रोल नं.
Roll No.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **11** 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 **11** 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.

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जीव विज्ञान (सैद्धान्तिक)

BIOLOGY (Theory)

</div>

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 प्रकार *I* के हैं, प्रत्येक प्रश्न *2* अंकों का है।

(iv) खण्ड *C* में प्रश्न संख्या *11* से *22* लघु-उत्तरीय प्रश्न प्रकार *II* 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. मोटर गाड़ियों के ईंधन में डीज़ल के स्थान पर CNG को वरीयता दिए जाने के दो लाभ बताइए। **1**

Mention two advantages for preferring CNG over diesel as an automobile fuel.

2. पारजीनी जंतु कौन होते हैं ? एक उदाहरण दीजिए। **1**

What are transgenic animals. Give an example.

3. *होमो हैबिलिस* और *होमो इरेक्टस* की आहार-प्रवृत्तियों में संभावी अंतर बताइए। **1**

Write the probable differences in eating habits of *Homo habilis* and *Homo erectus*.

4. MOET में 'आनुवंशिक माँ' की भूमिका की चर्चा कीजिए। **1**

Mention the role of 'genetic mother' in MOET.

5. नर मधुमक्खी में 16 गुणसूत्र होते हैं जबकि उसकी मादा में 32 गुणसूत्र होते हैं। एक कारण बताइए। **1**

A male honeybee has 16 chromosomes whereas its female has 32 chromosomes. Give one reason.

खण्ड – B
SECTION - B

6. एक मुक्त-जीवी और एक सहजीवी बैक्टीरिया के नाम बताइए जो जैव उर्वरक के रूप में कार्य करते हैं। इन्हें यह नाम क्यों दिया गया है ? **2**

Name a free-living and a symbiotic bacterium that serve as bio-fertilizer. Why are they so called ?

7. मानव के शरीर को संक्रमित करने के बाद HIV (मानव प्रतिरक्षा न्यूनता वायरस) कौन-सी कोशिकाओं के भीतर प्रवेश करता है? इन कोशिकाओं के भीतर होने वाली घटनाओं की व्याख्या कीजिए। **2**

Name the cells HIV (Human Immunodeficiency Virus) gains entry into after infecting the human body. Explain the events that occur in these cells.

8. समतापमंडल में CFC's और ओजोन के बीच परस्पर संबंध की व्याख्या कीजिए। **2**

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अथवा

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पवित्र उपवन अत्यधिक रक्षित क्यों होते हैं?

Explain the relationship between CFC's and Ozone in the stratosphere.

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OR

</div>

Why are sacred groves highly protected ?

9. नीचे आनुवंशिक कोडों के लक्षण दिए गए हैं। इनमें से प्रत्येक किसका संकेत देता है? **2**

रोध कोडोन, असंदिग्ध कोडोन, अपह्रासित कोडोन, सार्वभौमिक कोडोन।

Following are the features of genetic codes. What does each one indicate ?

Stop codon; Unambiguous codon; Degenerate codon; Universal codon.

10. आपके बगीचे में उग रहे पपीते के अनेक पौधों में से केवल कुछ ही में फल लगते हैं। कारण बताइए। **2**

Out of many papaya plants growing in your garden, only a few bear fruits. Give reason.

खण्ड – C

SECTION - C

11. (a) उन परम्परागत प्रजनन तकनीकों की दो सीमाएँ बताइए जो सूक्ष्म प्रवर्धन को बढ़ावा देती हैं। **3**

(b) सूक्ष्म प्रवर्धन के दो लाभ बताइए।

(c) दो उदाहरण दीजिए जहाँ इस विधि को व्यापारिक स्तर पर अपनाया जाता है।

(a) Write the two limitations of traditional breeding technique that led to promotion of micro propagation.

(b) Mention two advantages of micro propagation.

(c) Give two examples where it is commercially adopted.

12. (a) यह सामान्य रूप से देखा जाता है कि जिन बच्चों को उनके बचपन में छोटी माता का संक्रमण हो जाता है, हो सकता है कि उनकी वयस्कावस्था में यह रोग नहीं हो। किसी व्यक्ति में ऐसी प्रतिरक्षा के आधार का कारण बताते हुए व्याख्या कीजिए। इस प्रकार के प्रतिरक्षा का नाम बताइए। **3**

(b) इंटरफ़ेरॉन क्या होते हैं ? उनकी भूमिका बताइए।

(a) It is generally observed that the children who had suffered from chicken - pox in their childhood may not contract the same disease in their adulthood. Explain giving reasons the basis of such an immunity in an individual. Name this kind of immunity.

