SET-2

Series SSO/2

कोड नं.
Code No. 57/2/2

रोल नं.
Roll No.

परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।

Candidates must write the Code on the title page of the answer-book.

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

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SECTION A

1. "मनुष्य प्राथमिक और द्वितीयक उपभोक्ता दोनों ही हो सकता है ।" इस कथन की पुष्टि कीजिए । *1*

"Man can be a primary as well as a secondary consumer." Justify this statement.

2. ओपेरिन और हाल्डेन द्वारा प्रतिपादित परिकल्पित प्रस्तावों को लिखिए । *1*

Write the hypothetical proposals put forth by Oparin and Haldane.

3. RNA पॉलिमरेज़ II का क्या कार्य होता है ? *1*

Write the function of RNA polymerase II.

4. अपह्रासित कूट और असंदिग्ध कूट में अंतर बताइए । *1*

How does a degenerate code differ from an unambiguous one ?

5. अर्धसूत्री विभाजन (मीओसिस) किसी भी जीव के लैंगिक जीवन-चक्र में एक अति आवश्यक घटना है । दो कारण बताइए । *1*

Meiosis is an essential event in the sexual life cycle of any organism. Give two reasons.

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SECTION B

6. संयुक्त वन प्रबंधन क्या होता है ? इससे वन-संरक्षण में किस प्रकार सहायता मिलती है ? *2*

What is joint forest management ? How can it help in conservation of forests ?

7. बहि:प्रजनन और बहि:संकरण के बीच अंतर बताइए । *2*

अथवा

घर पर बनाए फल के ज्यूस की तुलना में बोतलबंद फल के ज्यूस अधिक निर्मल होते हैं । स्पष्ट कीजिए । *2*

Differentiate between outbreeding and outcrossing.

OR

Bottled fruit juices are clearer as compared to those made at home. Explain.

8. जब आप किसी उच्च तुंगता वाले स्थान पर भ्रमण करने जाते हो, तब आपको पहले दो दिन आराम करने की सलाह दी जाती है । कारण बताते हुए टिप्पणी कीजिए । *2*

When you go for a trek/trip to any high altitude places, you are advised to take it easy and rest for the first two days. Comment, giving reasons.

9. बहु लक्षणप्ररूपी अभिव्यक्तियों के लिए उत्तरदायी किसी जीन का एक उदाहरण दीजिए । इस प्रकार के जीनों को क्या कहते हैं ? इस प्रकार के प्रभाव के लिए उत्तरदायी कारण का उल्लेख कीजिए । *2*

Give an example of a gene responsible for multiple phenotypic expressions. What are such genes called ? State the cause that is responsible for such an effect.

10. असंगजनन क्या होता है ? किसानों के लिए यह परिघटना किस प्रकार लाभकारी होती है ? *2*

What is apomixis ? How is the phenomenon useful to the farmer ?

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SECTION C

11. समवृत्ति संरचनाएँ क्या होती हैं ? समजात संरचना से वे किस प्रकार भिन्न होती हैं ? प्रत्येक का एक-एक उदाहरण दीजिए । *3*

What are analogous structures ? How are they different from homologous structures ? Provide one example for each.

12. (a) निम्नलिखित स्थितियों में होने वाले मानव रोगों/विकारों के नाम बताइए :

(i) फिनाइल ऐलानिन हाइड्रोलेज़ नामक एंज़ाइम के कूटन के लिए उत्तरदायी जीन में उत्परिवर्तन हो जाए

(ii) 21वें गुणसूत्र की एक अतिरिक्त प्रति (कॉपी) विद्यमान हो

(iii) कैरियोटाइप (गुणसूत्र प्ररूप) XXY हो

(b) ऊपर दिए गए प्रश्नों में नामित रोगों/विकारों का कोई एक लक्षण बताइए । *3*

(a) Name the kind of diseases/disorders that are likely to occur in humans if

(i) mutation in the gene that codes for an enzyme phenyl alanine hydrolase occurs,

(ii) there is an extra copy of chromosome 21,

(iii) the karyotype is XXY.

(b) Mention any one symptom of the diseases/disorders named above.

13. DNA-प्रतिकृतियन की अर्धसंरक्षी योजना के प्रायोगिक प्रमाण प्रस्तुत करने के लिए नाइट्रोजन के भारी समस्थानिक को किस प्रकार प्रयुक्त किया गया ? *3*

How was a heavy isotope of nitrogen used to provide experimental evidence to semi-conservative mode of DNA-replication ?

14. उल्बवेधन क्या होता है ? इस पर वैधानिक प्रतिबंध क्यों लगा दिया गया है ? *3*

What is amniocentesis ? Justify the statutory ban on it.

15. मानव की शुक्रजनक नलिका के काटीय दृश्य का एक नामांकित आरेख बनाइए । *3*

Draw a labelled diagram of the sectional view of the seminiferous tubule of a human.

