SET – 3

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

जीव विज्ञान (सैद्धान्तिक)

BIOLOGY (Theory)

निर्धारित समय : 3 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 **1** अंक का है ।*

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

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

(v) *खण्ड – **घ** में प्रश्न संख्या **23** मूल्याधारित प्रश्न **4** अंकों का है ।*

(vi) *खण्ड – **ङ** 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 question number **1** to **5**, Very Short Answer type questions of **1** mark each.*

(iii) *Section **B** contains question number **6** to **10**, Short Answer type–**I** questions of **2** marks each.*

(iv) *Section **C** contains question 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 question 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 – क

SECTION – A

1. एक जीन तथा एक ऐलील में अंतर बताइए । **1**

   State a difference between a gene and an allele.

2. दुग्ध-उत्पादन में औसत से कम दूध देने वाले जंतुओं के लिए सबसे उत्तम प्रजनन विधि का सुझाव दीजिए । **1**

   Suggest the breeding method most suitable for animals that are below average in milk productivity.

3. एक शोधकर्ता को DNA के खंडों को पृथक करने की आवश्यकता है, उसे किसी विधि का सुझाव दीजिए । **1**

   Suggest a technique to a researcher who needs to separate fragments of DNA.

4. अलवण जल निकाय में अत्यधिक पोषण के कारण मछलियाँ मर जाती हैं । कोई दो कारण बताइए । **1**

   Excessive nutrients in a fresh water body cause fish mortality. Give two reasons.

5. एक ऐसे कोडोन का उदाहरण दीजिए जो दोहरा कार्य करता हो । **1**

   Give an example of a codon having dual function.

खण्ड – ख
SECTION – B

6. DNA प्रतिकृतियन के दौरान DNA लाइगेज़ नामक एंज़ाइम की भूमिका की चर्चा कीजिए । **2**

Discuss the role the enzyme DNA ligase plays during DNA replication.

7. वाहितमल-उपचार में उर्णिकों और अवायवीय आपंक पाचकों (digesters) में अंतर बताइए । **2**

Distinguish between the roles of flocks and anaerobic sludge digesters in sewage treatments.

8. अमीबता नामक रोग के कारक जीव का नाम बताइए । इस रोग के तीन लक्षण भी बताइए । **2**

अथवा

नीचे दी गयी तालिका में 'A', 'B', 'C' और 'D' को पहचानिए :

फसल	**क़िस्म**	**रोग के लिए प्रतिरोधक**
A	हिमगिरि	पर्ण किट्ट
फूलगोभी	पूसा शुभ्रा	B
सरसों	पूसा स्वर्णिम	C
लोबिया	D	जीवाणुवीय अंगमारी

Name the causative organism of the disease amoebiasis. List three symptoms of the disease.

OR

Identify 'A', 'B', 'C' and 'D' in the given table.

Crop	**Variety**	**Resistance to disease**
A	Himgiri	Leaf rust
Cauliflower	Pusa Shubhra	B
Brassica	Pusa Swarnim	C
Cowpea	D	Bacterial blight

9. वर्षावन में पाए जाने वाले पौधे नम स्थलों (wetlands) में नहीं पाए जाते हैं । व्याख्या कीजिए । **2**

Plants that inhabit a rain-forest are not found in a wetland. Explain.

10. एकलिंगी फूलों वाले आवृतबीजी पौधे या तो उभयलिंगाश्रयी होते हैं या एकलिंगाश्रयी । दोनों का एक-एक उदाहरण देते हुए व्याख्या कीजिए । **2**

Angiosperms bearing unisexual flowers are said to be either monoecious or dioecious. Explain with the help of one example each.

खण्ड – ग

SECTION – C

11. GMO किसे कहते हैं ? एक किसान के लिए GMO के संभावी किन्हीं पाँच लाभों की सूची बनाइए । **3**

What is a GMO ? List any five possible advantages of a GMO to a farmer.

12. अभिरुचि वाले जीन की पात्रे बहुत सारी प्रतिलिपियाँ प्राप्त करने की तकनीक का सुझाव दीजिए तथा उसका वर्णन कीजिए । **3**

Suggest and describe a technique to obtain multiple copies of a gene of interest *in vitro*.

13. (a) कुक्कुट फ़ार्म में मुर्गियों के अलावा पाले जाने वाले दो अन्य पक्षियों के नाम बताइए ।

(b) कुक्कुट फ़ार्म के प्रबंधन के चार महत्त्वपूर्ण घटकों की सूची बनाइए । **3**

(a) Name any two fowls other than chicken reared in a poultry farm.

(b) Enlist four important components of poultry farm management.

14. शिशु की वृद्धि के आरंभिक काल के दौरान स्तनपान कराने की सलाह क्यों दी जाती है ? कारण बताइए । **3**

Why is breast-feeding recommended during the initial period of an infant's growth ? Give reasons.