(b) What are interferons ? Mention their role.

13. समजात अंग किस प्रकार अपसारी विकास का निरूपण करते हैं ? एक उपयुक्त उदाहरण देते हुए व्याख्या कीजिए। **3**

How do homologous organs represent divergent evolution ? Explain with the help of a suitable example.

14. गर्भनिरोधक गोलियों के रचक दो हॉर्मोनों के नाम बताइए। इन्हें उत्तम और कारगर गर्भनिरोधक **3** क्यों माना जाता है ? वह गैर-स्टेरॉयड गोली कौन-सी है जिसको खाने की सलाह आमतौर से चिकित्सक देते हैं ?

अथवा

(a) कुछ पौधों द्वारा अनिषेक फलन फल और कुछ अन्य पौधों द्वारा असंग जनिक बीज किस प्रकार उत्पन्न किए जाते हैं ? व्याख्या कीजिए।

(b) किसान असंग जनिक बीजों का उत्पादन कब पसंद करते हैं ?

Name two hormones that are constituents of contraceptive pills. Why do they have high and effective contraceptive value ? Name a commonly prescribed non-steroidal oral pill.

OR

(a) How are Parthenocarpic fruits produced by some plants and apomictic seeds by some others ? Explain.

(b) When do farmers prefer using apomictic seeds ?

15. (a) मानव जीनोम परियोजना (HGP) में इस्तेमाल किए जाने वाले 'YAC' और 'BAC' में **3** 'Y' और 'B' किसके लिए प्रयुक्त होते हैं ? परियोजना में उनकी भूमिका बताइए।

(b) सकल मानव जीनोम की प्रतिशतता लिखिए जो प्रोटीनों का कूटलेखन (कोडन) करती है और खोजे गए उन जीनों की प्रतिशतता भी बताइए। जिनके कार्य भी विदित हैं, जैसे कि HGP के दौरान देखे गए।

(c) HGP में वैज्ञानिकों द्वारा पहचाने गए 'SNP' का पूरा-पूरा नाम लिखिए।

(a) What do 'Y' and 'B' stand for in 'YAC' and 'BAC' used in Human Genome Project (HGP). Mention their role in the project.

(b) Write the percentage of the total human genome that codes for proteins and the percentage of discovered genes whose functions are known as observed during HGP.

(c) Expand 'SNPs' identified by scientists in HGP.

16. ऐडेनोजीन डिएेमीनेज़ न्यूनता के उपचार में एंज़ाइम-प्रतिस्थापन चिकित्सा की व्याख्या कीजिए। **3**
इस विधि के दो नुकसान बताइए।

Explain enzyme-replacement therapy to treat adenosine deaminase deficiency.
Mention two disadvantages of this procedure.

17. परीक्षार्थ क्रॉस क्या होता है? इससे पौधे की विषमयुग्मजता का पता निश्चय रूप से किस प्रकार **3**
लगाया जा सकता है?

What is a test cross ? How can it decipher the heterozygosity of a plant ?

18. (a) जैव किसान पीड़कों का नियंत्रण किस प्रकार करते हैं? दो उदाहरण दीजिए। **3**

(b) परंपरागत पीड़क-नियंत्रण विधियों और उपरोक्त किसानों के उपागम में अंतर बताइए।

(a) How do organic farmers control pests ? Give two examples.

(b) State the difference in their approach from that of conventional pest
control methods.

19. (a) क्लोनिंग वेक्टर (संवाहक) pBR322 में वरण योग्य चिह्नक का नाम बताइए। इनकी **3**
भूमिका की भी चर्चा कीजिए।

(b) ऊपर बताए गए चिह्नकों की तुलना में एंज़ाइम β गैलैक्टोसाइडेज के कोडिंग अनुक्रम का
एक वरण योग्य चिह्नक माना जाता है, क्यों?

(a) Name the selectable markers in the cloning vector pBR322 ? Mention
the role they play.

(b) Why is the coding sequence of an enzyme β-galactosidase a preferred
selectable marker in comparison to the ones named above ?

20. प्राथमिक और द्वितीयक अनुक्रम में अंतर बताइए। दोनों का एक-एक उदाहरण भी दीजिए। **3**

Differentiate between primary and secondary succession. Provide one example
of each.