16. वांछित जीन के बेसों को अनुक्रम में व्यवस्थित करने के लिए उस जीन की अनेक प्रतियों की आवश्यकता होती है । इस वांछित जीन की बड़ी संख्या में प्रतियाँ तैयार करने में प्रयुक्त प्रक्रिया का नाम बताइए तथा उसकी व्याख्या कीजिए । *3*

Many copies of a specific gene of interest are required to study the detailed sequencing of bases in it. Name and explain the process that can help in developing large number of copies of this gene of interest.

17. जैवप्रौद्योगिकी का एक प्रमुख योगदान यह रहा है कि इससे पीड़कनाशी-प्रतिरोधी कपास के पौधों की किस्में विकसित की जा सकती हैं । समझाकर बताइए कि यह किस प्रकार संभव किया जा सका । *3*

One of the major contributions of biotechnology is to develop pest-resistant varieties of cotton plants. Explain how it has been made possible.

18. केंचुए को किसान का मित्र क्यों माना जाता है ? एक अपघटन चक्र में होने वाले ह्यूमसभवन और खनिजभवन की व्याख्या कीजिए । *3*

Why is earthworm considered a farmer's friend ? Explain humification and mineralisation occurring in a decomposition cycle.

19. परजीविता और प्रतियोगिता के बीच अंतर बताइए । दोनों का एक-एक उदाहरण दीजिए । इन दोनों के बीच सामान्य लक्षण भी बताइए । *3*

Differentiate between parasitism and competition, giving one example of each. State the common characteristic they share.

20. प्रतिबंधन एंडोन्यूक्लिएज़ एंज़ाइम EcoRI की क्रिया द्वारा पुनर्योजन DNA निर्माण को दर्शाने के लिए एक प्रवाह चार्ट बनाइए । *3*

अथवा

DNA-खण्डों को पृथक करने में तथा जैवप्रौद्योगिकी के प्रयोगों के लिए उन्हें उपलब्ध कराने में प्रयुक्त तकनीक का नाम बताइए तथा उसकी व्याख्या कीजिए । *3*

Prepare a flow chart in formation of recombinant DNA by the action of restriction endonuclease enzyme EcoRI.

OR

Name and explain the technique used for separating DNA fragments and making them available for biotechnology experiments.

21. उपयुक्त उदाहरणों की सहायता से जैव-विविधता संरक्षण के लिए संकीर्ण रूप से उपयोगी और व्यापक रूप से उपयोगी तर्कों की तुलना कीजिए । *3*

Compare narrowly utilitarian and broadly utilitarian approaches to conserve biodiversity, with the help of suitable examples.

22. बायोगैस का निर्माण करने के लिए वाहित-मल का किस प्रकार इस्तेमाल किया जा सकता है ? समझाकर बताइए । *3*

How can sewage be used to generate biogas ? Explain.

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SECTION D

23. आप अपने सहपाठी द्वारा दी गयी जन्मदिन-पार्टी में शामिल हुए । वहाँ आपने देखा कि कुछ मेहमान एक कोने में बैठे काफ़ी शोर मचा रहे थे और किसी पदार्थ का सेवन कर रहे थे । थोड़ी देर बाद इस ग्रुप में से एक लड़का चीखने लगा, असामान्य व्यवहार करने लगा और वह पसीने से लथपथ हो गया । ज्ञात करने पर पता लगा कि ये लड़के मादक (नशीले) पदार्थ का सेवन कर रहे थे ।

(a) क्या आप अपने माता-पिता/स्कूल के अधिकारियों को इस बात की सूचना देंगे ? हाँ/ना । अपने उत्तर की पुष्टि करने के लिए कारण बताइए ।

(b) किन्हीं दो नशीले पदार्थों के स्रोतों और उनसे होने वाली हानियों के बारे में एक नोट स्कूल के साथियों में बाँटने के लिए तैयार कीजिए ।

(c) अपने स्कूल के प्रिंसिपल को किन्हीं दो विधियों का सुझाव दीजिए ताकि इन नशीले पदार्थों के प्रयोग किए जाने के खिलाफ नौजवानों में जागृति पैदा की जा सके । *4*

You have attended a birthday party hosted by one of your classmates. You found some guests at the party sitting in a corner making a lot of noise and consuming 'something'. After a while one of the boys from the group started screaming, behaving abnormally and sweating profusely. On enquiry you found that the group members were taking drugs.

(a) Would you inform your parents/school authorities ? Yes/No. Give reasons in support of your answer.

(b) Prepare a note to be circulated amongst the schoolmates about the sources and dangers of any two drugs.

(c) Write any two ways that you will suggest to your school principal so as to promote awareness amongst the youth against the use of these drugs.

