

रोल नं.

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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 minutes 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 :

- प्रश्न-पत्र में पाँच खण्डों में 26 प्रश्न दिए गए हैं । सभी प्रश्न अनिवार्य हैं ।
- खण्ड – क में प्रश्न संख्या 1 से 5 अति लघुत्तर प्रश्न हैं । प्रत्येक प्रश्न एक अंक का है ।
- खण्ड – ख में प्रश्न संख्या 6 से 10 लघुत्तर प्रश्न I प्रकार के हैं । प्रत्येक प्रश्न दो अंक का है ।
- खण्ड – ग में प्रश्न संख्या 11 से 22 लघुत्तर प्रश्न II प्रकार के हैं । प्रत्येक प्रश्न तीन अंक का है ।
- खण्ड – घ में प्रश्न संख्या 23 मूल्याधारित प्रश्न चार अंकों का है ।
- खण्ड – ङ में प्रश्न संख्या 24 से 26 दीर्घ उत्तर प्रश्न हैं, प्रत्येक प्रश्न पाँच अंक का है ।
- प्रश्न-पत्र में कोई समग्र पर विकल्प नहीं है, फिर भी दो अंक के एक प्रश्न, तीन अंक के एक प्रश्न और पाँच अंकों के तीन प्रश्नों के भीतरी विकल्प दिए गए हैं । प्रत्येक परीक्षार्थी को ऐसे प्रश्नों के दो विकल्पों में से एक प्रश्न हल करना है ।

General Instructions :

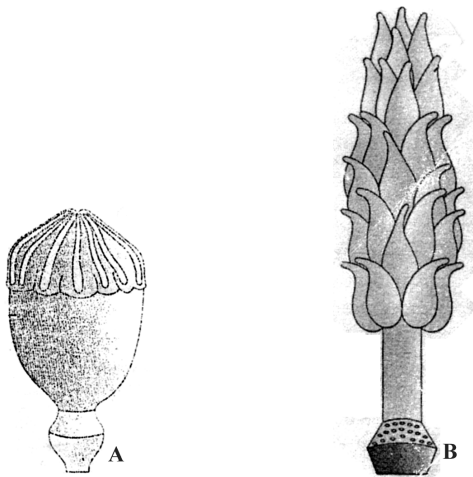
- (i) There are a total of **26** questions and **five** sections in the question paper. **All** questions are compulsory.
- (ii) Section **A** contains question number **1** to **5**, Very Short Answer type questions of **one** mark each.
- (iii) Section **B** contains question number **6** to **10**, Short Answer type **I** questions of **two** marks each.
- (iv) Section **C** contains question 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 question 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** of the questions out of the **two** given in the question paper with the same question number.

खण्ड – क

SECTION – A

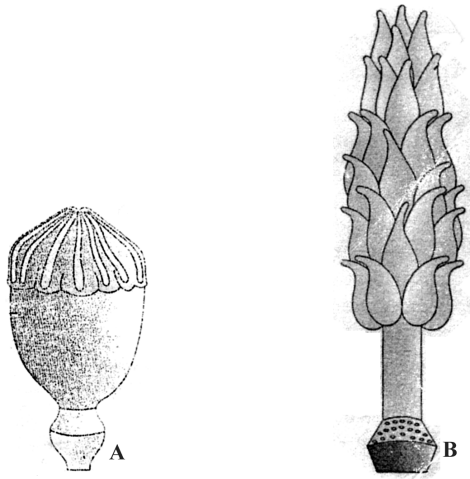
1. DNA की तुलना में RNA क्यों अधिक अभिक्रियाशील होता है ? 1
Why is RNA more reactive in comparison to DNA ?
2. चूषक मछली और शार्क के बीच पाए जाने वाली पारस्परिक क्रिया को क्या नाम दिया जाता है ? 1
Name the interaction that exists between sucker fish and shark.

3.



यहाँ दिए गए दो चित्रों में पैपेवर (A) और माइकेलिया (B) के पुष्पों के जायांग (स्त्रीकेसर) दर्शाए गए हैं। इनके अंडाशयों की संरचना में अंतर बताइए।

1



These pictures show the gynaecium of (A) Papaver and (B) Michellia flowers. Write the difference in the structure of their ovaries.