21. (a) जैवप्रौद्योगिकी के प्रयोगों में कोशिका को ''सक्षम'' बनाया जाता है। ऐसा करने में कैल्सियम आयन किस प्रकार सहायता करता है ? **3**

(b) जैवप्रौद्योगिकी प्रयोगों में ''जैवप्राक्षेपिक (जीन) गन'' की भूमिका बताइए।

(a) Why must a cell be made 'competent' in biotechnology experiments ? How does calcium ion help in doing so ?

(b) State the role of 'biolistic gun' in biotechnology experiments.

22. प्रत्येक का एक-एक उदाहरण देते हुए परजीविता और सहविकास की व्याख्या कीजिए। **3**

Explain Parasitism and co. evolution with the help of one example of each.

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खण्ड - D

SECTION - D

</div>

23. दुनिया भर में ऐसे अनेक विवाहित दंपति हैं जो निःसंतान हैं। यह जानकर दुःख होता है कि भारतवर्ष में दंपति के निःसंतान होने के लिए स्त्री को ही दोषी ठहराया जाता है। **4**

(a) भारतवर्ष में इन परिस्थितियों में प्रायः स्त्री को ही दोषी क्यों माना जाता है ? अपना मत प्रस्तुत कीजिए। ऐसे कोई दो मूल्य बताइए जो एक जीव विज्ञान छात्र होने के नाते आप इस सामाजिक बुराई को दूर करने के लिए प्रोत्साहित करेंगे।

(b) अनुर्वरता के लिए उत्तरदायी कोई दो कारण बताइए।

(c) उन परिस्थितियों में जहाँ पुरुष दोषी है, एक तकनीक का सुझाव दीजिए जिससे दंपति को संतति प्राप्त करने में सहायता मिल सके।

A large number of married couples the world over are childless. It is shocking to know that in India the female partner is often blamed for the couple being childless.

(a) Why in your opinion the female partner is often blamed for such situations in India ? Mention any two values that you as a biology student can promote to check this social evil.

(b) State any two reasons responsible for the cause of infertility.

(c) Suggest a technique that can help the couple to have a child where the problem is with the male partner.

24. (a) अनेकजीनी वंशागति क्या होती है ? एक उपयुक्त उदाहरण द्वारा इसकी व्याख्या कीजिए। 5

(b) वंशागति के बहुजीनी और मेन्डेलीय पैटर्न अनेकजीनी वंशागति के पैटर्न से किस प्रकार भिन्न होते हैं ?

अथवा

(a) कोशिका-चक्र की उस अवस्था का नाम बताइए जहाँ DNA – प्रतिकृतियन होता है।

(b) DNA – प्रतिकृतियन प्रक्रिया की व्याख्या कीजिए। इस प्रक्रिया में एंजाइमों की भूमिका पर विशिष्ट जोर दीजिए।

(c) DNA – प्रतिकृतियन को अर्धसंरक्षी क्यों बताया जाता है ?

(a) What is polygenic inheritance ? Explain with the help of a suitable example.

(b) How are pleiotropy and Mendelian pattern of inheritance different from polygenic pattern of inheritance ?

OR

(a) Name the stage in the cell cycle where DNA replication occurs.

(b) Explain the mechanism of DNA replication. Highlight the role of enzymes in the process.

(c) Why is DNA replication said to be semiconservative ?

25. (a) उन दो वृद्धि मॉडलों के नाम बताइए जो समष्टि वृद्धि का निरूपण करते हैं, तथा इन 5 मॉडलों द्वारा क्रमश: निरूपित वृद्धि वक्रों का आरेख बनाइए।

(b) इन वक्रों की आकृति में आने वाले अंतर का आधार बताइए।

(c) आज मानव जनसंख्या वृद्धि का निरूपण उपरोक्त दो वक्रों में से कौन-से वक्र द्वारा होता है ? आप क्या सोचते हैं कि क्या यह वक्र लंबी अवधि तक बना रह सकता है ? अपने उत्तर के समर्थन में कारण बताइए।

अथवा

(a) छोटे-से तालाब के उदाहरण की सहायता से व्याख्या कीजिए कि पारितंत्र के चार घटक एक इकाई की भांति कैसे कार्य करते हैं?

(b) तालाब में पायी जाने वाली खाद्य-शृंखला की किस्म का नाम लिखिए।

(a) Name the two growth models that represent population growth and draw the respective growth curves they represent.