15. उस प्रयोग का वर्णन कीजिए जिसने लुई पाश्चर को जीवन के स्वत:जनन के सिद्धांत को बरखास्त करने में सहायता की । **3**

Describe the experiment that helped Louis Pasteur to dismiss the theory of spontaneous generation of life.

16. खेलकूद प्रतियोगिता आरंभ होने से पूर्व, खिलाड़ियों के रुधिर तथा मूत्र के नमूनों की "ड्रग" जाँचने के लिए एकत्रित कर लिए जाते हैं । **3**

(a) इस प्रकार की जाँच करने की क्या आवश्यकता होती है ?

(b) वे कौन से "ड्रग" होते हैं जिनकी जाँच अधिकारीगण करना चाहते हैं ?

(c) दो पौधों के जेनेरिक नामों की सूची बनाइए जिनसे ये ड्रग प्राप्त किए जाते हैं ।

Prior to a sports event blood & urine samples of sportspersons are collected for drug tests.

(a) Why is there a need to conduct such tests ?

(b) Name the drugs the authorities usually look for.

(c) Write the generic names of two plants from which these drugs are obtained.

17. मानवों में एक अलिंगसूत्री अप्रभावी विशेषक (trait) का एक उदाहरण दीजिए । एक क्रॉस की सहायता से इसकी वंशागति के पैटर्न की व्याख्या कीजिए । **3**

Give an example of an autosomal recessive trait in humans. Explain its pattern of inheritance with the help of a cross.

18. उपयुक्त उदाहरणों की सहायता से वे तीन विधियाँ बताइए जिनके द्वारा जीव कम अवधि तक ही चलने वाली कष्टकारी परिस्थितियों का सामना कर पाते हैं । **3**

Explain with the help of suitable examples the three different ways by which organisms overcome their stressful conditions lasting for short duration.

19. RNAi तकनीक से किस प्रकार मेलॉईडेगायन इन्कॉग्निशिया नामक एक सूत्रकृमि द्वारा तंबाकू के पौधों में जड़ों का संक्रमण होने से बचाव हो गया ? **3**

How has RNAi technique helped to prevent the infestation of roots in tobacco plants by a nematode *Meloidegyne incognitia* ?

20. नीचे छह सूक्ष्मजीवों की सूची दी गयी है । मानवों के संदर्भ में उनकी उपयोगिता बताइए : **3**

(a) न्यूक्लिओपॉलीहेड्रोवायरस

(b) सैकरोमायसिस सेरीविसियाई

(c) मोनैस्कस पर्पूरिअस

(d) ट्राइकोडर्मा पॉलिस्पोरम

(e) पैनीसीलियम नोटेटम

(f) प्रोपिओनिबैक्टीरियम शारमेनाई

Given below is a list of six micro-organisms. State their usefulness to humans.

(a) *Nucleopolyhedrovirus*

(b) *Saccharomyces cerevisiae*

(c) *Monascus purpureus*

(d) *Trichoderma polysporum*

(e) *Penicillium notatum*

(f) *Propionibacterium sharmanii*

21. "एक खाद्य-शृंखला में, पोषी स्तर का प्रतिनिधित्व किसी स्पीशीज़ द्वारा नहीं बल्कि एक क्रियात्मक स्तर द्वारा होता है ।" समझाइए । **3**

अथवा

(a) उन किन्हीं दो स्थानों के नाम बताइए जहाँ स्थिर-वैद्युत अवक्षेपित्रों को लगाना अनिवार्य होता है । ऐसा करने की क्यों आवश्यकता पड़ती है ?

(b) स्थिर-वैद्युत अवक्षेपित्र की कोई एक सीमा बताइए ।

"In a food-chain, a trophic level represents a functional level, not a species." Explain.

OR

(a) Name any two places where it is essential to install electrostatic precipitators. Why it is required to do so ?

(b) Mention one limitation of the electrostatic precipitator.

22. लंबे तथा सफ़ेद फूल वाले मटर के पौधे के जीनप्ररूप का आप किस प्रकार पता लगाएँगे ? एक क्रॉस की सहायता से व्याख्या कीजिए । आप जिस प्रकार के क्रॉस का प्रयोग करेंगे, उसका नाम बताइए । **3**

How would you find genotype of a tall pea plant bearing white flowers ? Explain with the help of a cross. Name the type of cross you would use.

खण्ड – घ
SECTION – D

23. आजकल जनन एवं शिशु स्वास्थ्य (RCH) कल्याण कार्यक्रम चलाए जा रहे हैं । इन कार्यक्रमों के प्रमुख उद्देश्यों में से एक उद्देश्य यह भी है कि लोगों को जनन संबंधी पहलुओं के व्यापक क्षेत्र के बारे में जागरूक बनाया जाए, क्योंकि यह जनन संबंधी स्वस्थ समाज के निर्माण के लिए महत्त्वपूर्ण और अनिवार्य भी है ।

(a) "इस लक्ष्य की उपलब्धि के लिए एक तरीका यह भी है कि स्कूलों में लैंगिक शिक्षा दी जाए ।" इस कथन के बारे में अपने विचार की पुष्टि के लिए चार बिंदु बताइए ।

(b) ऐसे कोई दो "संकेतक" लिखिए जिनसे जनन संबंधी स्वस्थ समाज का संकेत मिलता हो । **4**

Reproductive and Child Healthcare (RCH) programmes are currently in operation. One of the major tasks of these programmes is to create awareness amongst people about the wide range of reproduction related aspects. As this is important and essential for building a reproductively healthy society.