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SECTION E

24. पोलियो-निवारक कार्यक्रम के अंतर्गत, देश से पोलियो का उन्मूलन करने के लिए नियमित अवधियों पर बड़े पैमाने पर बच्चों को पोलियो के टीके लगाए गए ।

(a) टीका (वैक्सीन) क्या होता है ? समझाइए कि बच्चे में इससे किस प्रकार रोग के खिलाफ प्रतिरक्षा उत्पन्न हो जाती है ।

(b) एक-एक उपयुक्त उदाहरण की सहायता से सक्रिय और निष्क्रिय प्रतिरक्षा के बीच अंतर बताइए । *5*

अथवा

जैव-उर्वरक क्या होते हैं ? कृषि में उनकी भूमिका का वर्णन कीजिए । रासायनिक-उर्वरकों की अपेक्षा जैव-उर्वरकों को क्यों वरीयता दी जाती है ? *5*

Under polio prevention programme, infants in India were given polio vaccines on a large scale at regular intervals to eradicate polio from the country.

(a) What is a vaccine ? Explain how does it impart immunity to the child against the disease.

(b) With the help of an example each, differentiate between active and passive immunity.

OR

What are biofertilizers ? Describe their role in agriculture. Why are they preferred to chemical fertilizers ?

25. (a) ऐंजियोस्पर्मों में परागण के बाद से आरंभ करके बीज के निर्माण तक की घटनाओं की व्याख्या कीजिए ।

(b) एक ऐल्बुमिनी बीज के विभिन्न भागों की कोशिकाओं के गुणसूत्रता-स्तर (सूत्रगुणता) का उल्लेख कीजिए । *5*

अथवा

मानवों में निषेचन और अंतर्रोपण प्रक्रियाओं की व्याख्या कीजिए । *5*

(a) Explain the events after pollination leading to the formation of a seed in angiosperms.

(b) Mention the ploidy levels of the cells of different parts of an albuminous seed.

OR

Explain the process of fertilisation and implantation in humans.

26. (a) स्नैपड्रेगन पौधे तद्रूप प्रजननी लाल फूल वाली और तद्रूप प्रजननी सफेद फूल वाली प्रजाति के बीच संकरण के परिणामस्वरूप, F_1 संतति में जनक प्रजाति का कोई लक्षण दिखाई नहीं दिया, जबकि जनक प्रजातियों के लक्षण F_2 की संततियों में फिर से प्रकट हो गए । पनेट वर्ग का इस्तेमाल करते हुए, इस पद्धति की व्याख्या कीजिए ।

(b) एक उदाहरण की सहायता से बहुजीनीय वंशागति की व्याख्या कीजिए । *5*

अथवा

एल्फ्रेड हर्शे और मार्था चेज़ ने किस प्रकार निर्णायक रूप से यह स्थापित किया कि DNA ही आनुवंशिक पदार्थ होता है ? व्याख्या कीजिए । *5*

(a) During a cross involving true breeding red flowered and true breeding white flowered snapdragon plants, the F_1 progeny did not show any of the parental traits, while they reappeared in F_2 progenies. Explain the mechanism using Punnett Square.

(b) Explain polygenic inheritance with the help of an example.

OR

How did Alfred Hershey and Martha Chase conclusively establish that DNA is the genetic material ? Explain.

Question Paper Code 57/2/2

SECTION – A

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

1. " Man can be a primary as well as a secondary consumer." Justify this statement.

Ans. Vegetarian diet - Primary consumer = ½

Non vegetarian diet - Secondary consumer = ½

[1 Mark]

2. Write the hypothetical proposals put forth by Oparin and Haldane.

Ans. Oparin & Haldane : First form of life could have (origin of life) come from pre existing non living organic molecules = ½

formation of diverse organic molecules from inorganic constituents/ formation of life was preceeded by chemical evolution = ½

[1 Mark]

3. Write the function of RNA polymerase II.

Ans. RNA polymerase II - transcribes precursor of mRNA / hn RNA

[1 Mark]

4. How does a degenerate code differ from an unambiguous one ?

Ans. Degenerate Code : one amino acid coded by more than one codon = ½

Unambiguous code : One codon for one amino acid = ½

[1 Mark]

5. Meiosis is an essential event in the sexual life cycle of any organism. Give two reasons.

Ans. (i) Meiosis helps in formation of gametes by reductional division & maintains number of chromosomes constant / maintains ploidy = ½

(ii) Recombination of genes in offsprings / brings variation = ½

[1 Mark]

SECTION B

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

6. What is joint forest management ? How can it help in conservation of forests?

Ans. JFM - A programme (initiated by Govt. of India in 1980) where govt. works closely with local communities for protecting & managing forests = 1

Forests are conserved by locals in a sustainable manner as locals are also benefitted with forest products / (fruits / gum / rubber / medicines etc) = 1

[2 Marks]

7. Differentiate between outbreeding and outcrossing.

Ans. Outbreeding -Breeding of unrelated animals (no common ancestor for 4 - 6 generations)

belonging to same breed or different breed or different species = 1

Outcrossing - breeding within the animals of same breed having no common ancestors for 4 - 6 generation on either side of their pedigree = 1

[2 Marks]

OR

Bottled fruit juices are clearer as compared to those made at home. Explain.

Ans. Enzyme Pectinase , protease are added for clearing them = 1 + 1

[2 Marks]

8. When you go for a trek/trip to any high altitude places, you are advised to take it easy and rest for the first two days. Comment, giving reasons.

