SET – 3

Series : GBM/1

कोड नं.
Code No. 57/1/3

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 जायेगा । 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।
- Please check that this question paper contains **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 घंटे *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 – **क** में प्रश्न संख्या **1** से **5** अति लघु-उत्तरीय प्रश्न हैं । प्रत्येक प्रश्न **एक** अंक का है ।*

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

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

(v) *खण्ड – **घ** में प्रश्न संख्या **23** मूल्य आधारित प्रश्न **चार** अंकों का है ।*

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

(vii) *प्रश्न-पत्र में समग्र पर कोई विकल्प नहीं है, फिर भी **दो** अंकों वाले **एक** प्रश्न में, **तीन** अंकों वाले **एक** प्रश्न में और **पाँच** अंकों वाले सभी **तीनों** प्रश्नों में भीतरी चयन-विकल्प दिए गए हैं । प्रत्येक परीक्षार्थी को ऐसे प्रश्नों के **दो** विकल्पों में से कोई **एक** प्रश्न हल करना है ।*

General Instructions :

(i) *There are total **26** questions in **five** sections in the question paper. **All** questions are compulsory.*

(ii) *Section **A** contains questions number **1** to **5**, Very Short Answer type questions of **one** mark each.*

(iii) *Section **B** contains questions number **6** to **10**, Short Answer type-**I** questions of **two** marks each.*

(iv) *Section **C** contains questions number **11** to **22**, Short Answer type-**II** questions of **three** marks each.*

(v) *Section **D** contains question number **23**, Value Based Question of **four** marks.*

(vi) *Section **E** contains questions number **24** to **26**, Long Answer type questions of **five** marks each.*

(vii) *There is no overall choice in the question paper, however, an internal choice is provided in **one** question of **two** marks, **one** question of **three** marks and all **three** questions of **five** marks. An examinee is to attempt any **one** question out of the **two** given in the question paper with the same question number.*

खण्ड – क

SECTION – A

1. जैव अवैध नकल क्या होती है ? **1**

   What is biopiracy ?

2. मानवों में अनुस्मरण अनुक्रिया को सुनिश्चित करने के लिए एक विधि का सुझाव दीजिए । **1**

   Suggest a method to ensure an anamnestic response in humans.

3. युग्मक निर्माण के दौरान एक जोड़ी अलिंगसूत्री गुणसूत्रों की नियति क्या होती है ? **1**

   State the fate of a pair of autosomes during gamete formation.

4. हमारी सरकार ने हमारे देश में M.T.P. के लिए जानबूझकर सख्त शर्तें लगा दी हैं । कारण बताते हुए इसकी पुष्टि कीजिए । **1**

   Our government has intentionally imposed strict conditions for M.T.P. in our country. Justify giving a reason.

5. नीचे दिए गए मानव क्रियाकलापों को उस क्रम में व्यवस्थित कीजिए जिसमें वे हिमयुग के दौरान आधुनिक होमो सैपिएंस के अस्तित्व में आने के पश्चात् विकसित हुए :

(i) मानव बस्ती

(ii) इतिहास-पूर्व गुफ़ा कला

(iii) कृषि **1**

Rearrange the human activities mentioned below as per the order in which they developed after the modern Homo sapiens came into existence during ice age :

(i) Human settlement

(ii) Prehistoric cave art

(iii) Agriculture

खण्ड – ख

SECTION – B

6. आपके इलाके के किसी तालाब में बड़े पैमाने पर शैवाल प्रस्फुटन दिखायी देता है ।

(a) यह प्रस्फुटन किस कारण उत्पन्न हुआ है और जल की गुणवत्ता पर इसका क्या प्रभाव पड़ेगा ?

(b) इस प्रस्फुटन की रोकथाम के उपाय का सुझाव दीजिए । **2**

Plenty of algal bloom is observed in a pond in your locality.

(a) Write what has caused this bloom and how does it affect the quality of water.

(b) Suggest a preventive measure.

7. कवकमूल (mycorrhizae) किस प्रकार पौधों की बेहतर वृद्धि में मदद करते हैं ? **2**

How do mycorrhizae help the plants to grow better ?

8. एक ऐंजियोस्पर्म - पौधें के मादा युग्मकोद्भिद की कोशिकाओं में विद्यमान कोशिकाओं की विविध प्रकार की गुणिता की चर्चा कीजिए । **2**

Mention the ploidy of the different types of cells present in the female gametophyte of an angiosperm.

9. न्यूक्लियोसोम की संरचना का वर्णन कीजिए । **2**

अथवा

निम्नलिखित जीवों के विकासीय महत्त्व की चर्चा कीजिए : **2**

(a) छछूँदर

(b) लोबफ़िन

(c) होमो हैबिलिस

(d) होमो इरेक्टस

Describe the structure of a nucleosome.

OR

Mention the evolutionary significance of the following organisms :

(a) Shrews

(b) Lobefins

(c) *Homo habilis*

(d) *Homo erectus*

10. स्पाइरुलाइना को बड़े पैमाने पर उगाना मानव जाति के लिए पर्यावरण की दृष्टि और पोषण की दृष्टि दोनों से लाभकारी होता है । पुष्टि कीजिए । **2**

"Growing *spirullina* on a large scale is beneficial both environmentally and nutritionally for humans." Justify.

