SET-3

Series SSO

कोड नं.
Code No. 57/3

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 **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.

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. सिस्ट्रॉन (समपार) क्या होता है ? *1*

What is a cistron ?

2. मधुमक्खी के पुंमधुपों (ड्रोन) में गुणसूत्रों की संख्या कितनी होती है ? इनमें शुक्राणुओं के उत्पादन के दौरान किस प्रकार का कोशिका-विभाजन होता है ? *1*

How many chromosomes do drones of honeybee possess ? Name the type of cell division involved in the production of sperms by them.

3. मोटर-गाड़ियों में ईंधन के रूप में सीसा-रहित पेट्रोल का प्रयोग करने के दो लाभों को सूचीबद्ध कीजिए । *1*

List two advantages of the use of unleaded petrol in automobiles as fuel.

4. रिट्रोवाइरसों में DNA नहीं होते । फिर भी, ग्रस्त परपोषी कोशिका में वाइरसी DNA होता है । यह किस प्रकार सम्भव है ? *1*

Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible ?

5. ऐसे कोई दो सम्भव उपचार सुझाइए जो ऐडीनोसीन डिऐमीनेज़ न्यूनता से ग्रस्त रोगी को दिए जा सकते हैं । *1*

Suggest any two possible treatments that can be given to a patient exhibiting adenosine deaminase deficiency.

खण्ड B

SECTION B

6. निम्नलिखित में से उन ***दो*** युग्मों को चुनिए जो अपसारी विकास प्रदर्शित करते हैं । अपने उत्तर का कारण भी बताइए ।

(i) चीते और स्तनधारियों के अग्रपाद

(ii) डॉल्फ़िनों और पेंग्विनों के फ्लिपर

(iii) तितलियों और पक्षियों के पंख

(iv) ह्वेलों और स्तनधारियों के अग्रपाद *2*

Select ***two*** pairs from the following which exhibit divergent evolution. Give reasons for your answer.

(i) Forelimbs of cheetah and mammals

(ii) Flippers of dolphins and penguins

(iii) Wings of butterflies and birds

(iv) Forelimbs of whales and mammals

7. लिवरवर्ट नामक पौधा अपना जीवन-चक्र शुष्क पर्यावरण में पूरा नहीं कर पाता । दो कारण बताइए । *2*

A liverwort plant is unable to complete its life-cycle in a dry environment. State two reasons.

8. सहोपकारिता (म्यूच्युएलिज़्म) क्या होता है ? ऐसे कोई दो उदाहरण बताइए जिनमें सम्बद्ध जीव कृषि के क्षेत्र में व्यापारिक दृष्टि से प्रयुक्त किए जाते हैं । *2*

अथवा

ऐसी कोई चार तकनीकों की सूची बनाइए जिनमें जैव-विविधता के *बाह्य स्थाने* (एक्स-सीटू) संरक्षण के नियम को प्रयुक्त किया जाता है । *2*

What is mutualism ? Mention any two examples where the organisms involved are commercially exploited in agriculture.

OR

List any four techniques where the principle of *ex-situ* conservation of biodiversity has been employed.

9. (a) सूक्ष्म-प्रवर्धन द्वारा उत्पन्न पौधों को सोमाक्लोन क्यों कहते हैं ?

(b) इस तकनीक के दो लाभ बताइए । *2*

(a) Why are the plants raised through micropropagation termed as somaclones ?

(b) Mention two advantages of this technique.

10. वाहित मल उपचार-संयंत्र में "अवायवीय आपंक डाइजेस्टर" के कार्य की व्याख्या कीजिए । *2*

Explain the function of "anaerobic sludge digester" in a sewage treatment plant.

खण्ड C

SECTION C

11. एक-संकर क्रॉस की F_2 संतति का लक्षणप्ररूपी और जीनप्ररूपी अनुपात, मेन्डेल के एक-संकर F_2 अनुपात से भिन्न, 1 : 2 : 1 प्राप्त हुआ । एक उपयुक्त उदाहरण की सहायता से, क्रॉस के परिणाम प्राप्त कीजिए और समझाकर बताइए कि यह किस प्रकार सम्भव है । *3*

The F_2 progeny of a monohybrid cross showed phenotypic and genotypic ratio as 1 : 2 : 1, unlike that of Mendel's monohybrid F_2 ratio. With the help of a suitable example, work out a cross and explain how it is possible.