Ans. Altitude sickness / due to low O_2 availability } = ½

Body compensates low oxygen availabilty during rest by increasing R.B.C production , decreasing the binding capacity of haemoglobin , increasing breathing rate = ½ + ½ + ½

[2 Marks]

9. Give an example of a gene responsible for multiple phenotypic expressions. What are such genes called ? State the cause that is responsible for such an effect.

Ans. Gene causing Phenylketonuria = 1

Pleiotropic genes = ½

Single gene mutation = ½

[2 Marks]

10. What is apomixis ? How is the phenomenon useful to the farmer.

Ans. - Mechanism to produce seeds without fertilization = 1

- Farmer can keep on using apomictic hybrid seeds year after year / economical = 1

[2 Marks]

SECTION C

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

11. What are analogous structures ? How are they different from homologous structures ? Provide one example for each.

Ans. - Organs having anatomically dissimilar structure but perform similar functions = 1

- wings of birds and wings of butterfly / eye of octopus and of mammals / flippers of penguin and dolphins / sweet potato and potato / any other appropriate example = ½

- Homologous organs have similar anatomical structure but different functions = 1

- Fore limbs of whales and cheetah / thorn of bougainvillea and tendril of Cucurbita / any other example = ½

[3 Marks]

12. (a) Name the kind of diseases/ disorders that are likely to occur in humans if

(i) Mutation in the gene that codes for an enzyme phenyl alanine hydrolase occurs,

(ii) There is an extra copy of chromosome 21,

(iii) The karyotype is XXX.

(b) Mention any one symptom of the diseases/disorders named above.

Ans. (a & b)

(i) Phenylketonuria , mental retardation = ½ + ½

(ii) Down' s syndrome , short statured / small round head / furrowed tongue / partially open mouth / broad palm with characteristics palm crease / retarded mental physical and psychomotor development = ½ + ½

(iii) Klinefelter's Syndrome , Overall masculine development with feminine features (enlarged breast / Gynaecomastia) / sterile = ½ + ½

(any one symptom from each category , any other appropriate symptom)

[3 Marks]

13. How was a heavy isotope of nitrogen used to provide experimental Evidence to semi-conservative mode of DNA- replication?

Ans. E.coli were allowed to grow on medium containing ^{15}N for many generations so that ^{15}N was incorporated in newly synthesized DNA making it heavy DNA (Nitrogen is important constituent of DNA) = ½

The heavy DNA can be differentiated from light DNA by Caesium Chloride Density Gradient centrifugation , = ½

The above E.coli (with ^{15}N) were then transferred in medium containing ^{14}N and, samples were taken out after 20 minutes and after 40 minutes = ½

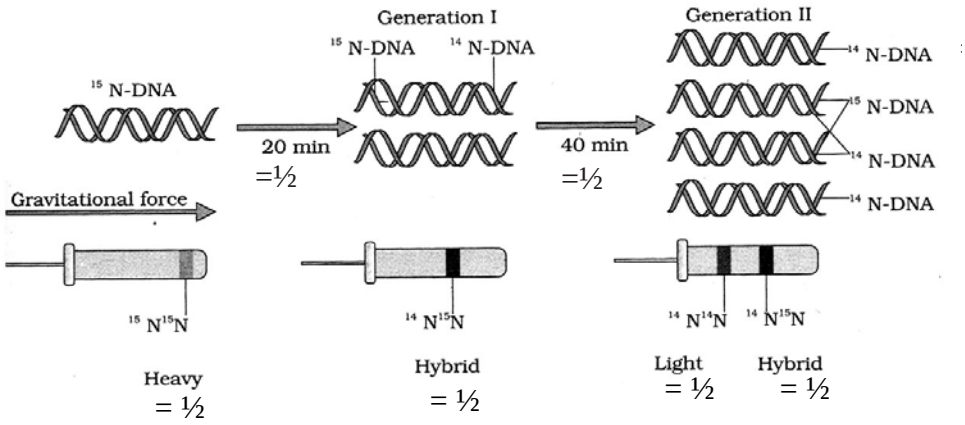
Extracted DNA was centrifuged and measured to get their density , = ½

DNA extracted after 20 minutes (Ist Generation) showed an intermediate hybrid density / $^{14}N\,^{15}N$, = ½

DNA extracted after 40 minutes (2nd Generation) showed equal amount of Light DNA / ^{14}N and hybrid DNA / $^{14}N\,^{15}N$ = ½

= ½ × 6

//



[3 Marks]