SECTION – C

11. किसी सभागार में आग लगने के दौरान बड़ी संख्या में इतने मेहमान जल गए कि उनकी पहचान करना भी दुष्कर हो गया । उस आधुनिक तकनीक का सुझाव दीजिए तथा उसका वर्णन भी कीजिए जिससे मृतकों को उनके रिश्तेदारों को सौंपा जा सके । **3**

During a fire in an auditorium a large number of assembled guests got burnt beyond recognition. Suggest and describe a modern technique that can help hand over the dead to their relatives.

12 (a) अंत:प्रजनन अवसाद क्या होता है ?

(b) पशुओं के अंत:प्रजनन के दौरान "वरण" के महत्त्व की व्याख्या कीजिए । **3**

(a) What is inbreeding depression ?

(b) Explain the importance of "selection" during inbreeding in cattle.

13. $p^2 + 2\,pq + q^2 = 1$ हार्डी वाइनबर्ग के नियम के आधार पर इस बीजगणितीय समीकरण की व्याख्या कीजिए । **3**

$p^2 + 2\,pq + q^2 = 1$. Explain this algebraic equation on the basis of Hardy Weinberg's principle.

14. डॉक्टरी जाँच के दौरान पता लगा कि एक नवजात शिशु में एक 21वाँ गुणसूत्र अधिक है । इस बच्चे में बड़े होकर क्या रोग लक्षण प्रकट होने की संभावना है ? **3**

During a medical investigation, an infant was found to possess an extra chromosome 21. Describe the symptoms the child is likely to develop later in the life.

15. मानव शुक्रजनक नलिका की आरेखी नामांकित काट के दृश्य बनाइए । **3**

Draw a labelled diagrammatic sectional view of a human seminiferous tubule.

16. कुछ पौधों में अनिषेकफलन और असंगजनन देखे गए हैं । प्रत्येक का एक-एक उदाहरण दीजिए । इन दोनों प्रक्रियाओं में पायी जाने वाली एक समानता तथा एक विषमता बताइए । **3**

Parthenocarpy and apomixis have been observed in some plants. Give an example of each. State a similarity and a difference observed between the two processes.

17. वाहित मल-उपचार में फ्लॉक्स (उर्णिक) तथा सक्रियित स्लज किस प्रकार सहायता करते हैं, वर्णन कीजिए । **3**

Describe how do 'flocs' and 'activated sludge' help in Sewage Treatment.

18. जैव-प्रौद्योगिकी में निम्नलिखित की भूमिकाओं की व्याख्या कीजिए :

(a) प्रतिबंधन एंडोन्यूक्लिऐज़

(b) जेल-विद्युतकण संचलन

(c) pBR322 में वरणात्मक चिह्नक **3**

Explain the role(s) of the following in Biotechnology :

(a) Restriction endonuclease

(b) Gel – electrophoresis

(c) Selectable markers in pBR322.

19. Bt कपास के पौधों पर भरण-पोषण करने वाले लेपिडोप्टेरा-कीट क्यों मर जाते हैं ? समझाकर बताइए कि ऐसा क्यों होता है । **3**

Why do lepidoplerans die when they feed on Bt cotton plant ? Explain how does it happen.

20. केवल एक प्रवाह चार्ट की सहायता से मानवों में मलेरिया परजीवी के जीवन-चक्र को दर्शाइए । **3**

Show with the help of a flow chart only, the life cycle of malerial parasite in humans.

21. 'स्वस्थाने' संरक्षण से संकटापन्न स्पीशीजों को मदद मिल सकती है । इस कथन की पुष्टि कीजिए । **3**

अथवा

जैव-विविधता "हानियों" के किन्हीं तीन कारणों के नाम बताइए तथा उनका वर्णन कीजिए । **3**

'*in-situ*' conservation can help endangered/threatened species. Justify the statement.

OR

Name and describe any three causes of biodiversity losses.

22. विदेशी-जीन-उत्पाद को प्राप्त करने के लिए लिये जाने वाले चरणों का सुझाव दीजिए । **3**

Write the steps you would suggest to be undertaken to obtain a foreign-gene-product.

खण्ड – घ

SECTION – D

23. संपूर्ण भारत की जनता उत्तरी भारत के बड़े भाग की वायु की बिगड़ती हुयी गुणवत्ता को लेकर बहुत अधिक चिंतित है । इस स्थिति से संत्रस्त होकर आपके इलाके की रिहायशी कल्याण संस्था ने "दफ़नाइए, जलाइए मत" जागरूकता कार्यक्रम का आयोजन किया । जीव-विज्ञान के विद्यार्थी होने के नाते संस्था ने इसमें भाग लेने के लिए आमंत्रित किया है ।

(a) दफ़नाने को बढ़ावा देने तथा जलाने को निरुत्साहित करने के आपके तर्क की पुष्टि किस प्रकार करेंगे ? (कोई दो कारण दीजिए) ।

(b) प्रवाह-चार्टों, प्रत्येक कार्रवाही के लिए एक-एक, की सहायता से, कार्रवाही के पश्चात् होने वाली परिघटनाओं की शृंखला की चर्चा कीजिए । **4**

Public all over India is very much concerned about the deteriorating air quality in large parts of North India. Alarmed by this situation the Resident's Welfare Association of your locality organized an awareness programme entitled "Bury not burn". They invited you, being a biology student to participate.