(b) State the basis for the difference in the shape of these curves.

(c) Which one of the curves represent the human population growth at present? Do you think such a curve is sustainable? Give reason in support of your answer.

OR

(a) Taking an example of a small pond explain how the four components of an ecosystem function as a unit.

(b) Name the type of food chain that exists in a pond.

26. (a) स्त्री में आर्तव प्रावस्था की व्याख्या कीजिए। इस प्रावस्था के दौरान अंडाशयी और पिट्यूटरी हार्मोनों के स्तरों की चर्चा कीजिए।　　**5**

(b) आर्तव-चक्र की पुटकीय प्रावस्था को प्रचुरोद्भवनी प्रावस्था भी क्यों कहते हैं? व्याख्या कीजिए।

(c) अंडोत्सर्ग के समय और उसके बाद ग्राफ़ी पुटक में होने वाली घटनाओं की व्याख्या कीजिए।

(d) ग्राफ़ी पुटक का आरेख बनाइए तथा उसमें गह्वर (antrum) तथा द्वितीयक अंडक का नामांकन कीजिए।

अथवा

(a) जीव विज्ञान के एक वरिष्ठ विद्यार्थी होने के नाते आपको कहा गया है कि आप अपने स्कूल के सेकेन्डरी स्तर के छात्रों को उन क्रियाविधियों का निदर्शन करें जिनसे उन्हें एक उभयलिंगी फूल में पर-परागण स्पष्टतः समझ में आ जाए। आपके द्वारा सुझाए गए विभिन्न चरणों की सूची बनाइए तथा उनमें से प्रत्येक चरण के लिए कारण भी बताइए।

(b) एक आवृत्तबीजी पौधे के गुरु बीजाणु धानी की काट का आरेख बनाइए, तथा उसमें फ्यूनिकुलस, सूक्ष्मद्वार, भ्रूणकोष और गुरूबीजाणु द्वितीयक (न्यूसेलस) का नामांकन कीजिए।

(a) Explain the menstrual phase in a human female. State the levels of ovarian and pituitary hormones during this phase.

(b) Why is follicular phase in the menstrual cycle also referred as proliferative phase ? Explain.

(c) Explain the events that occur in a graafian follicle at the time of ovulation and thereafter.

(d) Draw a graafian follicle and label antrum and secondary oocyte.

OR

(a) As a senior biology student you have been asked to demonstrate to the students of secondary level in your school, the procedure(s) that shall ensure cross-pollination in a hermaphrodite flower. List the different steps that you would suggest and provide reasons for each one of them.

(b) Draw a diagram of a section of a megasporangium of an angiosperm and label funiculus, micropyle, embryosac and nucellus.

SECTION – A

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

1. **Mention two advantages for preferring CNG over diesel as an automobile fuel.**

Ans Advantages of CNG-

    i)   burns efficiently / less unburnt residues.

    ii)   Cheaper than petrol / diesel.

    iii)   Causes less pollution.

    iv)   cannot be adulterated.

    v)   cannot be siphoned by thieves. (any two) = ½ × 2

                                                    [1 Mark]

2. **What are transgenic animals. Give an example.**

Ans. Animals whose DNA is manipulated to possess and express an extra (foreign) gene

eg. Rosie - transgenic cow

(Any other correct example of animal)

                                        [½ × 2 =1 mark]

3. **Write the probable differences in eating habits of *Homo habilis* and *Homo erectus.***

Ans *Homo habilis* did not eat meat / vegetarian

Homo erectus ate meat (meat eater) = ½ × 2

                                                  [1 Mark]

4. **Mention the role of 'genetic mother' in MOET.**

Ans Genetic mother is used to produce many eggs / for superovulation // 6-8 eggs (under the influence of FSH)

                                                  [1 Mark]

5. **A male honeybee has 16 chromosomes whereas its female has 32 chromosomes. Give one reason.**

Ans Male Honey bee develops from unfertilized female gamete / unfertilised egg / Parthenogenesis of female gamete (16 chromosomes), female develops by fertilization / fertilised egg (32 chromosomes) = ½ + ½

                                                  [1 mark]

SECTION – B

Q Nos. 6-10 are of two marks each

6. **Name a free-living and a symbiotic bacterium that serve as bio-fertilizer. Why are they so called ?**

Ans. *Azospirillium* / *Azotobacter* , *Rhizobium* = ½ + ½ (any other correct example)

