SET-2

Series GBM/2

कोड नं.
Code No. **57/2/2**

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. 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.

2. 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 ?

3. *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.

4. 1·36 mm लम्बे DNA खण्ड में कितने क्षारक युग्म होते हैं ? *1*

How many base pairs would a DNA segment of length 1·36 mm have ?

5. (i) आलू, और (ii) *पिस्टिया* में कायिक प्रवर्ध्यों के नाम बताइए । *1*

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

खण्ड B
SECTION B

6. MOET टेक्नोलॉजी में, एक बछड़ा उत्पन्न करने के लिए दो 'माँओं' की आवश्यकता होती है । पुष्टि कीजिए । *2*

In MOET technology, two 'mothers' are needed to produce one calf. Justify.

7. औद्योगिक और घरेलू उपकरणों के उत्पादन में CFCs के प्रयोग को कम करने के लिए नियमित अनुस्मारक क्यों दिए जाते हैं ? समझाइए । *2*

Why are there regular reminders to reduce the use of CFCs in the production of industrial and household appliances ? Explain.

8. 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.

9. आर्तव चक्र के दौरान पिट्यूटरी और अंडाशयी हॉर्मोनों के बीच सम्बन्धों का उल्लेख कीजिए । *2*

Mention the relationships between pituitary and ovarian hormones during a menstrual cycle.

10. 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.

खण्ड C
SECTION C

11. 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.

12. 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.

13. 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.

14. 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.

15. (a) प्रतिकृतीयन द्विशाख का एक नामांकित योजनाबद्ध आरेख बनाइए जिसमें DNA रज्जुकों के संतत और असंतत प्रतिकृतीयन दर्शाए गए हों ।

(b) दिखाए गए आरेख में संतत और असंतत प्रतिकृतीयन का कारण लिखिए । *3*

(a) Draw a labelled schematic diagram of a replication fork showing continuous and discontinuous replication of DNA strands.

(b) State a reason why is the replication continuous and discontinuous in the diagram drawn.

16. जीवन के उद्‌भव के बारे में एस.एल. मिलर द्वारा किए गए प्रयोग का वर्णन कीजिए । प्रयोग के अंत में निकाला गया निष्कर्ष भी लिखिए । *3*

Describe the experiment of S.L. Miller on the origin of life. Write the conclusion drawn at the end of the experiment.

17. 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 ?

18. 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.

19. निम्नलिखित समष्टि पारस्परिकक्रियाओं के बीच अंतरों और एक समानता को उजागर कीजिए :

स्पर्धा, परभक्षण और सहभोजिता । *3*

Highlight the differences and a similarity between the following population interactions :

competition, predation and commensalism.

20. 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.

21. 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.

22. 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.

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. 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.

25. (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 ?

26. (a) *वियोला* (पैंसी) द्वारा उत्पन्न पुष्पों के प्रकारों के नाम लिखिए और बताइए कि वे एक-दूसरे से किस प्रकार भिन्न होते हैं ।

(b) एक प्रकार के पुष्पों में परागण के उस प्रकार का वर्णन कीजिए जो बीज-सेट उत्पादन को सुनिश्चित करता है ।

(c) *वैलिसनेरिया* में परागण-प्रक्रिया का वर्णन कीजिए । *5*

अथवा

(a) उस तकनीक का वर्णन कीजिए जो एक ऐसी स्वस्थ विवाहित महिला की मदद कर सकती है जो जननक्षय अंडाणु उत्पन्न करने में असमर्थ है, लेकिन बच्चा पैदा करना चाहती है ।

(b) मानव अंडाणु का नामांकित आरेख बनाइए ।

(c) मानवों में बहुशुक्राणुता को किस प्रकार रोका जाता है ? *5*

(a) Name the types of flowers produced by *Viola* (Pansy). How do they differ from each other ?

(b) Describe the kind of pollination in one of the types of flowers that ensures seed-set production.

(c) Describe the process of pollination in *Vallisneria*.