(a) "Providing sex education in schools is one of the ways to meet this goal." Give four points in support of your opinion regarding this statement.

(b) List any two 'indicators' that indicate a reproductively healthy society.

खण्ड – ङ
SECTION – E

24. हर्शे और चैज़ द्वारा किए गए प्रयोगों के आधार पर पूछे गए निम्नलिखित प्रश्नों के उत्तर दीजिए :

(a) किस प्रकार के वायरस पर उन्होंने प्रयोग किया और क्यों ?

(b) वायरसों के वर्धन के लिए उन्होंने दो प्रकार के संवर्धन माध्यम का उपयोग क्यों किया ? व्याख्या कीजिए ।

(c) अपने प्रयोग के दौरान मिश्रण करने वाले की और बाद में एक अपकेन्द्रक की क्यों आवश्यकता पड़ी ?

(d) प्रयोगों के बाद उनके द्वारा निकाले गए निष्कर्षों की चर्चा कीजिए । **5**

अथवा

(a) डार्विन ने अनुकूली विकिरण की व्याख्या किस प्रकार की ? अनुकूली विकिरण का कोई अन्य उदाहरण दीजिए ।

(b) उस वैज्ञानिक का नाम बताइए जिसने डार्विन को प्रभावित किया और यह उसने किस प्रकार किया ?

Answer the following questions based on Hershey and Chases's experiments :

(a) Name the kind of virus they worked with and why ?

(b) Why did they use two types of culture media to grow viruses in ? Explain.

(c) What was the need for using a blender and later a centrifuge during their experiments ?

(d) State the conclusion drawn by them after the experiments.

OR

(a) How did Darwin explain adaptive radiation ? Give another example exhibiting adaptive radiation.

(b) Name the scientist who influenced Darwin and how ?

25. (a) हमें जैवविविधता के संरक्षण की क्यों आवश्यकता है ? हम ऐसा किस प्रकार कर सकते हैं ? **2**

(b) जैवविविधता के हॉट-स्पाटों और पवित्र उपवनों के महत्त्व की व्याख्या कीजिए । **3**

अथवा

(a) मानव जनसंख्या के लिए आयु पिरैमिडों के तीन प्रकारों का आरेखीय निरूपण कीजिए । **3**

(b) किसी दिए गए समय में मानव जनसंख्या के लिए आयु पिरैमिड भावी योजना बनाने में किस प्रकार पॉलिसी बनाने में सहायता करता है ? **2**

(a) Why should we conserve biodiversity ? How can we do it ?

(b) Explain the importance of biodiversity hot-spots and sacred groves.

OR

(a) Represent diagrammatically three kinds of age-pyramids for human populations.

(b) How does an age pyramid for human population at given point of time helps the policy-makers in planning for future.

26. (a) आवृतबीजियों में परागण के बाद होने वाली उन घटनाओं की व्याख्या कीजिए जिनके बाद बीज बन जाते हैं । **3**

(b) पराग कणों के स्रोत के आधार पर परागण की विभिन्न किस्मों की सूची बनाइए । **2**

अथवा

(a) वयस्क स्त्री में निषेचन और अंतर्रोपण की घटनाओं की संक्षेप में व्याख्या कीजिए । **3**

(b) एक अंत:स्रावी ग्रंथि के रूप में अपरा की भूमिका की चर्चा कीजिए । **2**

(a) Explain the post-pollination events leading to seed production in angiosperms.

(b) List the different types of pollination depending upon the source of pollen grain.

OR

(a) Briefly explain the events of fertilization and implantation in an adult human female.

(b) Comment on the role of placenta as an endocrine gland.

Question Paper Code 57/1/3

SECTION – A

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

1. State a difference between a gene and an allele.

Ans. Gene - contains information that is required to express a particular trait // unit of inheritance // segment of DNA called cistron //

sequence of DNA coding for tRNA / rRNA / polypeptide / enzyme

Allele - Genes which code for a pair of contrasting traits / (slightly) different forms of the same gene / individual gene in a particular gene pair (for same character)

[1 mark]

2. Suggest the breeding method most suitable for animals that are below average in milk productivity.

Ans. Outbreeding / Outcrossing / Cross-breeding / artificial insemination / hybridisation

[1 mark]

3. Suggest a technique to a researcher who needs to separate fragments of DNA.

Ans. (Gel) eletrophoresis

[1 mark]