(a) How would you justify your arguments that promote burying and discourage burning ? (Give two reasons)

(b) With the help of flow charts, one for each practice depict the chain of events that follow.

खण्ड – ङ

SECTION – E

24. एक प्ररूपी मेन्डेलीय द्विसंकर क्रॉस में "स्वतंत्र अपव्यूहन के नियम" की चर्चा कीजिए तथा उसकी व्याख्या कीजिए । **5**

अथवा

(a) इंग्लैंड में औद्योगीकरण से पहले और बाद में शलभ-एकत्रीकरण के दौरान किए गए प्रेक्षणों से प्राकृतिक वरण द्वारा विकास के विचार को पुष्टि किस प्रकार मिलती है ?

(b) उस परिघटना की व्याख्या कीजिए जो, प्राकृतिक वरण के अतिरिक्त, डार्विन फ़िंचों (पक्षियों) द्वारा भलीभाँति प्रदर्शित करती है । **(4 + 1) = 5**

State and explain the "law of independent assortment" in a typical Mendelian dihybrid cross.

OR

(a) How do the observations made during moth collection in pre- and post-industrialized era in England support evolution by Natural Selection ?

(b) Explain the phenomenon that is well represented by Darwin's finches other than natural selection.

25. (a) आयु का पिरैमिड क्या होता है ?

(b) मानव जनसंख्या के आयु-पिरैमिड के तीन निरूपक प्रकारों के नाम बताइए और प्रत्येक की लाक्षणिकता की सूची बनाइए । **(1 + 4) = 5**

अथवा

आर्थिक, पर्यावरणीय तथा सौन्दर्यपरक वस्तुओं तथा सेवाओं के व्यापक परिसर के लिए पूर्वपेक्षित स्वस्थ पारितंत्रीय सेवाओं की भूमिका की चर्चा कीजिए । **5**

(a) What is an age-pyramid ?

(b) Name three representative kinds of age-pyramids for human population and list the characteristics for each one of them.

OR

Discuss the role of healthy ecosystem services as a pre-requisite for a wide range of economic, environmental and aesthetic goods and services.

26. (a) शिमला मिर्च (capsicum) के फूल में अंडाशय में 240 बीजांड हैं । लेकिन उससे ऐसा फल उत्पन्न होता है जिसमें केवल 180 जीवनक्षम बीज़ मौजूद हैं । इस प्रकार के परिणाम के लिए उत्तरदायी कारण बताते हुए व्याख्या कीजिए ।

(b) एक जीवनक्षम बीज में एंडोस्पर्म के परिवर्धन का वर्णन कीजिए । भ्रूण-परिवर्धन से पहले एंडोस्पर्म का परिवर्धन क्यों होता है ?

(c) एक ऐंजियोस्पर्मी पौधे के ऐसे बीज़ का उदाहरण दीजिए जिसमें परिभ्रूणपोष मौजूद है । उस भाग का नाम बताइए जिससे परिभ्रूणपोष विकसित हुआ है । **(1 + 3 + 1) = 5**

अथवा

(a) मानवों की फैलोपी नली के भीतर निषेचन कहाँ पर होता है ? निषेचित अंडाणु के परिवर्धन का उसके अंत:रोपण होने तक के परिवर्धन का वर्णन कीजिए ।

(b) मानवों में बहुशुक्राणुता को किस प्रकार रोका जाता है ? **(4 + 1) = 5**

(a) A capsicum flower has 240 ovules in its ovary. But, it produces a fruit with only 180 viable seeds.

Explain giving a reason that could be responsible for such a result.

(b) Describe the development of an endosperm in a viable seed. Why does endosperm development precede embryo development ?

(c) Give an example of an angiosperm seed that has a perisperm. Name the part the perisperm develops from.

OR

(a) Where in the fallopian tube does fertilization occur in humans ? Describe the development of a fertilized ovum upto implantation.

(b) How is polyspermy prevented in humans ?