12. कुछ बीजों को असंगजननिक बीज क्यों कहते हैं ? इस प्रकार के बीजों का इस्तेमाल करने वाले किसानों को होने वाले एक लाभ और एक हानि का उल्लेख कीजिए । *3*

Why are some seeds referred to as apomictic seeds ? Mention one advantage and one disadvantage to a farmer who uses them.

13. सड़क दुर्घटना में किसी घायल व्यक्ति के ज़ख़्मों से तीव्र रक्त-प्रवाह हो रहा था तथा इलाज के लिए उसे एक नर्सिंग होम लाया गया । चिकित्सक ने एक गंभीर रोग से बचाने के लिए उसे तुरन्त एक इन्जेक्शन लगा दिया ।

(a) बताइए कि चिकित्सक ने रोगी के शरीर में किस दवा का इन्जेक्शन लगाया ।

(b) आपके विचार से दवा का यह इन्जेक्शन रोग से उसकी किस प्रकार सुरक्षा करेगा ?

(c) उस रोग का नाम बताइए जिससे बचाव के लिए उसे यह इन्जेक्शन लगाया गया और इससे किस प्रकार की प्रतिरक्षा प्राप्त होगी । *3*

A heavily bleeding and bruised road accident victim was brought to a nursing home. The doctor immediately gave him an injection to protect him against a deadly disease.

(a) Write what did the doctor inject into the patient's body.

(b) How do you think this injection would protect the patient against the disease ?

(c) Name the disease against which this injection was given and the kind of immunity it provides.

14. "ऊतक का कोई छोटा-सा नमूना अथवा रुधिर की एक बूँद भी पैतृत्व-निर्धारण में मदद कर सकती है ।" इस कथन की पुष्टि करने के लिए एक वैज्ञानिक व्याख्या प्रस्तुत कीजिए । *3*

"A very small sample of tissue or even a drop of blood can help determine paternity". Provide a scientific explanation to substantiate the statement.

15. निम्नलिखित समीकरण किसका निरूपण करता है ? व्याख्या कीजिए । *3*

$$p^2 + 2\,pq + q^2 = 1$$

What does the following equation represent ? Explain.

$$p^2 + 2\,pq + q^2 = 1$$

16. आनुवंशिक रूप से रूपान्तरित पादपों के किन्हीं तीन सम्भावित अनुप्रयोगों का वर्णन कीजिए । *3*

Describe any three potential applications of genetically modified plants.

17. अमेरिकी कम्पनी, एली लिली ने r-DNA प्रौद्योगिकी की जानकारी को मानव-इन्सुलिन उत्पादन में किस प्रकार प्रयुक्त किया ? *3*

How did an American Company, Eli Lilly use the knowledge of r-DNA technology to produce human insulin ?

18. प्रतिकूल परिस्थितियों में जीवित बने रहने के लिए घोंघे, बीज, भालू, ज़ूप्लैंक्टन, कवक और जीवाणु (बैक्टीरिया) अपने-आप को किस प्रकार अनुकूलित कर लेते हैं ? *3*

How do snails, seeds, bears, zooplanktons, fungi and bacteria adapt to conditions unfavourable for their survival ?

19. बेहतर तथा कारगर डेरी फ़ार्म प्रबन्धन की कोई छ: मूलभूत प्रक्रियाओं की सूची बनाइए । *3*

Enumerate any six essentials of good, effective Dairy Farm Management Practices.

20. जलीय खाद्य शृंखला में DDT की जैव-आवर्धन परिघटना को एक प्रवाह-चार्ट की सहायता से दर्शाइए । *3*

With the help of a flow chart, show the phenomenon of biomagnification of DDT in an aquatic food chain.

21. *स्ट्रेप्टोकोकस*, *मोनैस्कस* और *ट्राइकोडर्मा* द्वारा उत्पन्न जैव-सक्रिय अणुओं और उनके औषधीय महत्त्व को बताइए । *3*

अथवा

मीथैनोजेन जीवाणु क्या होते हैं ? ये बायोगैस उत्पादन में कैसे सहायता करते हैं ? *3*

State the medicinal value and the bioactive molecules produced by *Streptococcus*, *Monascus* and *Trichoderma*.