4. Excessive nutrients in a fresh water body cause fish mortality. Give two reasons.

Ans. Excessive nutrients result in excessive algal growth / eutrophication / algal bloom / toxins produced by algal bloom , water quality becomes poor / BOD increases / oxygen level decreases = ½ + ½

[1 mark]

5. Give an example of a codon having dual function.

Ans. AUG

SECTION-B

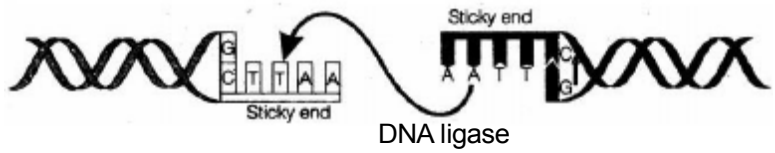
(Q. Nos. 6 - 10 are of two marks each)

6. Discuss the role the enzyme DNA ligase plays during DNA replication.

Ans. (Discontinuous) DNA fragments , are joined / sealed by them

// sticky ends of vector and foreign DNA , joined by them

The following diagram can be considered in lieu of explanation



= 1 + 1

[2 marks]

7. **Distinguish between the roles of flocks and anaerobic sludge digesters in sewage treatments.**

Flocs	**Anaerobic Sludge Digester**
- Breakdown organic matter aerobically	- Breakdown organic matter anaerobically
- Breakdown organic matter present in primary effluent.	- Breakdown organic matter in secondary effluent.
- They do not produce biogas.	- They produce biogas (mixture of methane ,H_2S and CO_2)

(Any two) 1 + 1

[2 marks]

8. **Name the causative organism of the disease amoebiasis. List three symptoms of the disease.**

Ans. - *Entamoeba histolytica* = ½

- Constipation , abdominal pain , cramps , stool with excess mucous / blood clots

(Any three) = ½ × 3

[½ + 1½ = 2 marks]

OR

Identify 'A', 'B' 'C' and 'D' in the given table.

Crop	**Variety**	**Resistance to disease**
A	Himgiri	Leaf rust
Cauliflower	Pusa Shubhra	B
Brassica	Pusa Swarnim	C
Cowpea	D	Bacterial blight

Ans. A = Wheat = ½

B = Black rot / Curl blight black rot = ½

C = White rust = ½

D = Pusa Komal = ½

[2 marks]

9. **Plants that inhabit a rain-forest are not found in a wetland. Explain.**

Ans. Plants that inhabit a rain forest are not adapted to survive in aquatic conditions / wetlands / Plants are conformers / stenothermal / cannot maintain constant internal environment / temperature / osmotic concentration of the body fluids affects kinetics of enzymes through basal metabolism /

activity and other physiological functions of the organisms

(Any <u>one</u>) = 2

[2 marks]

10. Angiosperms bearing unisexual flowers are said to be either monoecious or dioecious. Explain with the help of one example each.

Ans. <u>Monoecious Angiosperms</u>

Plants bear both male and female unisexual flowers on the same plant = ½

e.g. Cucurbits /coconut / maize ***(any one)*** = ½

<u>Dioecious Angisperms</u> - plants bear either male or female unisexual flowers on different plants = ½

e.g Papaya /date palms ***(any one)*** = ½

[½ × 4 = 2 marks]

SECTION-C

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

11. What is a GMO ? List any five possible advantages of a GMO to a farmer.

Ans. - Plants / bacteria / fungi / animals whose genes have been altered by manipulation = ½