Question Paper Code 57/1/3

SECTION – A

(Q. Nos. 1 - 5 are of one mark each)

1. What is biopiracy ?

Ans. Use of bioresources by MNC/organizations / individuals , without proper authorization / legal permission / without compensatory payment from the countries and people concerned = ½ + ½

[1 mark]

2. Suggest a method to ensure an anamnestic response in humans.

Ans. Vaccination / Immunization (Active / passive) / weakened or inactive microbes or pathogens or proteins or antibodies introduced into the host body

[1 mark]

3. State the fate of a pair of autosomes during gamete formation.

Ans. Segregate / separate

[1 mark]

4. Our government has intentionally imposed strict conditions for M.T.P. in our country. Justify giving a reason.

Ans. To prevent female foeticide / to maintain sex ratio / to avoid any danger for (young) mother (and foetus)

[1 mark]

5. Rearrange the human activities mentioned below as per the order in which they developed after the modem Homo sapiens came into existence during ice age :

(i) Human settlement

(ii) Prehistoric cave art

(iii) Agriculture

Ans. (i) Pre-historic cave art = ½

(ii) Agriculture / Human Settlement = ½

[½ + ½ = 1 mark]

SECTION -B

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

6. Plenty of algal bloom is observed in a pond in your locality.

(a) Write what has caused this bloom and how does it affect the quality of water.

(b) Suggest a preventive measure.

Ans. (a) Presence of large amounts of nutrients / Nitrogen / Phosphorus in water causes excessive growth of algae , depletes dissolved oxygen / imparts distinct colour to the water bodies / bloom forming algae are extremely toxic / deteriorates water quality / fish mortality = ½ + ½

(b) Treatment of waste water before it reaches the pond / Integrated waste water treatment / avoiding using NPK fertilizers / use of organic or biodegradable manure / resort to organic farming = 1

[1 + 1 = 2 marks]

7. How do mycorrhizae help the plants to grow better ?

Ans. Absorbs phosphorus , provide resistance to root borne pathogens , enhanced to tolerate salinity / drought ***(Any two)*** = 1 + 1

[2 marks]

8. Mention the ploidy of the different types of cells present in the female gametophyte of an angiosperm.

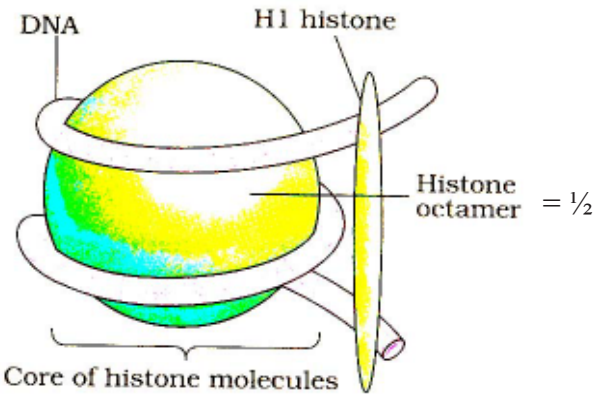
Ans. Synergids = n / haploid , egg = n / haploid , polar nuclei = n / haploid , antipodals = n / haploid = ½ × 4 // all types of cell of female gametophyte are haploid / n = 2

[2 marks]

9. Describe the structure of a nucleosome.

Ans. A unit of eight molecules of positively charged histones , negatively charged DNA , wrapped around the histones octamer , contains 200 bp of DNA helix = ½ × 4

// In lieu of the above explanation the following diagram alongwith the following statement can be considered



DNA is negatively charged , histone is positively charged , 200 bp of DNA helix = ½ × 3, Diagram = ½

[2 marks]

OR

Mention the evolutionary significance of the following organisms :

(a) Shrews

(b) Lobefins

(c) Homo habilis

(d) Homo erectus

Ans. (a) first mammals = ½

(b) first amphibians (lived both on land and in water) / fish with stout and strong fins which could move on land and go back to water = ½

(c) first human like being / hominid / brain capacity from 650 - 800 cc / did not eat meat = ½

(d) brain around 900 cc / ate meat = ½

[½ × 4 = 2 marks]

10. "Growing *spirullina* on a large scale is beneficial both environmentally and nutritionally for humans." Justify.

Ans. Can grow easily on materials like waste water from potato processing plants / straw / molasses / animal manure / sewage , reducing environmental pollution = ½ + ½

It serves as food rich in protein / carbohydrates / fats / vitamins / minerals ***(Any two)*** = ½ + ½

[2 marks]

SECTION-C

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

11. During a fire in an auditorium a large number of assembled guests got burnt beyond recognition. Suggest and describe a modern technique that can help hand over the dead to their relatives.

Ans. DNA finger printing = 1

Isolation of DNA and digestion of DNA by restriction endonucleases, separation of DNA fragments by (gel) electrophoresis and transferring (blotting) of separated DNA fragments to synthetic membrane or nitrocellulose or nylon , hybridization using VNTR probe and detection of hybridised DNA fragments by autoradiography , matching the banding pattern so obtained with that of relative = ½ × 4

[3 marks]

12 (a) What is inbreeding depression ?

(b) Explain the importance of "selection" during inbreeding in cattle.

Ans. (a) Continuous inbreeding especially close inbreeding usually reduces fertility , and even productivity / yield = ½ + ½

(b) Helps in accumulation of superior genes / elimination of less desirable genes , increases homozygosity , pure lines , true breeding , helps to restore fertility , helps to increase yield / productivity , produces more milk per lactation , produces superior progeny , produces disease resistant breeds

(Any two) = 1 + 1

[1 + 2 = 3 marks]

13. $p^2 + 2pq + q^2 = 1$. Explain this algebraic equation on the basis of Hardy Weinberg's principle.