OR

What are methanogens ? How do they help to generate biogas ?

22. महत्त्वपूर्ण जैव-प्रौद्योगिकी अभिक्रिया को निष्पादित करने के लिए निम्नलिखित को उनके सही-सही क्रम में पुनर्व्यवस्थित कीजिए : *3*

(a) उपयोगी DNA की प्रतिकृतियों का *पात्रे (इन विट्रो)* संश्लेषण

(b) ऑलिगोन्यूक्लियोटाइडों का रासायनिक संश्लेषण

(c) DNA-पॉलिमरेज़ एंज़ाइम

(d) DNA का सम्पूरक क्षेत्र

(e) जीनोमिक DNA टेम्पलेट

(f) मिलने वाले न्यूक्लियोटाइड

(g) प्राइमर

(h) तापस्थायी (थर्मोस्टेबल) DNA-पॉलिमरेज़ (*थर्मस ऐक्वेटिकस* से)

(i) द्विलड़ीय-DNA का विकृतीकरण

Rearrange the following in the correct sequence to accomplish an important biotechnological reaction :

(a) *In vitro* synthesis of copies of DNA of interest

(b) Chemically synthesized oligonucleotides

(c) Enzyme DNA-polymerase

(d) Complementary region of DNA

(e) Genomic DNA template

(f) Nucleotides provided

(g) Primers

(h) Thermostable DNA-polymerase (from *Thermus aquaticus*)

(i) Denaturation of ds-DNA

खण्ड D

SECTION D

23.* शिक्षा विभाग द्वारा आपके विद्यालय को "जनन-स्वास्थ्य – समस्याएँ और पद्धतियाँ" पर एक अन्तर-विद्यालयी गोष्ठी का आयोजन और मेज़बानी करने के लिए चुना है । हालाँकि, अनेक माता-पिता अपने बच्चों के इस गोष्ठी में भाग लेने के इच्छुक नहीं हैं । उनका तर्क है कि गोष्ठी का विषय "बहुत संकोचजनक" है ।

विषय को अति आवश्यक और सामयिक बताते हुए चार तर्कों का उपयुक्त कारणों सहित स्पष्टीकरण कीजिए । *4*

Your school has been selected by the Department of Education to organize and host an interschool seminar on "Reproductive Health – Problems and Practices". However, many parents are reluctant to permit their wards to attend it. Their argument is that the topic is "too embarrassing".

Put forth four arguments with appropriate reasons and explanation to justify the topic to be very essential and timely.

खण्ड E

SECTION E

24. (a) मेंडेलीय वंशागति, बहुजीनी वंशागति और बहुप्रभाविता (प्लीओट्रॉपी) एक-दूसरे से किस प्रकार भिन्न हैं ?

(b) एक उपयुक्त उदाहरण की सहायता से बहुजीनी वंशागति पैटर्न की व्याख्या कीजिए । *5*

अथवा

(a) "प्रतिकृत द्विशाख" का नामांकित आरेख बनाइए जिसमें ध्रुवता दिखाई गई हो । इस प्रकार की 'द्विशाखों' के भीतर DNA का प्रतिकृतियन क्यों होता है ?

(b) DNA के प्रतिकृतियन की प्रक्रिया में योगदान देने वाले दो एंज़ाइमों के नाम लिखिए, तथा इन एंज़ाइमों के गुणधर्म भी बताइए । *5*

(a) How are Mendelian inheritance, polygenic inheritance and pleiotropy different from each other ?

(b) Explain polygenic inheritance pattern with the help of a suitable example.

OR

(a) Draw a labelled diagram of a "replicating fork" showing the polarity. Why does DNA replication occur within such 'forks' ?

(b) Name two enzymes involved in the process of DNA replication, along with their properties.