14. What is amniocentesis? Justify the statutory ban on it.

Ans. Study of chromosonal pattern in amniotic fluid of foetus ,

It is misused to detect the sex of the foetus ,

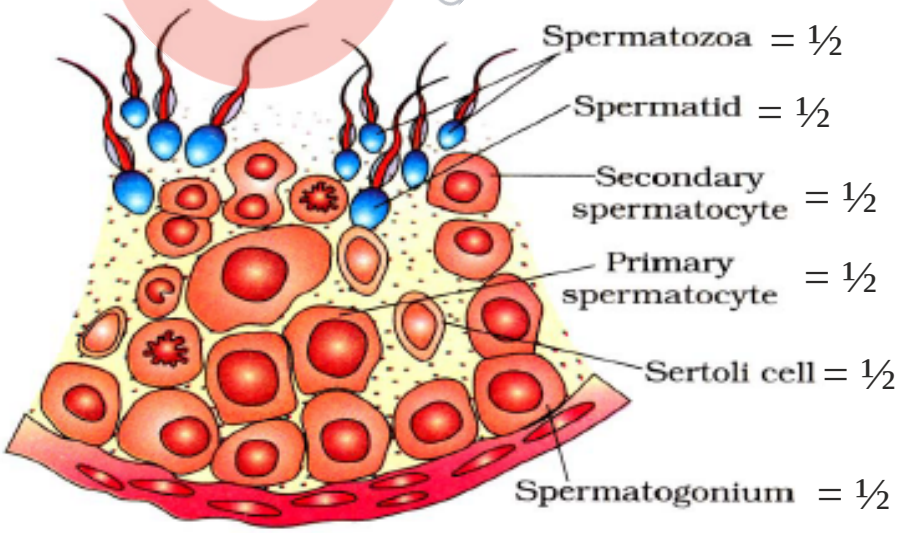
ban to check female foeticide

(= 1 × 3)

[3 Marks]

15. Draw a labelled diagram of the sectional view of the seminiferous tubule of a human.

Ans.



= ½ × 6

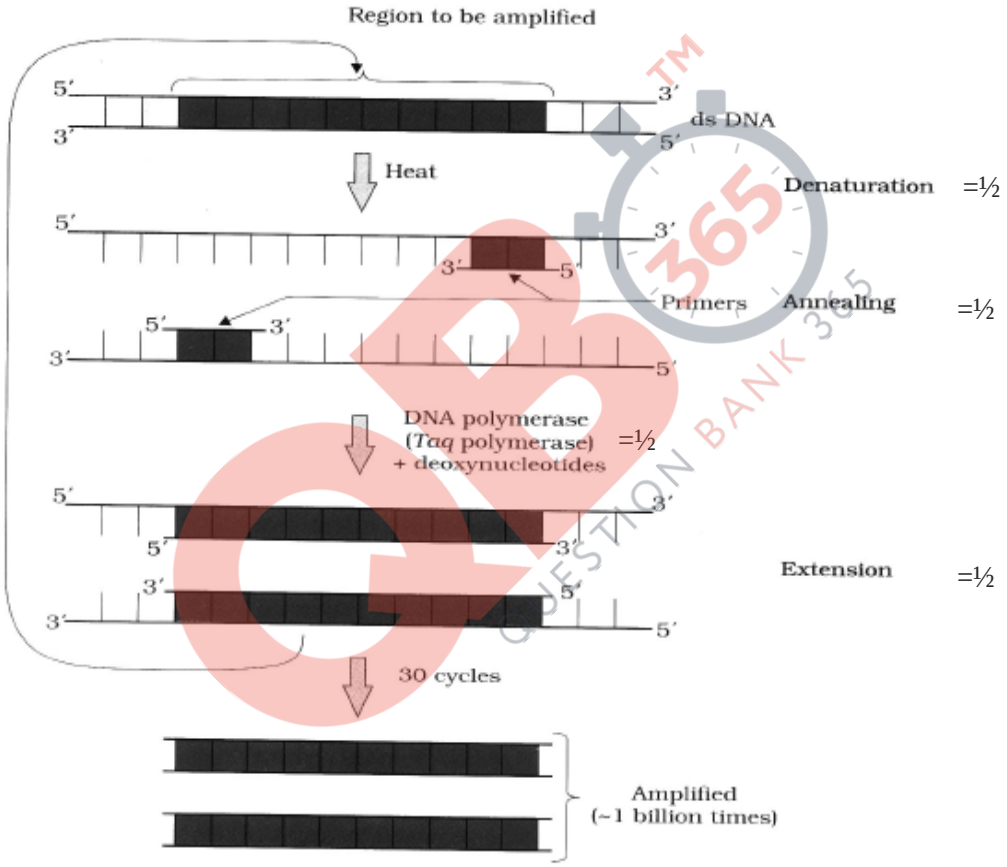
[3 Marks]

16. Many copies of a specific gene of interest are required to study the detailed Sequencing of bases in it. Name and explain the process that can help in developing large number of copies of this gene interest.

Ans. Polymerase Chain Reaction = 1

- Denaturation / Separation of ds DNA (by high temperature) = ½
- Annealing - Two sets of primers are added which anneal to 3' end of each seperated strand as they act as initiator of replication = ½
- Extension - DNA Polymerase / Taq polymerase =½ , extends primer by adding nucleotides using DNA as templates = ½

} //



[3 Marks]

17. One of the major contributions of biotechnology is to develop pest-Resistant varieties of cotton plants. Explain how it has been made possible

Ans. (i) Introducing Bt toxin cry gene from *Bacillus thuringiensis* , into cotton plant using r-DNA technology = ½ + ½

(ii) cry gene produces insecticidal protein in inactive stage (protoxin) which after ingestion is converted into active form in the gut of insect , due to alkaline pH there = ½ + ½

(iii) This toxin binds to surface of midgut epithelial cells , causes swelling and lysis leading to death of insect = ½ + ½

[3 Marks]

18. Why is earthworm considered a farmer's friend ? Explain humification and mineralization occurring in a decomposition cycle.