Ans. If p represents the frequency of allele A , q represent the allele frequency of a , then frequency of AA = p^2 , aa = q^2, Aa = 2pq

Total genes and their alleles in a population or gene pool remains constant (called as genetic equilibrium)

Sum total of all the allelic frequencies is 1 / [p + q = 1 / $(p + q)^2 = 1$]

(Any six) = ½ × 6

[3 marks]

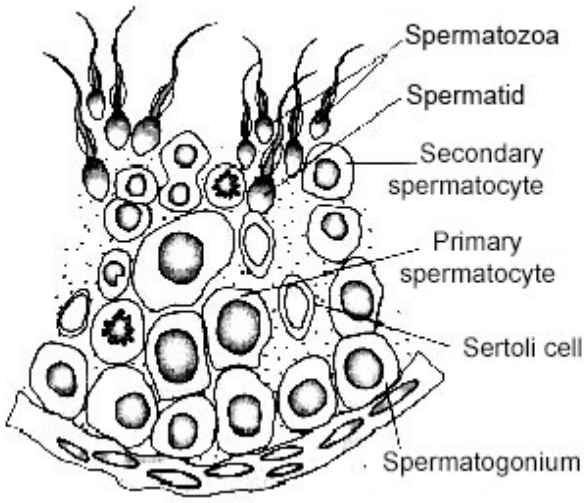
14. During a medical investigation, an infant was found to possess an extra chromosome 21. Describe the symptoms the child is likely to develop later in the life.

Ans. Short statured , small round head , furrowed tongue , partially open mouth , broad palm with characteristic palm crease , physical psychomotor & mental development retarded , big and wrinkled tongue , broad flat face , flat back of head , many 'loops' on finger tips

(Any three) = 1 × 3

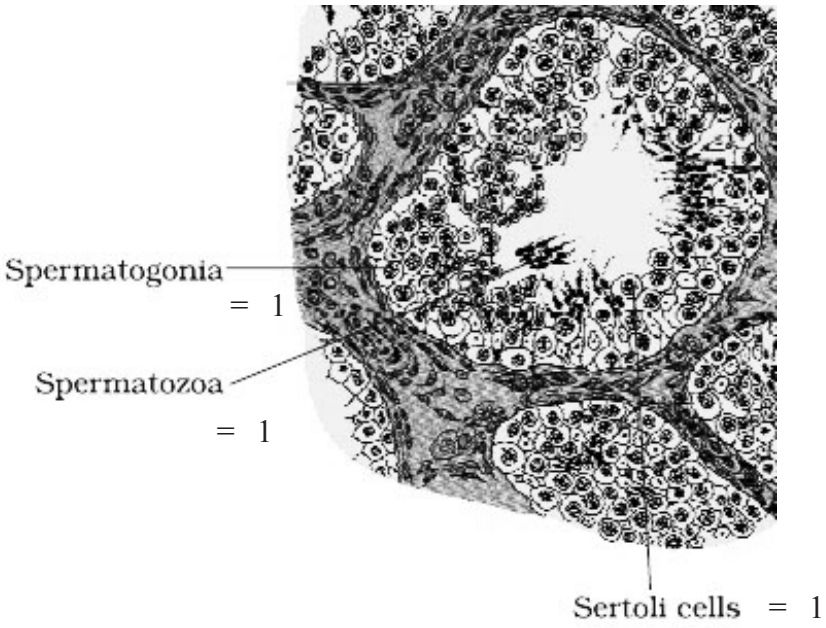
[3 marks]

15. Draw a labelled diagrammatic sectional view of a human seminiferous tubule.



(Any three correct labellings) = (1 × 3 = 3)

//



(1 × 3 = 3) [3 marks]

16. Parthenocarpy and apomixis have been observed in some plants. Give an example of each. State a similarity and a difference observed between the two processes.

Ans.

Parthenocarpy	Apomixis
Fruit is formed without fertilisation	Seed is formed without fertilisation
Seedless fruits are produced	Fruits with seeds are produced

(Any one difference) = 1

Eg. : Banana / grapes / any other correctly = ½

Eg. : species of Asteraceae / grasses /any other correctly = ½

Similarity : In both the processes development takes place without fertilisation = 1

[3 marks]

17. Describe how do 'flocs' and 'activated sludge' help in Sewage Treatment.

Ans. Flocs - Aerobic microbes consume the major part of the organic matter in the effluent , significantly reduces BOD = 1 + 1

Activated sludge - Small part of activated sludge is used as inoculum and pumped back to aeration tank / pumped into anaerobic sludge digesters where microbes or bacteria grow anaerobically to produce CH_4 or H_2S or CO_2 or biogas = 1

[2 + 1 = 3 marks]

18. Explain the role(s) of the following in Biotechnology :

(a) Restriction endonuclease

(b) Gel - electrophoresis

(c) Selectable markers in pBR322.