They enrich soil nutrient / nitrogen fixation = 1

                                                  [2 marks]

7. **Name the cells , HIV (Human Immunodeficiency Virus)gains entry into after infecting the human body. Explain the events that occur in these cells.**

Ans. Macrophages , (Helper) T-lymphocytes , viral RNA forms DNA by reverse transcription (reverse transcriptase) , directs the infected cells to produce viral particles / increase viral progeny = ½ × 4

[2 marks]

8. **Explain the relationship between CFC's and Ozone in the stratosphere.**

Ans UV rays act on CFC's , release Cl atom ,which act on ozone to release O_2 , resulting in ozone layer depletion / causing ozone hole = ½ ×4

[2 Marks]

OR

Why are sacred groves highly protected ?

Ans Sacred groves are highly protected - because of religious and cultural traditions , refuges for large number of rare and threatened plants / ecologically unique and biodiversity rich regions =1+1

[2 Marks]

9. **Following are the features of genetic codes. What does each one indicate ? Stop codon; Unambiguous codon; Degenerate codon; Universal codon.**

Ans Stop codon - does not code for any amino acid / terminates the synthesis of polypeptide chain

Unambiguous codon - one codon codes for one amino acid only

Degenerate codon - some amino acid are coded by more than one codon

Universal codon - genetic code is same for all organisms (bacteria to humans) = ½ ×4

[2 Marks]

10. **Out of many papaya plants growing in your garden,only a few bear fruits Give reason.**

Ans. Unisexual / Dioecious // male and female flowers are borne on separate plants , only plants bearing female flowers will bear fruits = 1 + 1

[2 marks]

SECTION – C

Q Nos. 11-22 are of three marks each

11. **(a) Write the two limitations of traditional breeding technique that led to promotion of micro propagation.**

(b) Mention two advantages of micro propagation.

(c) Give two examples where it is commercially adopted.

Ans. (a) Failed to keep pace with demand , failed to provide fast and efficient system of crop improvement = ½ × 2

(b) Large number of plants can be developed in a short duration / production of genetically identical plants / somaclones / healthy plants can be recovered from diseased plants

(Any two) = ½ × 2

(c)   Tomato / banana / apple *(Any two)* = ½ × 2

<div align="right">[3 Marks]</div>

12.   **(a)**   **It is generally observed that the children who had suffered from chicken - pox in their childhood may not contract the same disease in their adulthood. Explain giving reasons the basis of such an immunity in an individual. Name this kind of immunity.**

      (b)   **What are interferons ? Mention their role.**

Ans. (a)   The first infection of chicken pox produce a primary response and antibodies are generated against chicken pox virus , subsequent encounter with the same virus elicits a highly intensified secondary response , due to the memory cells formed during the first encounter , active immunity = ½ × 4

      (b)   Proteins secreted by viral infected cells , which protects non infected cells from viral infection / when α - interferon is given to cancer patient (it activates immune system) , destroys tumour = ½ × 2

<div align="right">[3 Marks]</div>

13.   **How do homologous organs represent divergent evolution ? Explain with the help of a suitable example.**

Ans. Organs with similar strucuture / same ancestry / anatomically same / same origin developed along different directions due to adapation / different needs , to perform different functions = 1+1

For example the fore limbs of some animals (Vertebrates) like whales , bats , cheetah and human have similar anatomical strucuture (i.e. humerus , radius , ulna, carpals,metacarpals and phalanges) develop differently to meet different needs / to perform different functions (any other correct example) =1

<div align="right">[3 Marks]</div>

14.   **Name two hormones that are constituents of contraceptive pills. Why do they have high and effective contraceptive value ? Name a commonly prescribed non-steroidal oral pill.**

Ans   Progestogen-estrogen / Progesterone-estrogen combination , Progestogen / Progesterone = ½ +½
They inhibit ovulation , inhibit implantation , alter quality of cervical mucus to retard entry of sperm =½ × 3
Saheli = ½

<div align="right">[3 Marks]</div>

<div align="center">**OR**</div>

      (a)   **How are Parthenocarpic fruits produced by some plants and apomictic seeds by some others ? Explain.**

      (b)   **When do farmers prefer using apomictic seeds ?**

Ans   (a)   Ovary develops into fruit without fertilisation =1

         Formation of seeds without fertilisation / form without reductional divison / develop into embryo without fertilisation =1

      (b)   To maintain hybrid characters (year after year in a desired plant) , to avoid buying hybrid seeds every year (expensive seeds) = ½ + ½

<div align="right">[3 Marks]</div>

15. (a) What do 'Y and 'B' stand for in 'YAC' and 'BAC' used in Human Genome Project (HGP). Mention their role in the project.