Ans. They help in breakdown of complex organic matter , as well as loosening of the soil = ½ + ½

Humification leads to humus formation , decompose slowly / reservoir of nutrients = ½ + ½

Humus is further degraded by microbes , releasing inorganic nutrients = ½ + ½

[3 Marks]

19. Differentiate between parasitism and competition, giving one example of each. State the common characteristic they share.

Ans.

Parasitism	Competition
Interaction where one species is benefitted and the other is harmed = ½ eg. Tape worm in man / cuscuta on hedge plant / malarial parasite in human / lice on human / ticks on dogs / any other example = ½	Interaction where both species harmed = ½ eg. Herbivores and plants / = ½ any other example

Species facing competition might evolve mechanisms that promote co-existence = ½

In parasitism both host and parasite tend to co-evolve = ½

[3 Marks]

20. Prepare a flow chart in formation of recombinant DNA by the action of restriction endonuclease enzyme EcoRI.

Ans. Restriction endonuclease (EcoRI) inspects the length of the DNA sequence of both vector and foreign DNA ,

↓

binds to the specific recognition sequence / palindromic sequence ,

↓

cuts the strand of DNA between G and A ,

↓

only when the sequence GAATTC is present in the DNA ,

↓

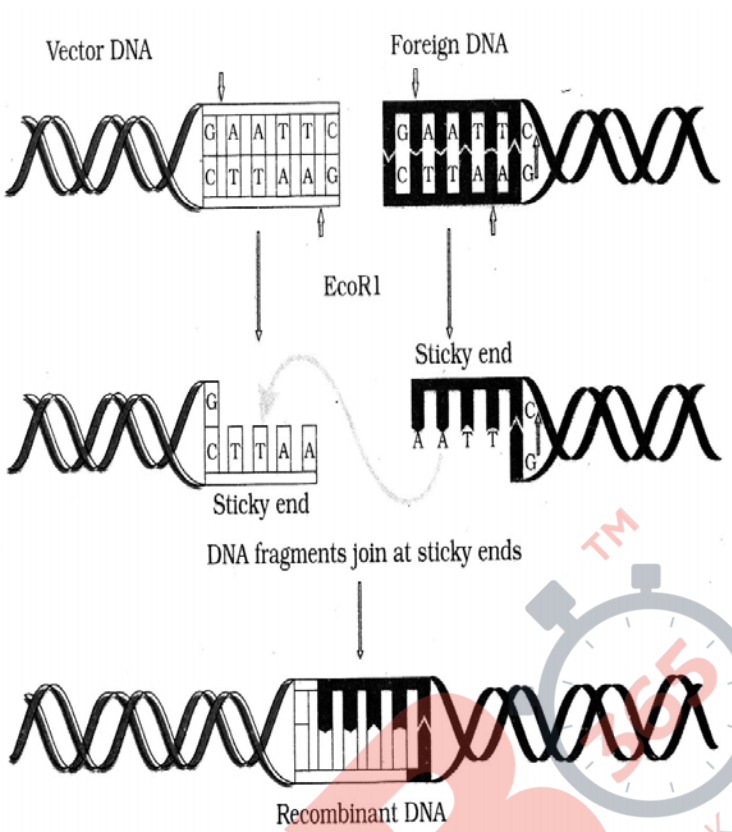
leaving single stranded overhanging stretches called sticky ends ,

↓

Ligases joins host and foreign DNA strands at sticky ends to form recombinant DNA

= ½ × 6

// **diagram can also be accepted in lieu of flow chart**



[3 Marks]

OR

Name and explain the formation of recombinant DNA fragments and making them available for biotechnology experiments.

Ans. Gel electrophoresis = 1

- Negatively charged DNA fragments are forced to move towards the anode under electric field on agarose gel ,
- DNA fragments get separated according to their size / Small fragments cover large distance & large fragments cover small distances ,
- These fragments are visualised after staining with ethidium bromide followed by exposure under UV rays
- The separated bands of DNA are cut out from the gel & extracted (elution) = ½ × 4

[3 Marks]

21. Compare narrowly utilitarian and broadly utilitarian approaches to conserve biodiversity, with the help of suitable examples.