- Tolerance to abiotic stresses / like cold / drought / salt / heat ,

reduced reliance on chemical pesticides / pest resistant crops ,

reduce post harvest losses ,

increased efficiency of mineral usage by plants ,

enhanced nutritional value ,

to create tailor made plant

(Any five) = ½ × 5

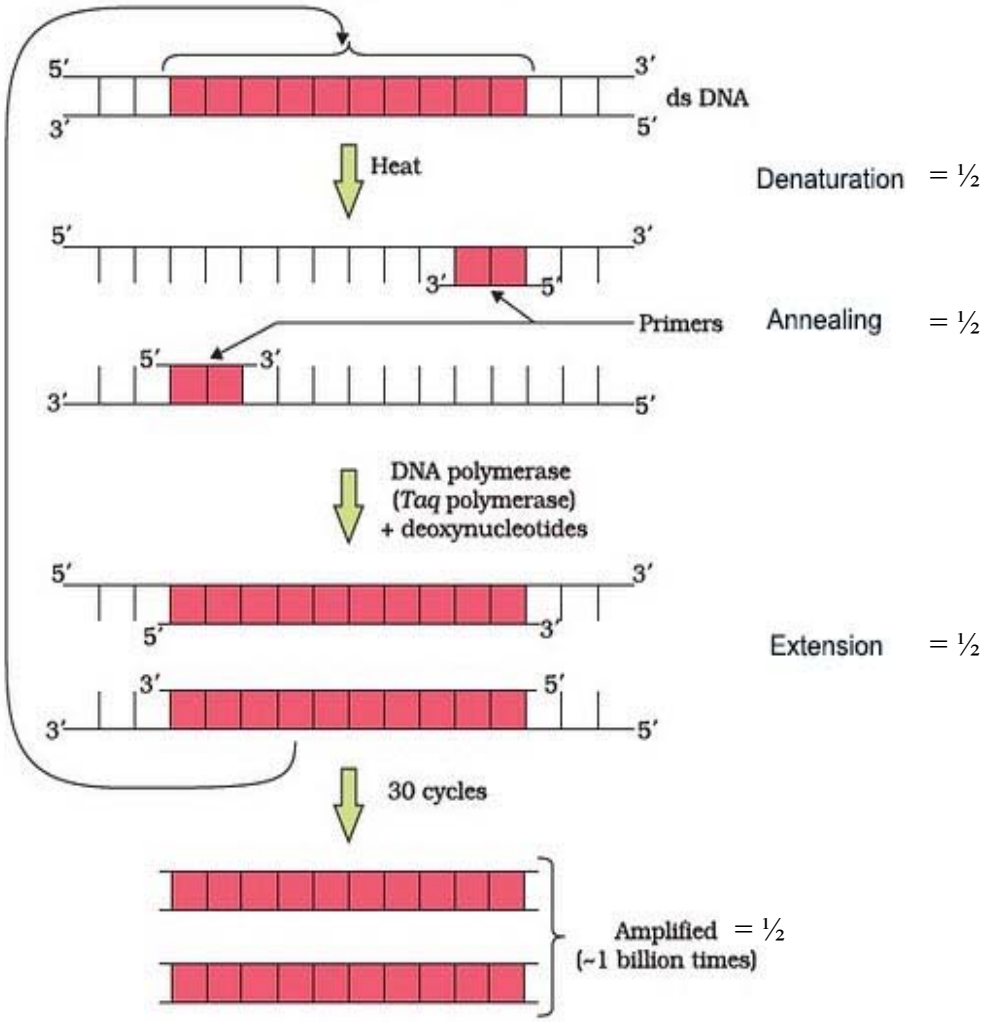
[3 marks]

12. Suggest and describe a technique to obtain multiple copies of a gene of interest in vitro.

Ans. PCR / polymerase chain reaction = 1

Separation / denaturation of two strands of two dsDNA , using two sets of primers / small chemically synthesised oligonucleotides complementary to regions of DNA and (thormostable) DNA polymerase / Taq polymerase , extension of the primers , by enzyme using nucleotides replicates the DNA and if the process of replication is repeated many times multiple copies of DNA are produced = ½ × 4

The following diagram can be considered in lieu of the explanation



[1 + 2 = 3 marks]

13. (a) Name any two fowls other than chicken reared in a poultry farm

(b) Enlist four important components of poultry farm management.

Ans. a) Ducks/ turkey / geese ***(any two)*** = ½ + ½

(b) Selection of disease free and suitable breeds ,

- proper and safe farm conditions
- proper food and water
- hygiene and health care (½ x 4)

14. Why is breast-feeding recommended during the initial period of an infant's growth ? Give reasons.

Ans. Colostrum , rich in nutrients , rich in antibodies / rich in IgA / provide passive immunity / provides immunity to new born / helps to develop resistance in new born / readily available for new born /

hygenic / develops a bond between mother and child.

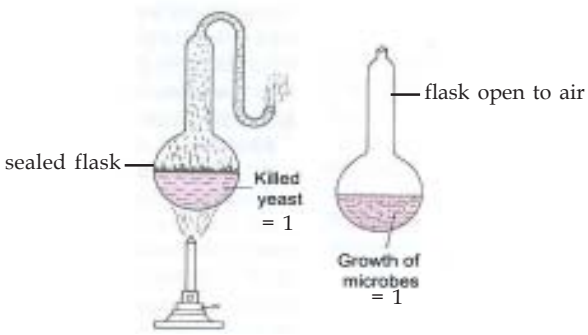
(Any three)

[3 marks]

15. Describe the experiment that helped Louis Pasteur to dismiss the theory of spontaneous generation of life.

Ans. Two pre sterilised flasks with killed yeast , one sealed , other open to air , differential growth of life in two flasks / life was found only in open flask. = ½ × 4

// **the following diagram can be considered in lieu of above explanation**



life comes from pre-existing life (it came from air entering the flask) / proved the theory of biogenesis = 1

[2 + 1 = 3 marks]

16. Prior to a sports event blood & urine samples of sportspersons are collected for drug tests.

(a) Why is there a need to conduct such tests ?

(b) Name the drugs the authorities usually look for.

(c) Write the generic names of two plants from which these drugs are obtained.