(b) Write the percentage of the total human genome that codes for proteins and the percentage of discovered genes whose functions are known as observed during HGP.

(c) Expand 'SNPs' identified by scientists in HGP.

Ans. (a) - Y = Yeast = ½

B = Bacterial = ½

- Used as vector for cloning foreign DNA = ½

(b) (<) 2% , (<) 50% = ½ + ½

(c) Single Nucleotide Polymorphism = ½

[3 Marks]

16. Explain enzyme-replacement therapy to treat adenosine deaminase deficiency. Mention two disadvantages of this procedure.

Ans. Functional adenosine deaminase is given to the patient by injection = 1

Disadvantages

- Therapy is not completely curative , periodic infusion of enzyme required = 1 + 1

[3 Marks]

17. What is a test cross ? How can it decipher the heterozygosity of a plant ?

Ans. - A cross to analyse whether genotype of dominant individual is homozygous or heterozygous = 1

- On crossing with a recessive parent , if 50% of progeny have dominant trait and 50% have recessive trait then the plant is said to be heterozygous = 1+1

//

The above value points can be considered with the help of a test cross = 1 + 1

[3 Marks]

18. (a) How do organic farmers control pests ? Give two examples.

(b) State the difference in their approach from that of conventional pest control methods.

Ans. (a) Natural predation / biological control = 1

Examples - lady bird used to kill aphids // dragon flies used to kill mosquitoes // *Bacillus thuringiensis* used to kill cotton bollworm / caterpillar / butterfly caterpillar

(Any two) = ½ + ½

(b)

Conventional Pest Control	Organic farming based pest control
- use of chemical insecticides & pesticides	- No chemical used.
- Harmful to non target organisms	- Not harmful to non target organisms
- Cause environmental pollution	- No adverse impact on environment

(Any two) = ½ × 2

[3 Marks]

19. **(a) Name the selectable markers in the cloning vector pBR322 ? Mention the role they play.**

(b) Why is the coding sequence of an enzyme (β-galactosidase) a preferred selectable marker in comparison to the ones named above ?

Ans. (a)   amp^R / ampicillin resistance genes , tet^R/ tetracycline resistance gene = ½ × 2

They help in identifying and eliminating non-transformants / non recombinants and selectively permitting the growth of the transformants / recombinants = 1

(b)   Simpler process / less cumbersome , in the presence of chromogenic substrate recombinants are colourless and non recombinants are blue in colour = ½ × 2

[3 Marks]

20. **Differentiate between primary and secondary succession. Provide one example of each.**

Ans.

Primary Succession	Secondary Succession
- It begins with areas where no living organisms ever existed	- It begins in areas where natural biotic communites have been destroyed
- Establishment of a biotic community is very slow	- Establishment of a biotic community is faster = 1 × 2
Example	**Example**
Newly cooled lava / bare rocks / newly created ponds or reservoir	- Abandoned farm lands / burnt or cut forests / lands that have been flooded = ½×2

[3 Marks]

21. **(a) Why must a cell be made 'competent' in biotechnology experiments ? How does calcium ion help in doing so ?**

(b) State the role of 'biolistic gun' in biotechnology experiments.

Ans. (a)   -   To take up the (hydrophilic) DNA from the external medium = 1

-   Divalent calcium ions increase the efficiency of DNA entering the cell through pores in the cell wall = 1

(b)   To introduce alien DNA into the plant cell by bombarding them with high velocity microparticles (gold or tungsten coated with DNA) = 1

[3 Marks]

22. **Explain Parasitism and co-evolution with the help of one example of each.**

Ans Mode of interaction between two species in which one species (parasite) depends on the other species (host) for food and shelter / one organism is benefitted , the other is harmed = ½ + ½

e.g Human liver fluke / Malarial parasite / Cuscuta = ½

Co-evolution is the relationship between two interacting organisms where both organisms failed to survive in the absence of the other = 1

e.g Fig and fig wasp / ophrys and bumble bee = ½ **(or any other suitable example)**

[3 Marks]

SECTION – D

Q No. 23 is of four mark

23. **A large number of married couples the world over are childless. It is shocking to know that in India the female partner is often blamed for the couple being childless.**