25. (a) एक व्यष्टि जीव की नहीं वरन् एक समष्टि के विभिन्न गुणों की सूची बनाइए ।

(b) समष्टि-घनत्व क्या होता है ? प्रत्येक का एक-एक उदाहरण देते हुए, किन्हीं तीन विभिन्न विधियों की व्याख्या कीजिए जिनसे समष्टि-घनत्व को मापा जा सकता है । *5*

अथवा

"प्राय: कहा जाता है कि ऊर्जा के पिरैमिड सीधे (आधार से ऊपर की ओर) होते हैं । दूसरी तरफ़ जैवमात्रा का पिरैमिड सीधा अथवा उल्टा दोनों ही प्रकार का हो सकता है ।" उदाहरणों और आरेखों की सहायता से व्याख्या कीजिए । *5*

(a) List the different attributes that a population has and not an individual organism.

(b) What is population density ? Explain any three different ways the population density can be measured, with the help of an example each.

OR

"It is often said that the pyramid of energy is always upright. On the other hand, the pyramid of biomass can be both upright and inverted." Explain with the help of examples and sketches.

26. (a) एक ऐसे प्रयोग की योजना बनाइए और प्रयोग के विभिन्न चरणों का एक प्रवाह-चार्ट भी बनाइए, जिससे यह सुनिश्चित हो सके कि बीजों का निर्माण केवल वांछित समुच्चय वाले पराग कणों से हुआ है । आपने जो प्रयोग किया है उसके प्रकार का नाम बताइए ।

(b) ऐसे प्रयोगों का महत्त्व भी बताइए । *5*

अथवा

स्त्री में होने वाले आर्तव चक्र के दौरान पीयूष तथा अंडाशयी हॉर्मोनों की भूमिका का वर्णन कीजिए । *5*

(a) Plan an experiment and prepare a flow chart of the steps that you would follow to ensure that the seeds are formed only from the desired sets of pollen grains. Name the type of experiment that you carried out.

(b) Write the importance of such experiments.

OR

Describe the roles of pituitary and ovarian hormones during the menstrual cycle in a human female.

Question Paper Code 57/3

SECTION – A

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

1. What is a cistron?

Ans. A segment of DNA , Coding for a polypeptide = ½ + ½

[1Mark]

2. How many chromosomes do drones of honeybee possess? Name the type of cell division involved in the production of sperm by them.

Ans. 16, Mitosis = ½ + ½

[1 Mark]

3. List two advantages of the use of unleaded petrol in automobiles as fuel.

Ans. (i) Allows the catalytic convertor to remain active = ½

(ii) Reduces air pollution = ½

[1 Mark]

4. Retroviruses have no DNA. However, The DNA of the infected host cell does possess viral DNA how is it possible?

Ans. Reverse transcription of viral RNA into viral DNA, then integrates/ incorporates with the host DNA = ½ + ½

[1 Mark]

5. Suggest any two possible treatments that can be given to a patient exhibiting adenosine deaminase deficiency.

Ans. (i) Enzymes replacement therapy (in which functional ADA is injected)

(ii) Bone marrow transplantation

(iii) Gene therapy / Culturing the lymphocytes followed by introduction of functional ADA cDNA into it & returning it into the patient's body

(Any two) = ½ + ½

[1 Mark]

SECTION – B

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

6. Select *two* pairs from the following which exhibit divergent evolution. Give reasons for your answer.

(i) Forelimbs of cheetah and mammals

(ii) Flippers of dolphins and penguins

(iii) Wings of butterflies and birds

(iv) Forelimbs of whales and mammals

Ans. (i) and (iv) = ½ + ½

Having similar anatomical structure / origin, but performing different functions = ½ + ½

[2 Marks]

7. A liverwort plant is unable to complete its life-cycle in a dry environment. State two reasons.

Ans. (i) They need water as medium of gamete transfer for fertilisation = 1

(ii) For germination of spores = 1

[2 Marks]

8. What is mutualism? Mention any two examples where the organisms involved are commercially exploited in agriculture.

Ans. Interaction between two species in which both are benefitted =1

i. *Rhizobium* in the roots (nodules) of legumes = ½

ii. *Mycorrhiza / Glomus* with the roots of higher plants = ½

[2 Marks]

OR

List any four techniques where the principle of ex-situ conservation of biodiversity has been employed.

Ans. Cryopreservation , in vitro fertilisation, micro propagation / tissue culture , sperm bank/ seed bank / gene bank = ½ ×4

[2 Marks]

9. (a) Why are the plants raised through micropropagation termed as somaclones ?

(b) Mention two advantages of this technique.

