for protecting *Brassica* and fruit trees ? Explain.

(b) (i) List the components of biogas.

(i) What makes methanogens a suitable source for biogas production ?

Ans. (a) Bacterium *Bacillus thuringiensis* (Bt) are available in sachets as dried spores, mixed with water and sprayed onto vulnerable plants , these are eaten up by the insect larvae , the toxins are released in the gut and larvae gets killed = ½ × 4 = 2

(b) Methane , H_2S , CO_2 , H_2 (any two = ½ , any three = 1)

(c) Methanogens grow anaerobically , on cellulosic material , produce large amount of methane , alongwith CO_2 & H_2 = ½ × 4 = 2

[2 + 3 = 5 Marks]