   (a) **Why in your opinion the female partner is often blamed for such situations in India ? Mention any two values that you as a biology student can promote to check this social evil.**

   (b) **State any two reasons responsible for the cause of infertility.**

   (c) **Suggest a technique that can help the couple to have a child where the problem is with the male partner.**

Ans. (a) Female partner is blamed due to social mind set / inequality of sexes / lack of awareness / male dominated society / any other relevent point *(Any two)* = ½ × 2

   - Awareness to be created that abnormality can occur in both male and females and infertility issues with suitable examples

   - Mutual respect towards both the partners in case of the problem and to find the remedy from medical experts instead of visiting quacks

   - Educate them to find the reason and not believe in superstitions *(Any two)* = ½ × 2

   (b) Physical (abnormality in reproductive system) , congenital , immunological or psychological *(Any two)* = ½ × 2

   (c) Intra cytoplasmic sperm injection (ICSI) / artificial insemination (AI) / Intra uterine insemination (IUI) = 1

[4 Marks]

SECTION – E

Q Nos. 24-26 are of five marks each

24. (a) **What is polygenic inheritance ? Explain with the help of a suitable example.**

   (b) **How are pleiotropy and Mendelian pattern of inheritance different from polygenic pattern of inheritance ?**

Ans (a) Inheritance in which traits are controlled by three or more genes , eg human skin colour / height , the inheritance depends upon the additive / cumulative effect of allelles , more the number of dominant allelles the expression of the trait will be more distinct / prominent , more the number of recessive allelles the trait will be diluted , if member of dominant and recessive allelles are equal the effect is intermediate = ½ × 6

//

same explanation with the help of any suitable example

   b) Single gene controls multiple phenotypic expression (Pleiotropy) , one gene controls one phenotypic expression (Mendelian) = 1+ 1

[5 Marks]

OR

   (a) **Name the stage in the cell cycle where DNA replication occurs.**

   (b) **Explain the mechanism of DNA replication. Highlight the role of enzymes in the process**

(c) **Why is DNA replication said to be semiconservative ?**

Ans (a) S phase / synthetic phase (of interphase) = ½

(b) The replication begins in definite regions which are called the origin of replication ,
Replication occurs within a small opening of the DNA referred to as Y shaped replication fork
(uncoiling of DNA is by some enzymes eg Helicase and topoisomerase),
Polymerisation of the nucleotides are catalysed by DNA dependent DNA polymerase in 5' -
3' directions ,
Deoxyribonucleotides act as substrates and also provide energy for the process ,
The new strands formed on 3 '-5' template is continuous ,
New strands formed on 5-'3' template is discontinuous,
The discontinuously formed fragments are joined by enzyme DNA ligase
= ½ × 7

(c) During DNA replication in the two newly synthesised daughter DNA one strand is parental
(conserved) and the other is newly synthesised =1

[5 Marks]

25. **(a)** **Name the two growth models that represent population growth and draw the respective growth curves they represent.**

(b) **State the basis for the difference in the shape of these curves.**

(c) **Which one of the curves represent the human population growth at present ? Do you think such a curve is sustainable ? Give reason in support of your answer.**

Ans (a) Exponental growth curve , logistics growth curve = ½ + ½

= ½ + ½
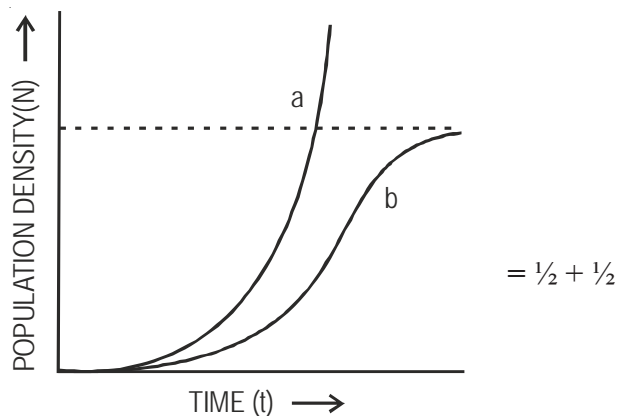
a - exponential growth curve b - logistic growth curve

(b) Exponential growth - food resources and space unlimited ,

Logistic growth - food resources and space limited = ½ + ½

(c) Exponential growth = 1

not sustainable , as resources are limited / carrying capacity. = ½ + ½

[5 Marks]