Ans. (a) Genetically identical = 1

(b) Large number of plants in short duration, Virus free plants = ½ + ½

[2 Marks]

10. Explain the function of "anaerobic sludge digester" in a sewage treatment plant.

Ans. Anaerobic sludge digester has anerobic bacteria that digests the aerobic bacteria and fungi present in the sludge = 1

during the digestion these bacterias produce mixture of gases such as methane and H_2S and CO_2 / biogas = 1

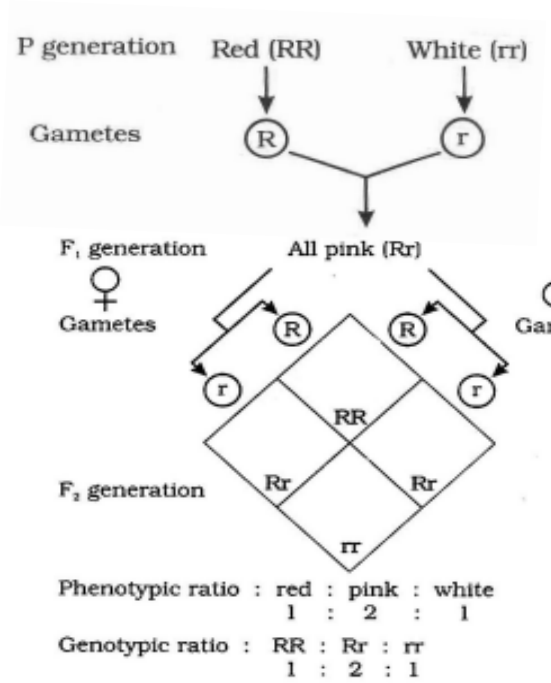
[2 Marks]

SECTION – C

Q. Nos. 11 - 12 are of three marks each

11. The F_2 progeny of a monohybrid cross showed phenotypic and genotypic ratio as 1:2:1, unlike that of Mendel's monohybrid F_2 ratio. With the help of suitable example, work out a cross and explain how it is possible.

Ans. *Mirabilis jalapa* / four O' clock plant / *Antirrhinum (majus)/* Snapdragon flower /dog flower = ½



= ½

= ½

= ½

In heterozygous condition a single dominant gene is not sufficient to produce red colour, therefore it is a case of incomplete dominance = ½ + ½

[3 Marks]

12. Why are some seeds referred to as apomictic seeds? Mention one advantage and one disadvantage to a farmer who uses them.

Ans Seeds produced without fertilisation are referred to as apomictic = 1

Advantage: Desired characters retained in offspring (progeny) / no segregation of characters in offspring (progeny) / assured seed production in absence of pollinators =1 (Any other relevant advantage)

Disadvantage: Cannot control accumulation of deleterious genetic mutation / usually restricted to narrow ecological niches / lack ability to adapt to changing envionrment = 1(Any other relevant disadvantage)

13. A heavily bleeding and bruised road accident victim was brought to a nursing home. The doctor immediately gave him an injection to protect him against a deadly disease.

(a) Write what did the doctor inject into the patient's body.

(b) How do you think this injection would protect the patient against the disease ?

(c) Name the disease against which this injection was given and the kind of immunity it provides.

Ans. (a) Tetanus antitoxins/Tetanus toxoid =1

(b) The preformed antibody injected , act on the pathogen immediately to provide protection = ½×2

(c) Tetanus, passive immunity = ½×2

[3 Marks]

14. "A very small sample of tissue or even a drop of blood can help to determine paternity". Provide a scientific explanation to substantiate the statement.

Ans. (i) DNA from all cells of an individual shows the same degree of polymorphism and therefore becomes a useful identification tool =1

(ii) Polymorphs are heritable and the child inherits 50% of the chromosome from each parent=1

(iii) With the help of PCR the small amount of DNA from blood can be amplified and be used in DNA finger printing to identify the paternity =1

Note: (if only DNA finger printing is described or illustrated allot only 1 mark)

[3 Marks]

15. What does the following equation represent ? Explain.

$p2 + 2\,pq + q2 = 1$

Ans. Hardy Weinberg's Principle / allele frequencies in a population are stable and is constant from generation to generation, 1 represents stable allelic frequency in a population,indicating no evolution occuring, p^2 frequency of homozygous dominant /AA, 2 pq frequency of heterozygous/Aa,q^2 frequency of homozygous recessive /aa = ½×6