4. प्रतिरक्षा के संदर्भ में मोनोसाइट प्रकार की सफेद रुधिर कोशिका को कोशिकीय अवरोध क्यों माना जाता है ? 1
In what way is monocyte a cellular barrier with reference to immunity ?
5. टर्नर सिंड्रोम के क्रोमोसोमीय विकार क्या हैं ? बताइए । 1
State the chromosomal defect in individuals with Turner's syndrome.

खण्ड – ख

SECTION – B

6. एक निःसंतान दम्पति 'टेस्ट ट्यूब बेबी' प्रोग्राम के लिए राजी हो गए हैं । गर्भधारण करने के लिए इस पद्धति में अपनाए जाने वाले मूलभूत चरणों की सूची बनाइए । 2

अथवा

निम्नलिखित के कार्य बताइए :

- (a) पारदर्शी अंडावरण
(b) मूलांकुर-चोल

A childless couple has agreed for a test tube baby programme. List only the basic steps the procedure would involve to conceive the baby.

OR

Mention the function of

- (a) Zona pellusida
(b) Coleorhiza

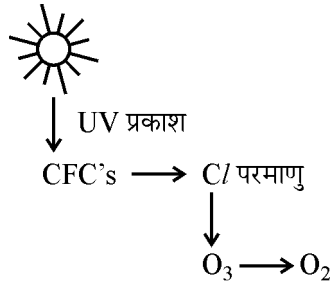
7. एक उदाहरण देते हुए बताइए कि विकसीय समजातता किस पर आधारित होती है । 2
Explain with the help of an example the type of evolution homology is based on.

8. E-coRI क्या है ? बताइए कि EcoRI किस प्रकार एक्सोन्यूक्लिएज़ से भिन्न होता है । 2
What is EcoRI ? How does EcoRI differ from an exonuclease ?

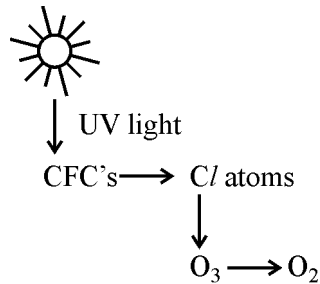
9. उच्च तुंगता वाले क्षेत्रों पर पहुँचने के बाद व्यक्तियों को तुंगता-बीमारी क्यों हो जाती है ? दो-तीन दिन के बाद उनका शरीर कैसे जलवायु के अनुकूल हो जाता है ? 2

Why do people suffer from altitude sickness after reaching the high altitude regions ?
How does their body acclimatized after a couple of days ?

10.



- (a) ओज़ोन के निम्नीकरण के पश्चात् होने वाले दुष्प्रभाव क्या हैं ?
(b) इससे मानव स्वास्थ्य पर क्या प्रभाव पड़ता है ? 2



- (a) What are the after effects of the degradation of ozone ?
(b) How does it affect human health ?

खण्ड – ग

SECTION – C

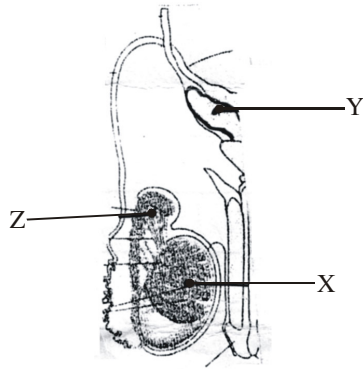
11. मरुद्भिद् पर्यावास में होने वाले उस पादप-अनुक्रमण की व्याख्या कीजिए जब तक चरमोत्कर्ष समुदाय तक नहीं पहुँच जाता । 3

Explain succession of plants in xerophytic habitat until it reaches climax community.