OR

(a) **Taking an example of a small pond, explain how the four components of an ecosystem function as a unit.**

(b) **Name the type of food chain that exists in a pond.**

Ans (a) Productivity - conversion of inorganic substances into organic material with the help of radiant energy / sunlight by the autotrophs / producers (phytoplankton , algae , floating ,submerged plants) =1

Decomposition - decomposers (fungi , bacteria , flagellates) breakdown dead decayed organic matter into simpler compounds =1

Energy Flow - Unidirectional movement of energy towards higher trophic levels (producer to consumer) and its dissipation and loss as heat to the enviornment =1

Nutrient cycle- Mineralisation of dead matter to release them back for reuse of autotrophs =1

(b) Grazing food chain / detritus food chain =1

[5 Marks]

26. (a) **Explain the menstrual phase in a human female. State the levels of ovarian and pituitary hormones during this phase.**

(b) **Why is follicular phase in the menstrual cycle also referred as proliferative phase ? Explain.**

(c) **Explain the events that occur in a graafian follicle at the time of ovulation and there-after.**

(d) **Draw a graafian follicle and label antrum and secondary oocyte.**

Ans. (a) Menstrual phase occurs when released ovum not fertilised , break down of endometrial lining (of the uterus) and its blood vessel form the liquid that comes out through the vagina , lasts for 3 to 5 days = ½ × 3
Level of ovarian and pituitary hormones fall = ½
//
graphically represented

(b) Primary follicle grows into graafian follicle under the influence of LH & FSH , regeneration of endometrium (under the influence of estrogen) = ½ × 2

(c) Graafian follicle ruptures to release the ovum (secondary oocyte) , remaining parts of the Graafian follicle transform into corpus luteum = ½ × 2

(d)

antrum = ½

secondary oocyte = ½
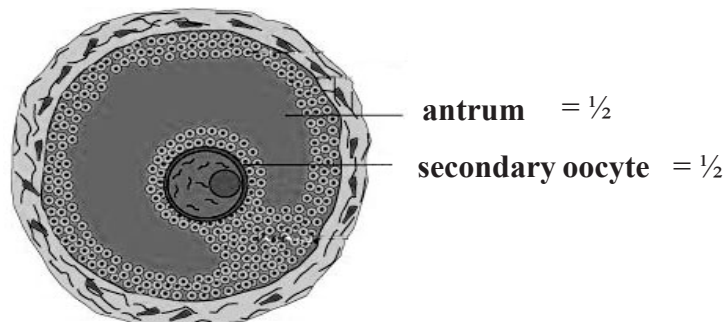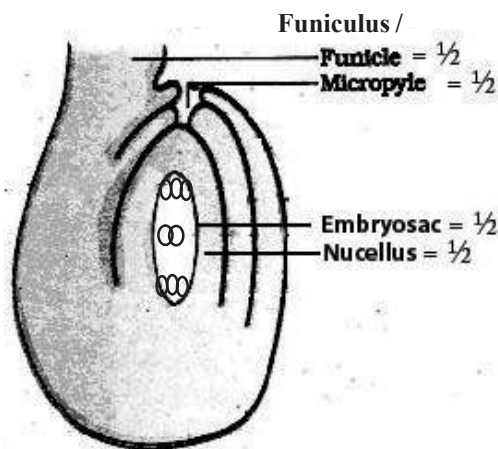
[5 Marks]

OR

(a) As a senior biology student you have been asked to demonstrate to the students of secondary level in your school, the procedure(s) that shall ensure cross-pollination in a hermaphrodite flower. List the different steps that you would suggest and provide reasons for each one of them.

(b) Draw a diagram of a section of a megasporangium of an angiosperm and label funiculus, micropyle, embryosac and nucellus.

Ans. (a) Emasculation , removal of anthers from the flower bud before the anther dehisce to avoid self pollination $= \frac{1}{2} + \frac{1}{2}$

Bagging , to prevent contamination of its stigma with unwanted pollen grains $= \frac{1}{2} + \frac{1}{2}$

Rebagging , the stigma of the mature ovary are dusted with desired pollen grains and rebagged to allow the fruit to develop $\quad = \frac{1}{2} + \frac{1}{2}$

(b)

Funiculus /
Funicle $= \frac{1}{2}$
Micropyle $= \frac{1}{2}$
Embryosac $= \frac{1}{2}$
Nucellus $= \frac{1}{2}$

[5 Marks]