Ans. Narrowly Utilitarian - Humans derive countless direct economic benefits from nature = 1

eg. dyes / resin / food / wood etc (or any other suitable example) = ½

Broadly utilatarian - plays major role in many ecosystem services that nature provides = 1

eg. pollination / aesthetic pleasure / production of oxygen (or any other suitable example) = ½

[3 Marks]

22. How can sewage be used to generate biogas ? Explain.

Ans. When BOD of sewage is reduced , effluent is passed into a settling tank for bacterial flocs to settle down (which is Activated sludge) = ½ + ½

Activated sludge is pumped into anaerobic sludge digesters , Bacteria grow anaerobically and digest bacteria & fungi in sludge = ½ + ½

During digestion bacteria produce a mixture of gases containing methane , hydrogen sulphide and CO_2 = ½ + ½

[3 Marks]

SECTION D

Q. No. 23 is of four marks

23. You have attended a birthday party hosted by one of your classmates. You found some guests at the party sitting in a corner making a lot of Noise and consuming 'something'. After a while one of the boys from the group started screaming, behaving abnormally and sweating profusely. On enquiry you found that the group members were taking drugs.

(a) Would you inform your parents/school authorities ? Yes/No . Give reasons in support of your answer.

(b) Prepare a note to be circulated amongst the schoolmates about the sources and dangers of any two drugs.

(c) Write any two ways that you will suggest to your school principal so as to promote awareness amongst the youth against the use of these drugs.

Ans. (a) Yes, so that it does not become a habit by repeated use / consumption of drugs may cause harmful effects / any other reason = 1

(b)
- Drug : Cocaine - Source is plant Erythroxylum coca = ½

  Danger - effects central nervous system / interferes with transport of neurotransmitter (dopamine) = ½
- Drug : Opioids / heroin / smack - source is latex of Papaver somniferum / poppy plant = ½

  Danger - slows down body function = ½
- Drug : Cannabinoids source is Cannabis (sativa) = ½

  Danger - effects cardiovascular system = ½

(Any two drugs and their danger) = 1 + 1

(c) By organising : -

Poster competitions / Street play / talk by experts / interviews / any other appropriate awareness campaign (any two) = ½ + ½

[4 Marks]

SECTION E

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

24. Under Polio prevention programme, infants in India were given polio Vaccines on a large scale at regular intervals to eradicate polio from the country.

(a) What is a vaccine ? Explain how does it impart immunity to the child against the disease.

(b) With the help of an example each, differentiate between active and passive immunity.

Ans. (a) Vaccine – It is inactivated or weakened pathogen that is inoculated into the body of the child = 1

Vaccines generate memory - B & T - cells that recognize the pathogen quickly on subsequent exposure , produce specific antibodies against the pathogen / antigen = ½ + ½

(b) Active Immunity – Immunity that an organism develops due to direct exposure of pathogen by producing antibodies in the body = 1

eg .vaccination / infections / hepatitis etc. = ½

Passive Immunity - readymade antibodies are directly given to protect the body from foreign pathogens = 1

eg. Colostrum / tetanus / antitoxin for snake bite etc. = ½

[5 Marks]

OR

What are biofertilizers ? Describe their role in agriculture. Why are they preferred to chemical fertilizers.

Ans. Biofertilizers – are organisms that enrich the nutrient quality of the soil = 1

Role – (i) increase nutrient quality

(ii) fix atmospheric nitrogen

(iii) resistant to root borne pathogens

(iv) tolerance to salinity and drought

(v) overall increase in plant growth and development (any four) = ½ × 4 = 2

These are preferred to chemical fertilizers because

- They do not pollute soil / air / water = 1
- do not spoil soil texture or pH of the soil = 1

[5 Marks]

25. (a) Explain the events after pollination leading to the formation of a Seed in angiosperms.

(b) Mention the ploidy levels of the cells of different parts of an aluminous seed.

Ans. (a) (i) Pistil accepts right type pollen , pollen grain germinates to produce pollen tube that grows and reaches the ovary , male gametes enter the ovule through micropyle , one male gamete fuses with nucleus of egg cell to form diploid zygote , other male gamete

fuses with two polar nuclei forming primary endosperm cell which develops into endosperm , diploid zygote develops into embryo , followed by development of ovule into seed = ½ × 8

(b) Embryo - 2n / diploid = ½

Endosperm - 3n / triploid = ½

[5 Marks]

OR

Explain the process of fertilization and implantation in humans.

Ans. Fertilisation : Sperm comes in contact with zona pellucida layer of ovum , and induces changes in the membrane that blocks the entry of additional sperms , this induces completion of second meiotic division to form second polar body and haploid ovum (ootid) , nucleus of sperm fuses with that of ovum to form diploid zygote = ½ × 4