OR

(a) Describe the technique that can help a healthy married woman who is unable to produce viable ova but wants to bear a child.

(b) Draw a labelled diagram of a human ovum.

(c) How is polyspermy prevented in humans ?

Question Paper Code 57/2/2

SECTION – A

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

1. 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]

2. 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) -ATGC- = ½ , ii) -AUGC - = ½ [1 Mark]

3. 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]

4. How many base pairs would a DNA segment of length 1.36 mm have ?

Ans. $4 \times 10^6 = 1$ [1 Marks]

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

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

SECTION – B

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

6. In MOET technology, two 'mothers' are needed to produce one calf. Justify.

Ans. One mother contributes fertilised eggs (8-32 cell stage) , the other is surrogate [1 × 2 = 2 Marks]

7. Why are there regular reminders to reduce the use of CFCs in the production of industrial and household appliances ? Explain.

Ans. - CFC adds to degradation of ozone layer in the stratosphere

- Ozone shields the earth by absorbing UV radiation from sun

- UV rays are highly injurious to organisms

- To prevent degradation of ozone layer (in stratosphere) / to maintain a balance between production and degradation of ozone in stratosphere = ½ × 4 = 2 [2 Marks]

8. 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]

9. Mention the relationships between pituitary and ovarian hormones during a menstrual cycle.

Ans. - FSH stimulate follicular development and secretion of estrogen = 1

- LH induces ovulation and development of corpus luteum which secretes progesterone = 1

[1 + 1= 2 Marks]

10. 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 (IA) (IB)

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]

SECTION – C

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

11. 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 =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]

12. 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]

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

Ans. 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 × 6 [3 Marks]

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

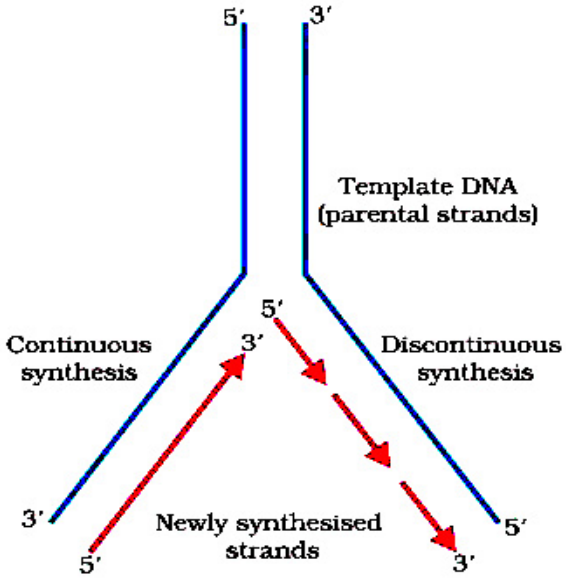
Ans. Zygote moves through isthmus and undergoes cleavage (forming morula) , morula continues to divide and transform into blastocyst (as it moves further into uterus) , Blastomeres in the blastocyst are arranged into an outer layer trophoblast , and inner cell mass , the trophoblast layer gets attached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

[3 Marks]

15. (a) Draw a labelled schematic diagram of a replication fork showing continuous and discontinuous replication of DNA strands.

(b) State a reason why is the replication continuous and discontinuous in the diagram drawn.

Ans. (a)