12. मानवों के किन गुणसूत्रों पर उत्परिवर्ती जीन पाए जाते हैं जिनके कारण थैलैसीमिया नामक रोग हो जाता है ? इन उत्परिवर्ती जीन द्वारा क्या-क्या समस्याएँ होती हैं ? 3

Which chromosomes carry the mutant genes causing thalassaemia in humans ? What are the problems caused by these mutant genes ?

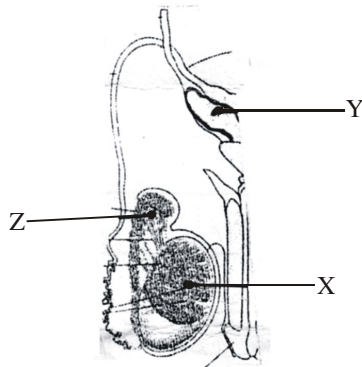
13.



उपरोक्त आरेख में मानव का नर जनन-तंत्र (केवल एक तरफ़ का) दर्शाया गया है ।

- 'X' की पहचान कीजिए तथा शरीर के भीतर उसकी स्थिति बताइए ।
- सहायक ग्रंथि 'Y' का नाम बताइए तथा उसके स्राव का नाम भी बताइए ।
- 'Z' का नाम तथा उसका कार्य बताइए ।

3



The above diagram shows human male reproductive system (one side only).

- Identify 'X' and write its location in the body.
- Name the accessory gland 'Y' and its secretion.
- Name and state the function of 'Z'.

14. गन्ने की एक फसल किसी वायरस से संक्रमित हो गयी है । इससे वायरस मुक्त गन्ना-फसल किस प्रकार विकसित की जा सकती है ? इस प्रणाली की व्याख्या कीजिए ।

3

A sugarcane has been affected by virus. How can a virus free cane be developed from it ? Explain the procedure.

15. इंग्लैण्ड में श्वेत और काले रंग के शलभों के प्राकृतिक वरण में औद्योगीकरण की क्या भूमिका रही ?

3

अथवा

विकास के संदर्भ में उड़न गिलहरी और उड़न फ़ैलेन्जर के बीच समानता का क्या अर्थ समझते हैं ?

How did industrialization play a role in Natural Selection of light and dark coloured moth in England ?

OR

What do you infer from the resemblance between flying squirrel and flying phalanger with reference to their evolution.

16. (a) B-कोशिकाओं और T-कोशिकाओं में क्या क्रियात्मक अंतर होता है ?
 (b) rDNA प्रौद्योगिकी का प्रयोग करते हुए हेपेटाइटिस B वैक्सीन उत्पन्न करने में प्रयुक्त स्रोत का नाम बताइए । 3
 (a) What is the functional difference between B cells and T cells.
 (b) Name the source used to produce hepatitis B vaccine using rDNA technology.
17. बताइए कि HIV के कारण AIDS के पीड़ित व्यक्ति का प्रतिरक्षा-तंत्र किस प्रकार भंग हो जाता है । 3
 How does the HIV breakdown the immune system of the AIDS patient ?
18. एक अपरदाहारी किस प्रकार अपघटक से भिन्न होता है ? प्रत्येक का उदाहरण देते हुए व्याख्या कीजिए । 3
 How does a detritivore differ from a decomposer ? Explain with an example each.
19. PCR में Taq पॉलीमरेज़ को क्यों वरीयता दी जाती है ? इस एंज़ाइम के स्रोत की चर्चा कीजिए । 3
 Why is Taq polymerase preferred in PCR ? Mention the source of this enzyme.
20. आर्तव चक्र के दौरान निम्नलिखित दिनों में एक सामान्य स्त्री में होने वाली घटनाओं की व्याख्या कीजिए : 3
 (a) 13वें से लेकर 15वें दिन तक अंडाशय के भीतर होने वाली घटना
 (b) 16वें से लेकर 23वें दिन तक अंडाशय के भीतर पाए जाने वाले हॉर्मोनों का स्तर
 (c) 24वें से लेकर 29वें दिन तक गर्भाशय के भीतर होने वाली घटनाएँ
 Explain the events in a normal woman during her menstrual cycle on the following days.
 (a) Ovarian event from 13-15 days
 (b) Ovarian hormones level from 16 to 23 days
 (c) Uterine events from 24 to 29 days
21. (a) DNA के टेम्प्लेट रज्जुक और कोडिंग रज्जुक में अंतर बताइए ।
 (b) DNA के प्रतिकृतीयन के लिए ऊर्जा के स्रोत का नाम बताइए । 3
 (a) Differentiate between a template strand and coding strand of DNA.
 (b) Name the source of energy for the replication of DNA.
22. हमारे किसान आज भी DDT का उपयोग करते हैं । इससे स्थानीय पक्षी-समष्टि पर किस प्रकार दुष्प्रभाव पड़ता है ? 3
 Our farmers still use DDT. How is this affecting the local bird population ?