Ans. (a) To detect drug abuse / use of banned drugs / use of cannabinoids / anabolic steroids / narcotic analgesic / diuretics / hormones / drugs used to accelerate performance / increase muscle strength / bulk / promote aggressiveness / to ensure fair game

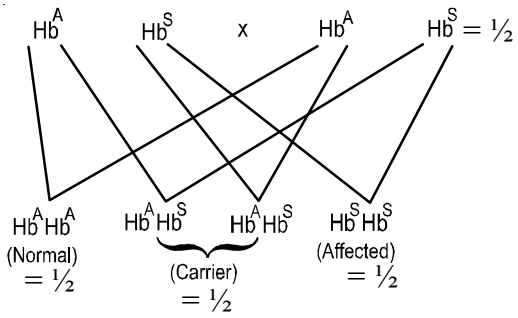
(b) Cannabinoids / cocaine / coca alkaloid / coke / crack / hashish / charas / ganja / hemp plant extract

(c) *Cannabis / Atropa / Erythroxylum / Datura* ***(Any two)***

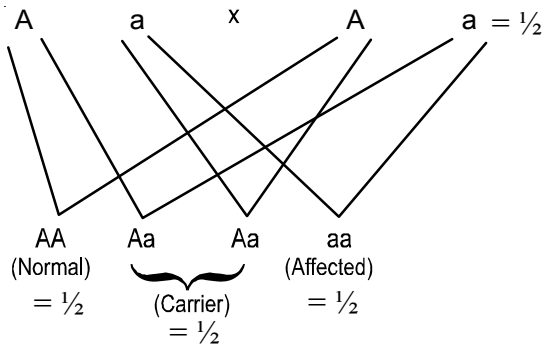
[1 × 3 = 3 marks]

17. Give an example of an autosomal recessive trait in humans. Explain its pattern of inheritance with the help of a cross.

Ans. Sickle cell anaemia / Phenylketonuria / Thalassemia / O Blood group / Non - rolling of tongue / Fused or attached ear lobes / Inability to taste PTC (phenyl thiocarbamide) =1



or



* **Similar cross can be considered for any other trait mentioned above**

[1 + 2 = 3 marks]

18. Explain with the help of suitable examples the three different ways by which organisms overcome their stressful conditions lasting for short duration.

Ans. Migration- The organisms (animals) can move away temporarily from stressful habitat to a more hospitable area and return when stressful period is over = ½

e.g – humans moving from Delhi to Shimla during summer / many animals or birds undertake long distance migration to hospitable area any one e.g = ½

- spore formation – various kind of thick walled spores are formed which germinate on availability of suitable enviornment. = ½

e.g – bacteria / fungi / lower plants ***(Any one)*** = ½

//

Dormancy – seeds or vegetative reproductive structures help to tide over stress by reducing their metabolic activity. =½

e.g seeds or vegetative reproductive structures of higher plants = ½

//

Hibernation – It takes place during winter = ½

e.g bears or any other correct relevant example = ½

//

Aestivation – It takes place during summer to avoid heat and dessication (in animals) = ½

e.g snails / fish or any other correct relevant example = ½

Diapause :- under unfavourable conditions zooplanktons enter a stage of suspended metabolic activity = ½

e.g zooplankton = ½

(***any two*** after migration = 1+1)

19. How has RNAi technique helped to prevent the infestation of roots in tobacco plants by a nematode *Meloidegyne incognitia* ?

Ans. Using *Agrobacterium* vectors , nematode specific genes introduced into host plant , produced sense - antisense RNA in host cells , ds RNA - initiated RNAi , silenced specific mRNA of nematode , parasite could not survive in transgenic host = ½ × 6

[3 marks]

20. Given beiow is a list of six micro-organisms. State their usefulness to humans.

(a) Nucleopolyhedrovirus

(b) Saccharomyces cerevisiae

(c) Monascus purpureus

(d) Trichoderma polysporum

(e) Penicillium notatum

(f) Propionibacterium sharmanii

Ans. (a) As bio control agents / species specific / narrow spectrum insecticidal application / no negative impacts on plants / mammals / birds / fish / non target insects / Integrated Pest Management

(b) Used in bread making / brewing industry / ethanol / CO_2 production

(c) Cholesterol lowering agent / competitively inhibiting the enzyme responsible for synthesis of cholesterol

(d) Produces Cyclosporin - A / immuno suppressive agent

(e) Produces antibiotic penicillin

(f) Produces large holes in Swiss cheese / produces large amount of CO_2 in swiss cheese

[½ × 6 = 3 marks]

21. "In a food-chain, a trophic level represents a functional level, not a species." Explain.

Ans. Position of a species in any trophic level is determined by the function performed by that mode of nutrition of species in a particular food chain / A given species may occupy more than one trophic level in the same ecosystem (in different food chains) at the given time , If the function of the mode of nutrition of species changes its position shall change in the trophic levels , same species can be at primary consumer level in one food chain and at secondary consumber level in another food chain in the same ecosystem at the given time = 1 × 3

Similar value points explained with the help of a suitable example = 3

[3 marks]

OR

(a) Name any two places where it is essential to install electrostatic precipitators. Why it is required to do so ?

(b) Mention one limitation of the electrostatic precipitator.