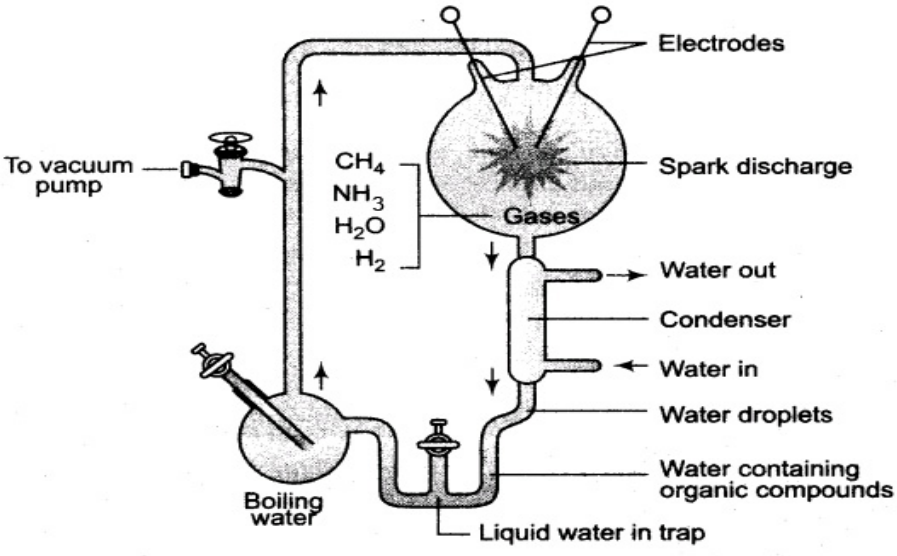
4 labellings = ½ × 4 = 2

(b) 2 strands are antiparallel , DNA polymerase acts only in one direction i.e. 5' → 3'
½ + ½ = 1

[3 Marks]

16. Describe the experiment of S.L. Miller on the origin of life. Write the conclusion drawn at the end of the experiment.

Ans.



Diagrammatic representation of Miller-Urey experiment

The set-up created conditions like that of primitive atmosphere , Electrical discharge with electrodes in closed flask , containing CH_4 NH_3 H_2 H_2O vapour , - observed formation of amino acids ½ × 4 = 2

Conclusion : The first form of life arose through evolutionary forces from non-living molecules / abiogenesis = 1

[3 Marks]

17. 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]

18. 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]

19. Highlight the differences and a similarity between the following population interactions : competition, predation and commensalism.

Ans.

	Competition	Predation	Commensalism
Differences	Both species lose in their interaction	Only one species benefits in their interaction	One species is benefitted and the other is neither benefitted nor harmed in their interaction
Simlarity	Both the interacting species live together	Both the interacting species live together	Both the interacting species live together

= ½ × 6 = 3 [3 Marks]

20. 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]

21. 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]

22. 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]

SECTION – D

Q. No. 23 is of four mark

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 banned 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 presence of chemicals that indicate intake of banned drugs if 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. 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 ?

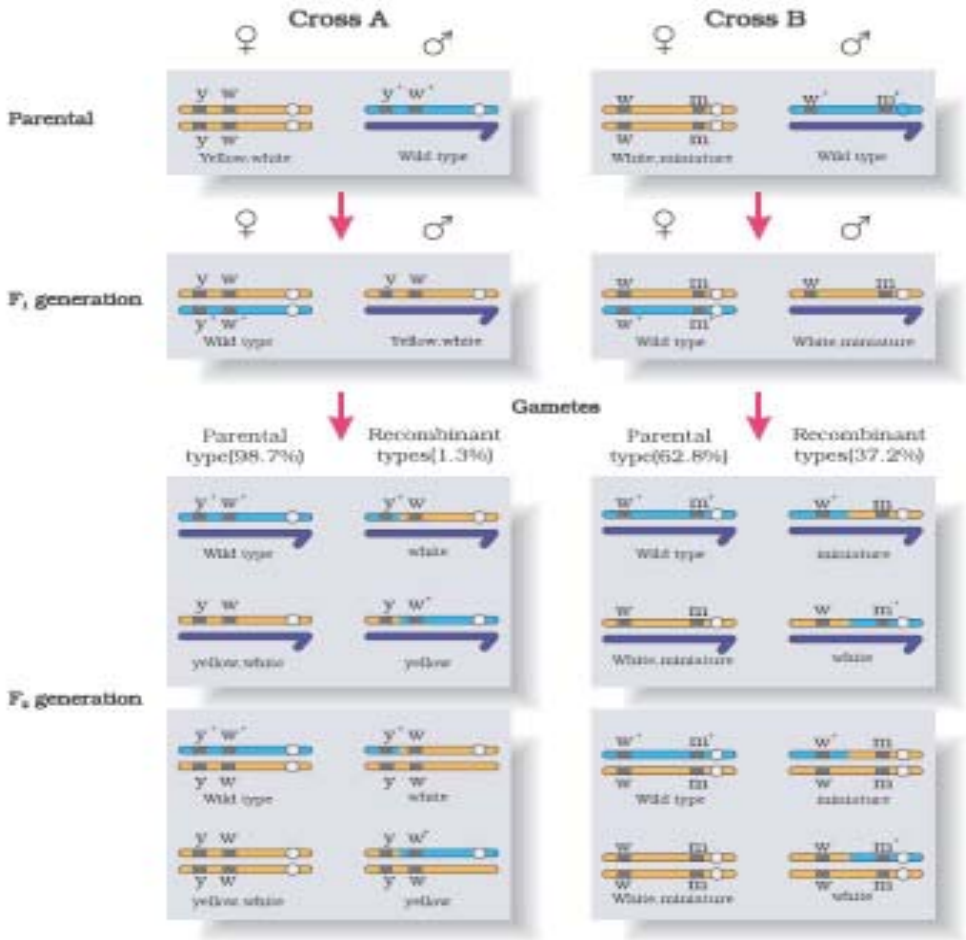
Ans. According to Morgan and his group if genes were very tightly linked they showed very low recombination = 1