Note : (if AA,Aa,aa have been indicated using any other alphabet correctly can be accepted)

[3 Marks]

16. Describe any three potential applications of genetically modified plants.

Ans. More tolerant to abiotic stress, less dependence on chemical pesticides, reduces post harvest losses,increase efficiency of mineral usage by plants,enhance nutritional value of food. eg. Vitamin A enriched rice (any three) = 1+1+1

[3 Marks]

17. How did an American company ,Eli Lilly use the knowledge of r-DNA technology to produce human insulin ?.

Ans. Two chains of DNA sequence corresponding to A & B chains of human insulin prepared, introduced them into plasmids of *E.coli* to produce separate A & B chains, A & B chains extracted combined by creating disulphide bonds = 1 × 3

[3 Marks]

18. How do snails, seeds, bears, zooplanktons, fungi and bacteria adapt to conditions unfavorable for their survival ?

Ans. Snail-aestivation = ½

Seeds-dormancy/suspended metabolic activities = ½

Bear-Hibernation = ½

Zooplankton- diapause/suspended development = ½

Fungi-Spore/Zygospore = ½

Bacteria-Cyst/spore = ½

[3 Marks]

19. Enumerate any six essentials of good ,effective Dairy Farm Management Practices.

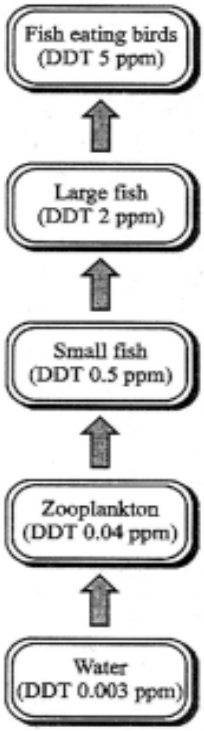
Ans. Selection of high yielding and diseases resistant breeds,housedwell,adequate water supply,maintained disease free,feeding in a scientific manner,regular visits by veteranary doctors,regular inspection and record keeping,cleanliness and hygiene while milking and transport

(any six) = ½×6

[3 Marks]

20. With help of a flow chart ,show the phenomenon of biomagnifications of DDT in an aquatic food chain.

Ans



5 stages- ½ Mark each (½ × 5) the flow chart should show arrows in correct direction with increasing levels of DDT = (½ **)**

[3 Marks]

21. State the medicinal value and the bioactive molecule produced by *Streptococcus, Monascus* and ***Trichoderma.***

Ans. *Streptococcus* ; Streptokinase , clot buster / remove clot from the blood vessels = ½ + ½

Monascus ; Statin , blood cholesterol lowering agent / it inhibits the enzymes responsible for synthesis of cholesterol = ½ + ½

Trichoderma ; cyclosporin A , immunosuppressive agents used in organ transplantation = ½ + ½

[3 Marks]

OR

What are Mathanogens? How do they help to generate biogas?

Ans. Anaerobic, methane producing bacteria = ½ × 2

methanogens generate biogas, when act on cellulose rich biowaste (anerobically) = 1 + 1

[3 Marks]

22. Rearrange the following in the correct sequence to accomplish an important biotechnological reaction:

(a) *In vitro* synthesis of copies of DNA of interest

(b) Chemically synthesized oligonucleotide

(c) Enzyme DNA-polymerase

(d) Complementary region of DNA

(e) Genomic DNA template

(f) Nucleotides provided

(g) Primers

(h) Thermostable DNA-ploymerase (from *Thermus aquaticus*)

(i) Denaturation of ds-DNA

Ans. Correct sequence is

$$\underbrace{i \rightarrow e \rightarrow b/g}_{=1} \rightarrow \underbrace{g/b \rightarrow c/h \rightarrow h/c}_{=1} \rightarrow \underbrace{f \rightarrow d \rightarrow a}_{=1}$$

//

$$\underbrace{a \rightarrow i \rightarrow e}_{=1} \rightarrow \underbrace{b/g \rightarrow g/b \rightarrow c/h}_{=1} \rightarrow \underbrace{h/c \rightarrow f \rightarrow d}_{=1}$$

Note: (Stop Marking where the sequence goes wrong)

[3 Marks]

SECTION :- D

Q No. 23 is of four mark

23. Your school has been selected by the Department of Education to organize and host an interschool seminar on "Reproductive Health –Problems and Practices". However, many parents are reluctant to permit their wards to attend it. Their argument is that the topic is "too embarrassing".