खण्ड – घ

SECTION – D

23. एक इक्कीस वर्षीय युवा दुर्घटना में मृत्यु को प्राप्त हो गया । उसके माता-पिता उसके अंगों को दान देने के लिए तत्पर हो गए । उन दो अति आवश्यक चिकित्सकीय चरणों की सूची बनाइए, जो किसी अंग के प्रतिरोपण करने से पहले लिए जाने ज़रूरी होते हैं । कभी-कभी प्रत्यारोपण कुछ मामलों में क्यों अस्वीकृत हो जाता है ? अंग दान को प्रोत्साहित करने के लिए आप अपने स्वास्थ्य-क्लब के सदस्यों के साथ क्या विचार-विमर्श करना चाहेंगे ? **4**

A youth in his twenties met with an accident and succumbed to the injuries. His parents agreed to donate his organs. List any two essential clinical steps to be undertaken before any organ transplant. Why is the transplant rejected sometimes ? What views would you share with your health club members to promote organ donation ?

खण्ड – ङ

SECTION – E

24. मानव-अंडाणु का निषेचन किस स्थल पर होता है ? इसके बाद कोरकपुटी (ब्लास्टोसिस्ट) के अंतर्रोपण तक होने वाली घटनाओं की क्रमवार सूची बनाइए । **5**

अथवा

- (a) द्विबीजपत्री पुष्प के निषेचित भ्रूणकोष का आरेख बनाइए । इसके सभी कोशिकीय संघटकों का नामांकन कीजिए ।
- (b) इस भ्रूणकोष से उत्पन्न एक परिपक्व भ्रूण के परिवर्धन की व्याख्या कीजिए ।

Mention the site of fertilization of a human ovum. List the events that follow in sequence until the implantation of the blastocyst.

OR

- (a) Draw a diagram of a fertilized embryo sac of a dicot flower. Label all its cellular components.
- (b) Explain the development of a mature embryo from this embryo sac.
25. ग्रिफिथ ने आनुवंशिकी में रूपांतरण-सिद्धांत को किस प्रकार प्रमाणित किया ? इस प्रणाली की व्याख्या कीजिए । **5**

अथवा

बताइए कि “बहुप्रभाविता”, “अपूर्ण प्रभाविता”, “सह प्रभाविता” और “अनेक जीनी वंशागति” मेन्डल द्वारा किए गए प्रेक्षणों से विसामान्य होती हैं ? प्रत्येक का एक उदाहरण देते हुए व्याख्या कीजिए ।

How did Griffith prove transforming principle in Genetics. Explain the procedure.

OR

How do “Pleiotropy”, “incomplete dominance”, “co-dominance” and “polygenic inheritance” deviate from the observation made by Mendel ? Explain with the help of one example for each.

अथवा

जब तक वेक्टर और DNA-स्रोत को न काटा जाए, अलग हुए खंडों को अलग न किया जाए, तथा जोड़ा न जाए, तब तक वांछित पुनर्योजी वेक्टर अणु को उत्पन्न नहीं किया जा सकता ।

- (a) वांछित DNA क्रमों को किस प्रकार काटा जाता है ?
- (b) काटे गए खंडों को अलग करने की तकनीक की व्याख्या कीजिए ।
- (c) इस प्रकार निर्मित पुनर्योजी वेक्टर DNA अणु से किस प्रकार जुड़ जाते हैं ?