Ans. (a) Thermal power plants / smelters / other particulate matter releasing industries = ½ + ½

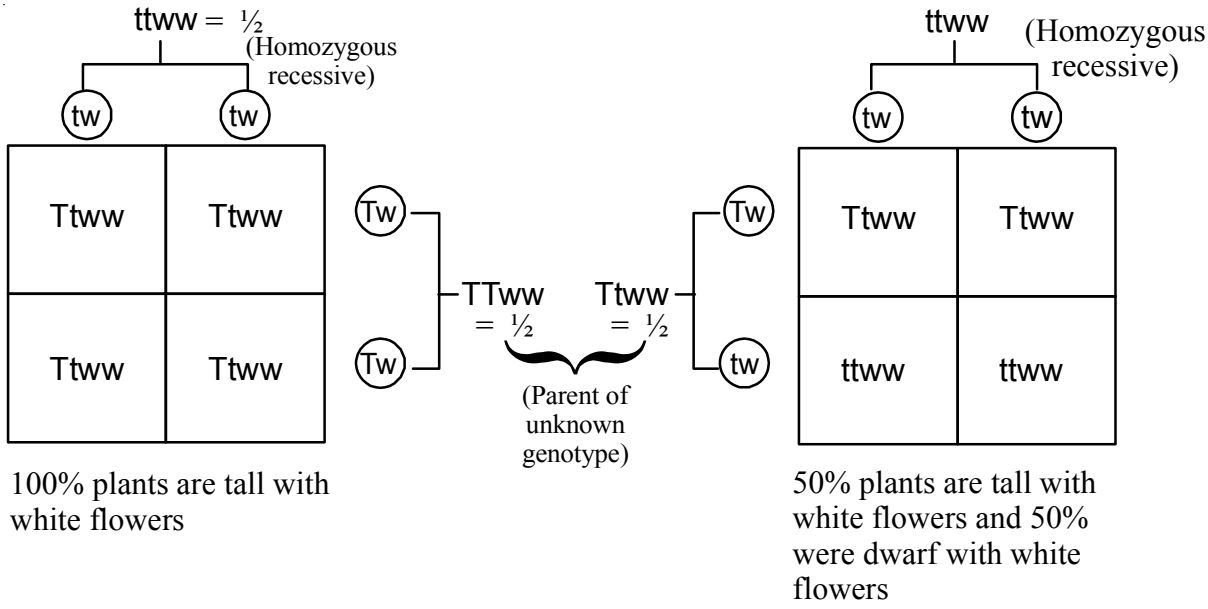
(Any two)

To remove particulate matter = 1

(b) Very very small particulate matter / less than 2.5 micrometres are not removed / velocity of air between plates must be low enough to allow the dust to fall / cannot work without electricity = 1

[2 + 1 = 3 marks]

22. How would you find genotype of a tall pea plant bearing white flowers ? Explain with the help of a cross. Name the type of cross you would use.



Test cross = ½

Both crosses = ½

Both interpretations = ½

[3 marks]

SECTION - D

(Q. Nos. 23 is of four mark)

23. Reproductive and Child Healthcare (RCH) programmes are currently in operation. One of the major tasks of these programmes is to create awareness amongst people about the wide range of reproduction related aspects. As this is important and essential for building a reproductively healthy society.

(a) "Providing sex education in schools is one of the ways to meet this goal." Give four points in support of your opinion regarding this statement.

(b) List any two 'indicators' that indicate a reproductively healthy society.

Ans. (a)
- Provide right information to the young so as to discourage children from believing in myths and misconception about sex related aspects.
- Proper information about reproductive organs
- Proper information about adolescence and related changes
- Safe hygienic practices
- STDs / AIDS
- Available birth control options
- Care of pregnant mothers

- Post natal care
- Importance of breast feeding
- Equal opportunities for male and female child
- awareness of problems due uncontrolled population growth
- Sex abuse
- Sex related crimes

(Any four) = ½ × 4

(b) Better awareness about sex related matters / increase number of assisted deliveries / better post natal care / decrease in IMR (Infant Mortality Rate) / decrease MMR (Maternal Mortality Rate) / increase number of couples with small families / better detection and cure of STDs / overall increased medical facilities for sex related problems / total well being in all aspects of reproduction / physical - behavioural - social / physically and functionally normal reproductive organs / normal emotional and behavioural interaction among all sex related aspects.

(Any two) = 1 + 1

[2 + 2 = 4 marks]

SECTION - E

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

24. Answer the following questions based on Hershey and Chases's experiments :

(a) Name the kind of virus they worked with and why ?

(b) Why did they use two types of culture media to grow viruses in ? Explain.

(c) What was the need for using a blender and later a centrifuge during their experiments?

(d) State the conclusion drawn by them after the experiments.