Put forth four arguments with appropriate reasons and explanation to justify the topic to be very essential and timely.

Ans. 1. The issue of puberty and adolescence need to be addressed effectively with the respective age group because many changes take place in the body during adolescence of which they are supposed to be aware of = 1

2. To bring in awareness about their reproductive health and its effect on their physical, emotional and social being = 1

3. To address the increase in sex abuse and sex crimes in our country = 1

4. Myths and misconceptions related to reproductive issues =1

Note: (any other related or relevant argument with reasons may be accepted)

[4 Marks]

SECTION:-E

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

24. (a) How are Mendelian inheritance, polygenic inheritance and pleiotropy different from each other ?

(b) Explain polygenic inheritance pattern with help of suitable example.

Ans. (a)

Mendelian Inheritance	Polygenic inheritance	Pleiotropy
One gene controls one trait/character/phenotype	Two or more genes influence the expression of one trait/ character/phenotype	One gene controls the expression of more than one trait/character/ phenotype

=1 × 3

(b) Human Height/skin colour are examples of polygenic inheritance, height trait is controlled by at least three gene pairs, additive effect of each allele contributes to the phenotypic expression of the trait, more the dominant alleles more pronounced is the phenotypic expression /more the recessive alleles less pronounced is the phenotypic expression = ½ ×4

Note: (skin colour may be accepted in place of height as an example)

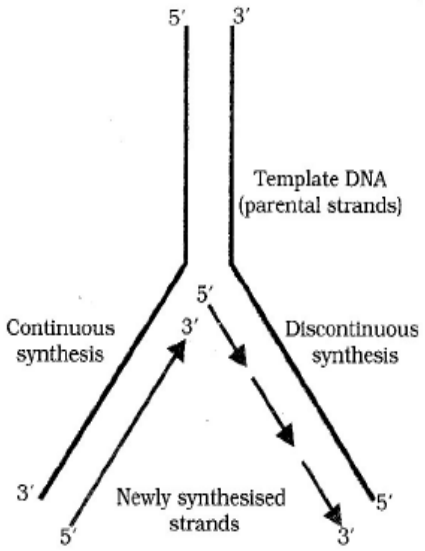
[5 Marks]

OR

(a) Draw a labelled diagram of a "replicating fork" showing the polarity.Why does DNA replication occur within such 'fork' ?

(b) Name two enzymes involved in the process of DNA replication, along with their prop

Ans. (a)



(Correct diagram with polarity of parental strands and any other 3 labels) = ½ × 4

Since two strands of DNA cannot be seperated in its entire length due to very high energy requirement / high amount of energy is required to break the hydrogen bonds holding the two strands the replication occurs in small opening of DNA strands called the Replication fork = 1

(b) i) DNA dependent DNA polymerase , adds nucleotides only in 5' to 3' directions/are very fast =½ ×2

ii) DNA ligase , joins the discontinuously synthesised DNA fragments during replication =½ ×2

[5 Marks]

25. (a) List the different attributes that a population has and not an individual organism.

(b) What is population density? Explain any three different ways the populationdensity can be measured, with the help of an example each .

(a) Attributes of population

Birth rate , Death Rate , sex ratio,age pyramids/age distribution (any two) = ½ × 2

(b) Population density -

Number of individuals per unit area at a given time / period = 1

1. Biomass / % Cover , e.g Hundred *Parthenium* plants and 1 huge banayan tree = ½×2
2. Relative Density , e.g Number of fish caught per trap from a lake =½×2
3. Numbers , e.g Human population = ½ × 2
4. Indirect estimation , e.g without actually counting/seeing them e.g tiger census based on pugmarks and fecal pellets = ½ × 2