Explain the application of biotechnology in producing Bt cotton.

OR

Unless the vector and source DNA are cut, fragments separated and joined, the desired recombinant vector molecule cannot be created.

- (a) How are the desirable DNA sequences cut ?
 - (b) Explain the technique used to separate the cut fragments.
 - (c) How are the resultant fragments joined to the vector DNA molecule ?
-

Senior School Certificate Examination
COMPARTMENT (2015)
Marking Scheme - Biology (Theory)
Expected Answers/Value Points

General Instructions

The Marking Scheme and mechanics of marking

1. In the marking scheme-the marking points are separated by commas, one oblique line (/) indicates acceptable alternative, two obliques (//) indicate complete acceptable alternative set of marking points.
2. Any words/phrases given within brackets do not have marks.
3. Allow spelling mistakes unless the misspelt word has another biological meaning. Ignore plurals unless otherwise stated in the marking scheme.
4. In any question exclusively on diagram no marks on any description. But in questions on descriptions, same value points may be marked on the diagrams as a substitute.
5. All awarded marks are to be written in the left hand margin at the end of the question or its part.
6. Place a tick (v') in red directly on the key/operative term or idea provided it is in correct context. Place "Half-tick" ½ wherever there is ½ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read, the-answer).
7. If no marks are awarded to any part or question put a cross (x) at incorrect value portion and mark it zero (in words only).
8. Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.
9. Add part totals of the question and write the question total at the end. Count all the ticks for the entire question as a recheck and draw a circle around the question total to confirm correct addition.
10. If parts have been attempted at different places do the totalling at the end of the part attempted last.
11. If any extra part is attempted or any question is reattempted, score out the last one and write "extra".
12. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.
13. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.
14. Points/answer given in brackets in marking scheme are not so important and may be Ignored for marking.

Section A

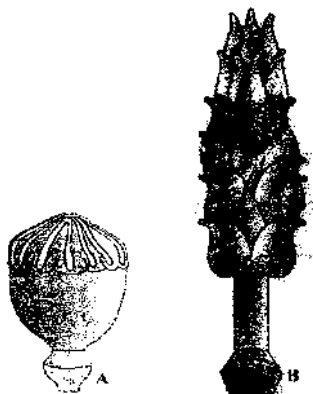
Q nos 1-5 are of one mark each

Q1. Why is RNA more reactive in comparison to DNA?

Ans. 2'-OH present in RNA (in every nucleotide) make it reactive 1

Q2. Name the interaction that exists between sucker fish and shark

Ans. Commensalism 1

Q3. These pictures show the gynaecium of (A) Papaver and (B) Michellia flowers. Write the difference in the structure of their ovaries.Ans. a. (multicarpellary) ovary showing fused / syncarpous pistil $\frac{1}{2}$ b. (multicarpellary) ovary showing free / apocarpous pistil $\frac{1}{2}$ **Q4. In what way is monocyte a cellular barrier with reference to immunity?**Ans. Phagocytose ,and destroy microbes // engulfs, and destroys the antigen/microbes $\frac{1}{2} + \frac{1}{2}$ **Q5. State the chromosomal defect in individuals with Turner's syndrome**Ans. (In female) Monosomy of sex chromosome // XO condition // Absence of one X chromosome
 $\frac{1}{2} + \frac{1}{2}$ **SECTION – B**

Q nos 6-10 are of two marks each

Q6. A childless couple has agreed for a test tube baby programme. List only the basic steps the procedure would involve to conceive the baby.**OR****Mention the function of****(a) Zona pellucida****(b) Coleorhiza**Ans. . Extraction of gametes from the parents/donors. $\frac{1}{2}$

Invitro / fertilisation (simulation conditions in laboratory) $\frac{1}{2}$
 transfer of the zygote or early embryo, (at 8 blastomere stage)into the fallopian tube $\frac{1}{2} + \frac{1}{2}$

OR

a. Protective layer of the ovum 1

b. protects the radicle in a monocot embryo 1

Q7. Explain with the help of an example the type of evolution homology is based on.