Ans. (a) Cuts at specific position within the DNA / cuts DNA at specific nucleotide / cuts at palindromic nucleotide sequence = 1

(b) Separation of DNA fragments (under the influence of electric field) = 1

(c) Helps in Identifying and eliminating non-transformants from transformants / selection of transformants = 1

[1 + 1+ 1 = 3 marks]

19. Why do lepidopterans die when they feed on Bt cotton plant ? Explain how does it happen.

Ans. Bt cotton contains inactive toxin protein / protoxin / insecticidal protein / crystal protein , once the insect ingests it the inactive protoxins converted into active form due to alkaline pH in gut , which solubilise the crystals , activated toxins binds to surface of midgut (epithelial cells) , create pores causes cell swelling ,lysis eventually leading the death of the insect pest = ½ × 6

[3 marks]

20. Show with the help of a flow chart only, the life cycle of malarial parasite in humans.

Ans. When mosquito bites human sporozoites are injected into blood stream → parasite reaches the liver cells and multiplies → liver cells burst releasing parasite into the blood → parasites then enter into RBCs multiplying and bursting them → male gametocytes , female gametocyte develop in RBCs = ½ × 6 = 3

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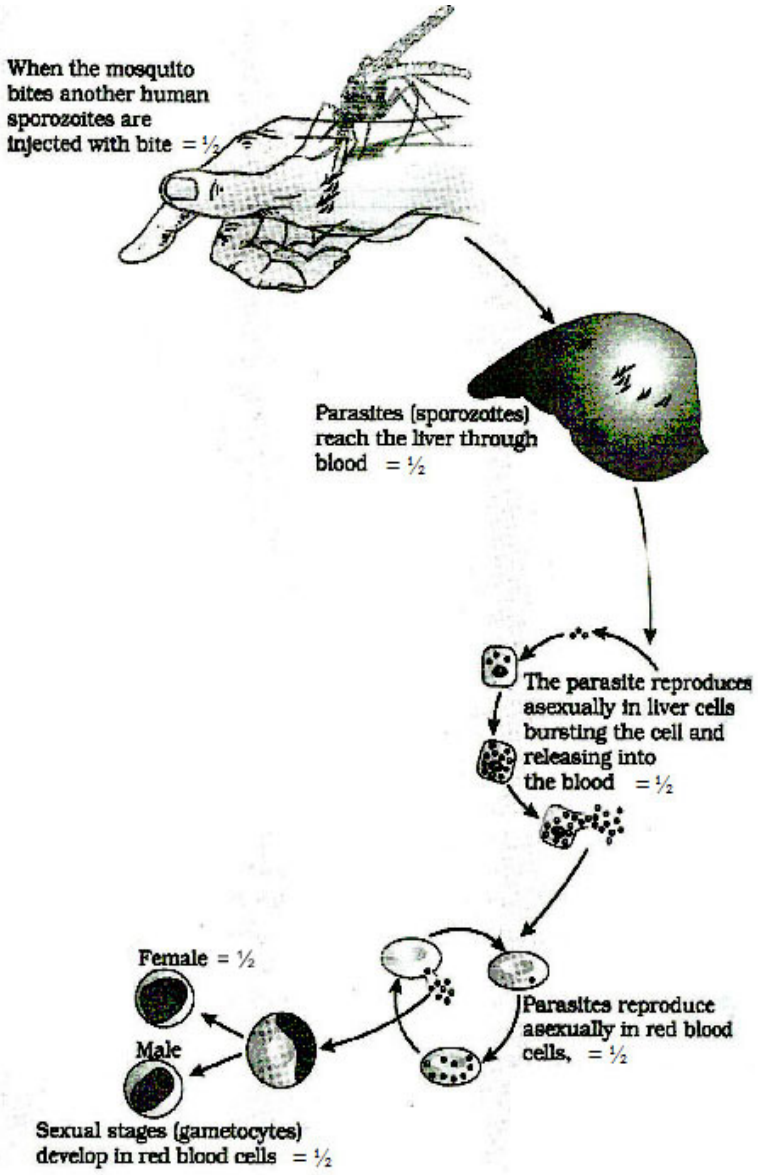
In lieu of the above explanation the following diagram can be considered



= ¼ × 6

[3 marks]

21. '*in-situ*' conservation can help endangered/threatened species. Justify the statement.

Ans. Threatened organisms are conserved in their natural habitat / eco system , and such regions are legally protected = 1+ 1

As hotspots / biosphere reserves / national parks / sancturies / sacred groves / ramsar sites

(Any two names) = ½ + ½

[3 marks]

OR

Name and describe any three causes of biodiversity losses.