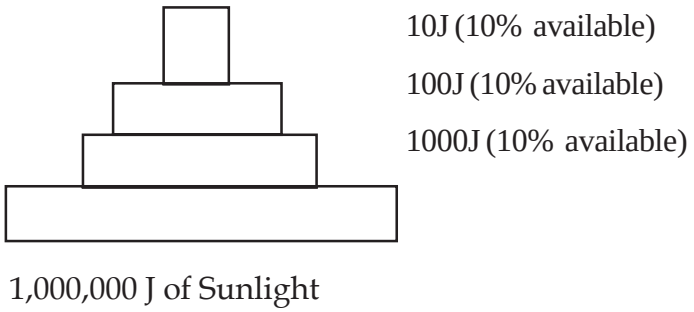
(Any three)

[5 Marks]

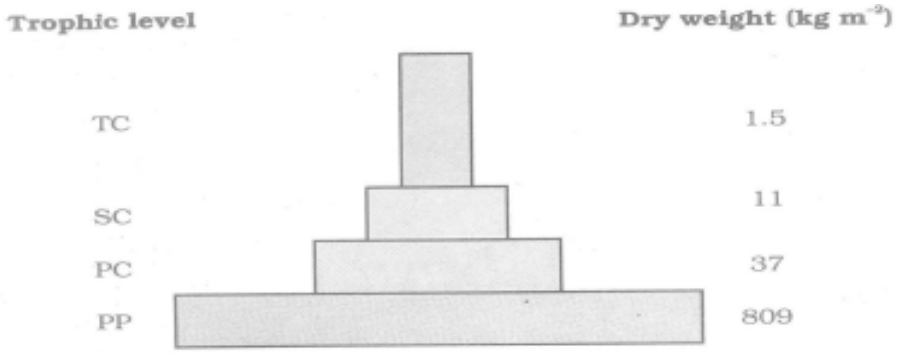
OR

"It is often said that the pyramid of energy is always upright. On the other hand the pyramid of biomass can be both upright and inverted." Explain with the help of examples and sketches.

Ans.



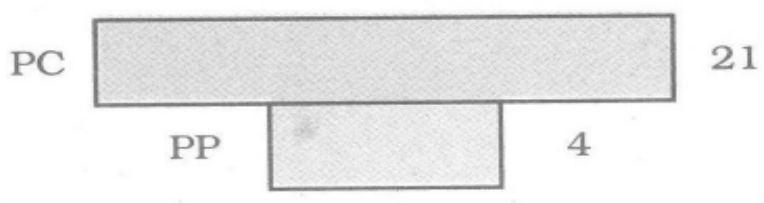
Upright Pyramid of Energy : e.g of any Grassland food chain depicting energy transfer at each trophic level = 1+1



Upright Pyramid of Biomass : e.g grassland food chain-grass ⟶ rabbit ⟶ fox ⟶ Tiger

(Any other relevant example) = 1 for Diagram + ½ for example

Note:(If only two trophic levels are drawn with dry weight mentioned correctly can be accepted)



Inverted Pyramid of Biomass: e.g aquatic ecosystem where small standing crop of phytoplanktons supports large standing crop of zooplanktons =1 for Diagram + ½ for example

[5 Marks]

26. (a) Plan an experiment and prepare a flow chart of the steps that you would follow to ensure that the seeds are formed only from the desired sets of pollen grains. Name the experiment that you carried out .

(b) Write the importance of such experiments.

Ans. (a) Selection of flowers from desired plants ⟶ emasculation ⟶ bagging ⟶ dusting of the pollens on the stigma of the flowers that were bagged ⟶ flower rebagged ⟶ fruit formed
= ½ × 6

Artificial Hybridisation =1

(b) Production of superior/ improved varieties of plants = 1

[5 Marks]

OR

Describe the roles of pituitary and ovarian hormones during the menstrual cycle in a human female.

Ans. Pituitary hormones :

(When levels of FSH is high) FSH, induces follicular growth, secretion of estrogen by follicles, (when LH surge is there in the mid of the cycle) lutinising hormones/LH, along with FSH leads to ovulation , and then formation of corpus luteum = ½ ×6

Ovarian hormone:

Estrogen , repair/proliferation of endometrium,

Progesterone,maintains endometrium for implantation = ½ ×4

(Low level of progesterone leads to menstrual flow)

[5 Marks]