Ans. (a) Bacteriophage , they infect bacteria = ½ + ½

(b) Two types of culture media were used in order to make protein of viruses (with the help of ^{35}S) radioactive in one case , and DNA molecule in virus (with the help of ^{32}P radioactive in other case , = ½ × 2

so as to identify which one of the two had entered into the bacteria during viral infection = 1

(c) Blender - to separate the viral protein coats that are still attached to the surface of bacteria = ½

Centrifuge - to separate lighter supernatant (containing viral protein coats) from denser residue (containing bacteria) = ½

(d) DNA is the genetic material i.e passed from virus to bacteria = 1

OR

(a) How did Darwin explain adaptive radiation ? Give another example exhibiting adaptive radiation.

(b) Name the scientist who influenced Darwin and how ?

Ans. (a) Darwin observed that from original seed eating features in finches altered beaks arose enabling them to become insectivorous and vegetarian finches = 1

Adaptive radiation - the process of evolution of different species in a given geographical area starting from a point and literally radiating to another areas of geography (habitats) = 1

Another example is Australian marsupials / placental mammals in Australia = 1

(b) Thomas Malthus = 1

Population size grows exponentially (due to maximum reproduction) , however population size remains limited due to limited natural resources / leading to competition = ½ + ½

[3 + 2 = 5 marks]

25. (a) Why should we conserve biodiversity ? How can we do it ?

(b) Explain the importance of biodiversity hot-spots and sacred groves.

Ans. (a) (i)
- Narrowly utilitarian - related examples like derive economic benefits from nature food (cereals, pulses, fruits) / firewood / fibre / construction materials / industrial products (tannins, lubricants, dice, resins, perfumes) / product of medicinal importance / drugs = ½
- Broadly utilitarian - 20% of total O_2 from Amazon forests / pollination / aesthetic pleasures = ½
- Ethical - millions of species (plants, animals, microbes) share this planet / we need to realise that every species has an intrinsic value (even if it may not current or any economic value to us) / we have a moral duty to care for their wellbeing and pass on our biological legacy to future generations = ½

(ii)
- In situ conservation / biosphere reserves / national parks / sanctuaries / sacred groves = ½ //
- Ex situ conservation / zoological parks / botanical gardens / wild life safari parks / cryopreservation / seed banks / tissue culture (eggs in vitro) = ½

(b) Hot spots - regions with high level of species richness , high degree of endemism = 1 + 1

Sacred groves - tracts of forest containing tree / wild life were venerated ,and given total protection // to protect last refuses for a large number of rare , and threatened plants = ½ + ½

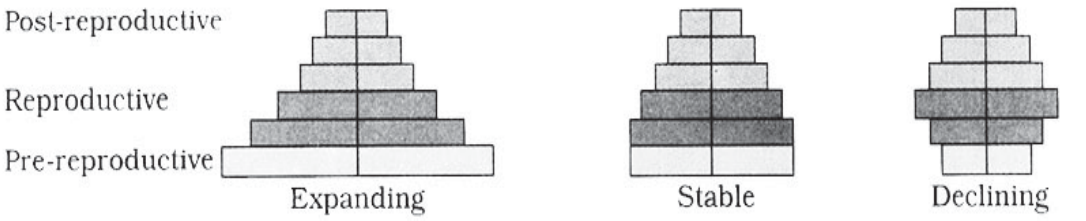
[2 + 3 = 5 marks]

OR

(a) Represent diagrammatically three kinds of age-pyramids for human populations.

(b) How does an age pyramid for human population at given point of time helps the policy-makers in planning for future.

Ans. (a)



= 1 = 1 = 1

Ans. (b) Planning of health / education / transport / infra-structure / finance / food / employment can depend on the age-pyramid analysis of a population / any other relevant point. (Any two explanation) = 1 + 1

[3 + 2 = 5 marks]

26. (a) Explain the post-pollination events leading to seed production in angiosperms.

(b) List the different types of pollination depending upon the source of pollen grain.

Ans. (a) Pollen pistil interaction , germination of pollen tube that carries two male gametes , double fertilization / syngamy and triple fusion , development of endosperm , development of embryo , maturation of ovule into seed.= ½ × 6

(b) Autogamy / self pollination / Geitonogamy = 1

Xenogamy / cross pollination = 1

[3 + 2 = 5 marks]

OR

(a) Briefly explain the events of fertilization and implantation in an adult human female.

(b) Comment on the role of placenta as an endocrine gland.

(a) **Fertilization**

- Sperm comes in contact and enters the secondary oocyte
- activates / induces secondary oocyte to complete meiosis II leads to formation of ovum / ootid
- the haploid nucleus of sperm and that of ovum fused to form a diploid zygote completing the process of fertilization = ½ × 3

Implantation

- Trophoblast layer of blastocyst attaches to the endometrium (of the uterus)
- The uterine cells divide rapidly and cover the blastocyst ,
- The blastocyst becomes embedded in the endometrium and the implantation is completed = ½ × 3

(b)
- hCG (human chorionic gonadotropin)
- hPL (human placental lactogen)
- estrogen
- progestogens = ½ × 4

[3 + 2 = 5 marks]