Ans. Habitat loss and fragmentation =½ , Habitat loss from tropical rainforest / The Amazon rain forest is being cut and cleared / for raising cattle / for conversion to grass lands / for cultivating soyabeans / large habitats are broken up into small fragments due to human activities / mammals and birds requiring large territories are badly affected leading to decline in population = ½

Over exploitation = ½ , when 'need' turns 'greed' lead to over exploitation of natural resources / steller's sea cow / passenger pigeon were over exploited / marine fish populations around the world are over exploited / endangering existance of commercially important species = ½

Alien species invasions = ½ , when introduced unintentionally or deliberately for any purpose some of them turn invasive and decline indigenous species / carrot grass / parthenium / African cat fish / *Clarias gariepinus* poses threat to indigenous cat fishes of our river = ½

Co-extinctions = ½ , when a species becomes extinct the plant or animal species associated with it (an obligate way) become extinct / when a host species becomes extinct (its unique assemblage of) parasites meets the same fate / extinction of any member in plant pollinator mutualism leads to extinction of other = ½

(Any three named and explained) = 1 ×3

[3 marks]

22. Write the steps you would suggest to be undertaken to obtain a foreign-gene-product.

Ans. Insert a piece of alien or desired or foreign DNA into a cloning vector , transfer it into a bacterial / plant / animal cell , the alien DNA gets multiplied , optimised condition (temperature pH , substrate , salts , vitamins , O_2 provided to the culture / culture in bioreactor / in continuous culture system to induce the expression of the target product , extracting the desired product , purifying it by using different separation techniques = ½ × 6

[3 marks]

SECTION-D

Q. Nos. 23 is of four marks

23. Public all over India is very much concerned about the deteriorating air quality in large parts of North India. Alarmed by this situation the Resident's Welfare Association of your locality organized an awareness programme entitled "Bury not burn". They invited you, being a biology student to participate.

(a) How would you justify your arguments that promote burying and discourage burning ? (Give two reasons)

(b) With the help of flow charts, one for each practice depict the chain of events that follow.

ns. (a)
- Burying of biodegradable wastes (Agriculutural waste / plant parts such as dry leaves / vegetable peels / fallen flower / rotten fruits etc.) : in the pit / landfill and should be covered with soil leading to the decomposition of organic matter / which enrich soil / increase soil fertility ***(Any two points)***= ½ + ½
- If these things are burnt it will lead to formation of harmful gases / smoke / particulate matter which causes air pollution / global warming / respiratory diseases ***(Any two points)*** = ½ + ½

(b)
- Burying of biodegradable wastes (Agriculutural waste / plant parts such as dry leaves / vegetable peels / fallen flower / rotten fruits etc.) : in pit / landfill → decomposition → compost → increase soil fertility / recycling of nutrients

//

Burying of biodegradable wastes (Agriculutural waste / plant parts such as dry leaves / vegetable peels / fallen flower / rotten fruits etc.) : fragmentation → leaching → catabolism → humification → mineralisation

//

Burying of biodegradable wastes (Agriculutural waste / plant parts such as dry leaves / vegetable peels / fallen flower / rotten fruits etc.) : Detritus → decompositions

(Any one flow chart) = 1

- If these things are burnt : air pollution / global warming → respiratory disease

//

If these things are burnt : release of CO_2 → global warming

(Any one flow chart) = 1

[2 + 2 = 4 marks]

SECTION-E

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

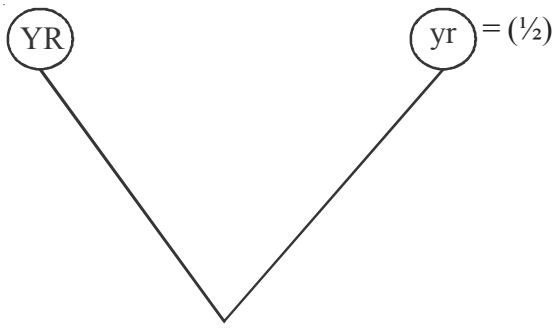
24. State and explain the "law of independent assortment" in a typical Mendelian dihybrid cross.

Ans. Law of Independent Assortment : when two pair of traits are combined in a hybrid , inheritance of one pair of characters is independent of the other pair of characters / when two pairs of contrasting characters or genes or traits are inherited together in a dihybrid cross (in a pea plant) the inheritance of one pair of character is independent of inheritance of the other character in the progeny = 1

Explanation : Mendel took homozygous pea plant producing yellow and round seeds and crossed them with homozygous pea plant producing green and wrinkled seeds / shown in a flow chart of a dihybrid cross given

//

(a) YYRR × y y r r = (½)



F_1 - Yy Rr = (½)

(½)		YR	Yr	yR	yr } (= ½)	
	YR	YYRR	YYRr	YyRR	YyRr	F_2 (½)
	Yr	YYRr	YYrr	YyRr	Yyrr	
	yR	YyRR	YyRr	yyRR	yyRr	
	yr	YyRr	Yyrr	yyRr	yyrr	

Phenotypes –	Yellow round	:	Yellow wrinkled	:	Green round	:	Green wrinkled
Phenotype ratio –	9	:	3	:	3	:	1

(Four different types of phenotypes in correct ratio) = ½ + ½

(Formation of new phenotypes along with parental phenotypes is possible because inheritance of two pairs of contrasting traits or genes in the progeny is independent of each other)

[4 + 1 = 5 marks]

OR

(a) How do the observations made during moth collection in pre- and post-industrialized era in England support evolution by Natural Selection ?