(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 = 1 + 1

- Ribosomes moves from codon to codon along mRNA , aminoacids are added one by one brought by tRNA to form the polypeptide chain = 1 + 1

[1 + 2 + 2 = 5 Marks]

25. (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.

ns. 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.

(ii) 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]

26. (a) Name the types of flowers produced by *Viola* (Pansy). How do they differ from each other ?

(b) Describe the kind of pollination in one of the types of flowers that ensures seed-set production.

(c) Describe the process of pollination in *Vallisneria*.

Ans. (a) Chasmogamous - Flower have exposed anther and stigma = ½ + ½

Cleistogamous - flowers do not open at all = ½ + ½

(b) Self pollination / autogamy in cleistogamous flowers , in which anther and stigma lie close to each other and when anthers dehisce pollen grains come in contact with the stigma = ½ + ½

(c) The female flowers reach the surface of the water by the long stalk , and male flowers / pollen grains are released to the surface of water , carried passively by water currents, some reach stigma of female flower ½ × 4 = 2

[2 + 1 + 2 = 5 Marks]

OR

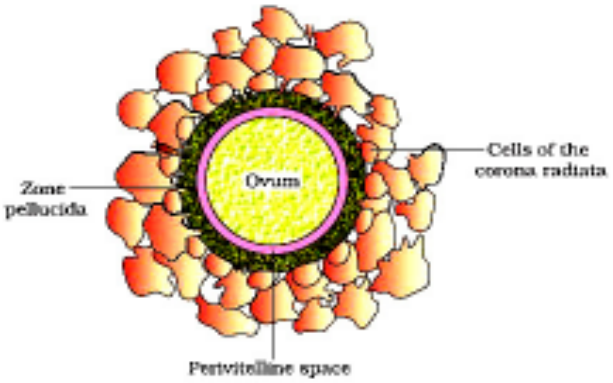
(a) Describe the technique that can help a healthy married woman who is unable to produce viable ova but wants to bear a child.

(b) Draw a labelled diagram of a human ovum.

(c) How is polyspermy prevented in humans ?

Ans. (a) GIFT / Gamete Intra Fallopian transfer - Transfer of an ovum collected from a donor , into the fallopian tube of a healthy married female , who does not produce viable eggs , but can provide suitblae environment for fertilisation $4 \times ½ = 2$

(b)



$4 \times ½ = 2$

(c) During fertilisation a sperm comes in contact with the zona pellucida layer of the ovum , induces changes in the membrane (& block the entry of additional sperms) = ½ + ½ = 1

[2 + 2 + 1 = 5 Marks]