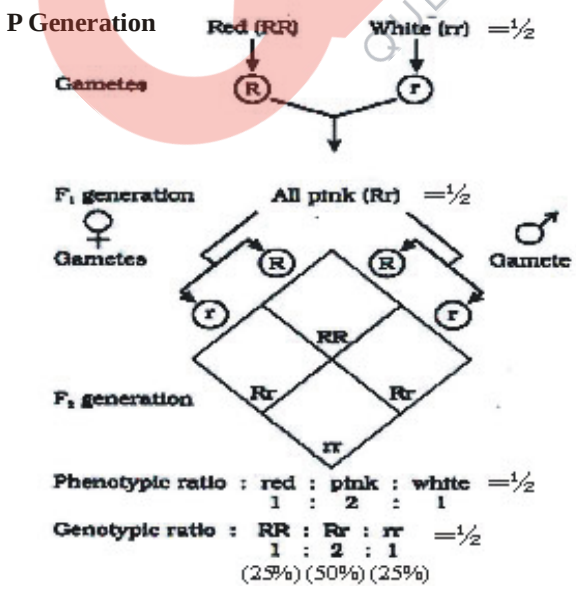
Implantation : Repeated cleavage in zygote results in formation of blastocyst , whose outer layer is called trophoblast , and an inner group of cells called inner cell mass , trophoblast layer gets attached to endometrium , inner cell mass gets differentiated as embryo , uterine cells divide rapidly and covers the blastocyst that becomes embedded in the endometrium= ½ × 6

[5 Marks]

26. (a) During a cross involving true breeding red flowered and true breeding white flowered snapdragon plants, the F1 progeny did not show any of the parental traits, while they reappeared in F2 progenies. Explain the mechanism using punnett Square.

(b) Explain polygenic inheritance with the help of an example.

(a)



= ½ × 6

(b) Inherited traits which are controlled by three or more genes are called polygenic traits = ½

Three genes A B C control skin colour in human. The genotypes with all dominant alleles (AABBCC) will be the darkest skin colour , AaBbCc will have intermediate skin colour , all recessive have lightest skin colour . = ½ + ½ + ½ /

(any other example) = 1½

[3 + 2 = 5 Marks]

OR

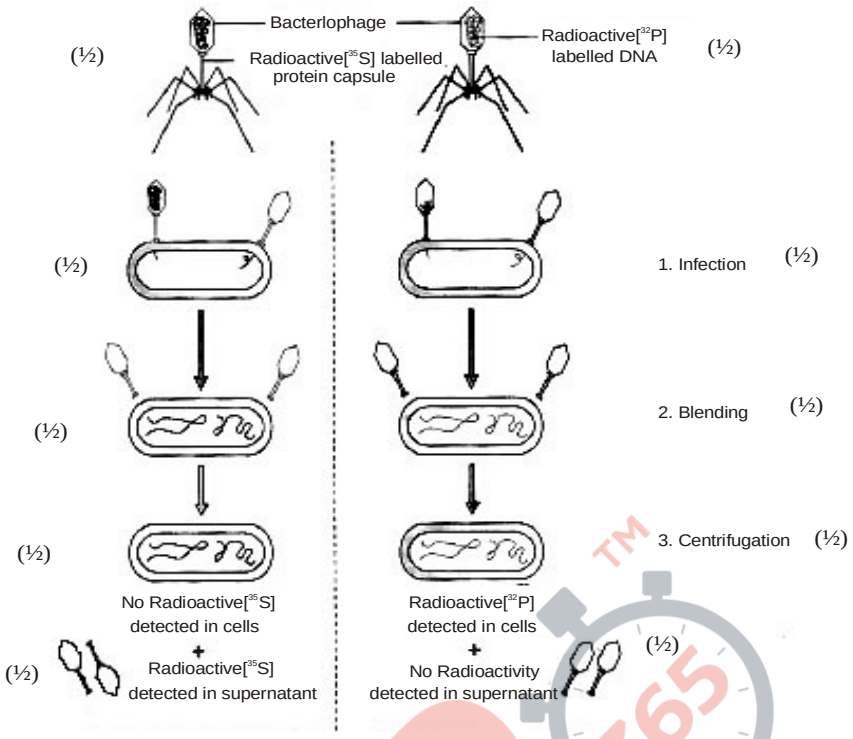
How did Alfred Hershey and Martha Chase conclusively establish that DNA is the genetic material? Explain.

Ans.
- Some bacteriophage were grown in a medium that contained ^{32}P radioactive phosphorus , while some were grown in a medium that contained ^{35}S with radioactive sulphur = ½ × 2
- the labelled bacteriophage from both media were allowed to infect *E.coli* = 1
- In both the cases viral coats were removed from the bacteria by agitating them in a blender = 1
- The virus particles were separated from the bacteria by spinning them in a centrifuge = 1
- No radioactivity was detected in cells (*E.coli*) but detected in supernatant in case where bacteriophage were labelled with radioactive sulphur = ½
- Radioactivity detected in cells (*E.coli*) while no radioactivity detected in supernatant in another case where bacteriophage were labelled with radioactive phosphorus = ½

(Phosphorus being a constituent of DNA indicates that DNA is the genetic material that is passed from virus to bacteria)

[5 Marks]

// **The following diagrammatic representation can be considered in lieu of the above explanation.**


Bacterlophage
Radioactive[35S] labelled protein capsule
Radioactive[32P] labelled DNA
1. Infection
2. Blending
3. Centrifugation
No Radioactive[35S] detected in cells
+
Radioactive[35S] detected in supernatant
Radioactive[32P] detected in cells
+
No Radioactivity detected in supernatant

= ½ × 10

[5 Marks]