(b) Explain the phenomenon that is well represented by Darwin's finches other than natural selection.

Ans. (a)

- Before industrialisation white coloured lichen covered the trees in which white winged moths camouflaged themselves from predators ,
- More white winged moths existed on trees than dark winged or melanised moths ,
- After industrialisation there were more dark winged moths in the same area i.e. proportion was reversed ,
- Predators would spot a moth easily against a contrasting background ,

- During post industrialisation tree trunks became dark due to industrial smoke and soot ,
- White winged moth did not survive due to detection by predators whereas dark winged survived = ½ × 6

(b) The process of evolution of different species in a given geographical area starting from a point , radiating to other areas of geography (habitats) is called adaptive radiation , finches evloved in the same island from original seed eating features , many other altered beaks arose enabling them to become insectivorous and vegetarian finches = ½ ×4

[3 + 2 = 5 marks]

25. (a) What is an age-pyramid ?

(b) Name three representative kinds of age-pyramids for human population and list the characteristics for each one of them.

Ans. (a) If the age distribution (per cent individuals of a given age or age group) is plotted for the population the resulting structure is called the age pyramid = 2

(b) Expanding = ½ : pre reproductive population is greater than reproductive or post reproductive population / growing with maximum no. of individuals in pre reproductive phase and least no. in post reproductive phase = ½

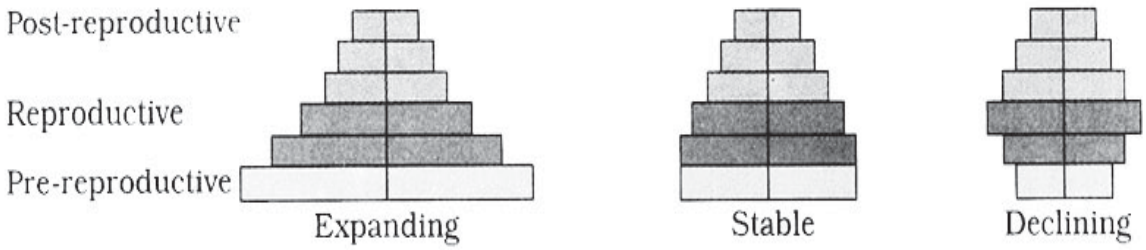
Stable = ½ : Pre-reproductive & reproductive population are almost similar / ideal for population / mainains balanced continuity / no. of individuals in reproductive and pre reproductive phase is almost same and less no. of individuals in post reproductive phase = ½

Declining = ½ : Pre-reproductive population is less than reproductive population /less no. of individuals in pre reproductive phase than reproduction→ phase = ½

(½ × 6)

// (b part)

In lieu of the above explanation the following diagram can be considered



= 1 = 1 = 1

[2 + 3 = 5 marks]

OR

Discuss the role of healthy ecosystem services as a pre-requisite for a wide range of economic, environmental and aesthetic goods and services.

Ans. Purify air and water , mitigate droughts and floods , cycle nutrients , generate fertile soils , provide wild life - habitat , maintain biodiversity , pollinate crops , provide storage site for carbon , provide aesthetic cultural and spiritual value recreation , climate regulation

[½ × 10 = 5]

26. (a) A capsicum flower has 240 ovules in its ovary. But, it produces a fruit with only 180 viable seeds.

Explain giving a reason that could be responsible for such atesult.

(b) Describe tfie development of an endosperm in a viable seed. Why does endosperm development precede embryo development ?

(c) Give an example of an angiosperm seed that has a perisperm. Name the part the perisperm develops from.

Ans. (a) Less number of pollen grains / male gametes were available / all pollen grains did not germinates / all pollen grains did not form pollen tubes / many pollen were not compatible / 60 ovules not fertilised / only 180 fertilised = 1

(b) PEN undergoes successive nuclear divisions to give rise to free nuclei / free nuclear endosperm , cell wall formation occurs and the endosperm becomes cellular = 1 + 1

Cells of endosperm are filled with reserve food materials that are used for nutrition of developing embryo = 1

(c) Black pepper / beet = ½

Nucellus = ½

[1 + 3 + 1 = 5 marks]

OR

(a) Where in the fallopian tube does fertilization occur in humans ? Describe the development of a fertilized ovum upto implantation.

(b) How is polyspermy prevented in humans ?

Ans. (a) Ampullary region / ampullary isthmic junction = 1

- Cleavage occurs in zygote to form 2 - 4 - 8 - 16 daughter cells / upto 16 daughter cells called blastomeres
- 8 - 16 / 16 blastomeres stage called morula
- Morula continues to divide and transform into blastocycst (as it moves further into uterus)
- Blastomeres in the blastocyst are arranged into an outer layer called trophoblast which gets attached to endometrium
- Inner group of cells are called inner cell mass get differentiated into embryo
- Uterine cells divide rapidly and covers blastocyst / implantation = ½ × 6

(b) When a sperm comes in contact with a zona pellucida layer of ovum , it induces changes in membrane to block entry of additional sperm = ½ + ½

[4 + 1 = 5 marks]