Ans. Homology is based on divergent evolution

$\frac{1}{2}$

These have similar anatomical structure but perform different function. 1

- Example- Thorn of bougainvillea and tendril of cucurbita/ Forelimbs of human and horse/ any other appropriate example. $\frac{1}{2}$

Q8. What is EcoRI ? How does EcoRI differ from an exonuclease?

2

Ans. EcoRI is restriction endonuclease enzyme.

1

Exonuclease removes nucleotides from the ends of DNA

$\frac{1}{2}$

EcoRI makes cuts at specific position within the DNA

$\frac{1}{2}$

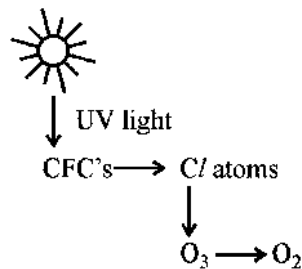
**Q9. Why do people suffer from altitude sickness after reaching the high altitude regions ?
How does their body acclimatized after a couple of days?**

Ans. "Altitude sickness" is because of low atmospheric pressure at high altitude, the body does not get sufficient oxygen $\frac{1}{2} + \frac{1}{2}$

The body compensates low oxygen availability by increasing RBCs production decreasing the binding capacity of haemoglobin, by increasing breathing rate (any two) $\frac{1}{2} + \frac{1}{2}$

**Q10. (a) What are the after effects of the degradation of ozone?
(b) How does it affect human health?**

2



Ans. (a). Thinning of Ozone/ Ozone depletion UV-B penetrates Ozone- forms hole- reaches earth. 1

(b). UV -B damages DNA causes mutation, ageing of skin/ damage of skin cells/ skin cancer/ inflammation of cornea (snow blindness, cataract) (any two) $\frac{1}{2} + \frac{1}{2}$

Section C

Q nos 11-22 are of three marks each

Q11. Explain succession of plants in xerophytic habitat until it reaches climax community.

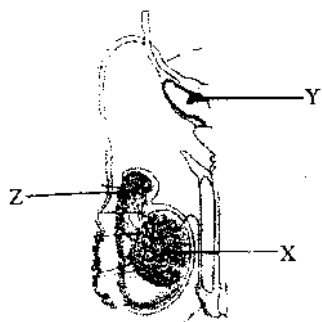
Ans. Lichens on bare rock, acids to dissolve rock (weathering of soil), Bryophytes to hold soil water, grass, small plants / shrubs, trees- forest(Climax community) $\frac{1}{2} \times 6 = 3$

Q12. Which chromosomes carry the mutant genes causing thalassaemia in humans ? What are the problems caused by these mutant genes?

Ans. 11th and 16th chromosomes carry the Mutant gene causing thalassaemia $\frac{1}{2} + \frac{1}{2}$

These cause the formation of abnormal haemoglobin molecules resulting into anaemia. 1

Q. 13



The above diagram shows human male reproductive system (one side only).

- (a) Identify 'X' and write its location in the body.
 (b) Name the accessory gland 'Y' and its secretion.
 (c) Name and state the function of 'Z'.

Ans. (a) X=Testicular lobules location – Testis//Testis , location outside the abdominal cavity/ scrotum

$\frac{1}{2} + \frac{1}{2}$

(b) Y= Accessory glands, seminal plasma

$\frac{1}{2} + \frac{1}{2}$

(c) Z= epididymis, function: storage of sperms

$\frac{1}{2} + \frac{1}{2}$

Q14. A sugarcane has been affected by virus. How can a virus free cane be developed from it ? Explain the procedure.

Ans. Tissue culture / micropropagation,

1

Meristem (Apical and axillary) can be removed from the explants, grown in vitro culture with special nutrient medium (with sucrose acids, auxins & cytokinin) under sterile / aseptic condition, plants lets develop as virus free plants

$\frac{1}{2} \times 4 = 2$

Q15. How did industrialization play a role in Natural Selection of light and dark coloured moth in England?

OR

What do you infer from the resemblance between flying squirrel and flying phalanger with reference to their evolution.

Ans. Before industrialisation there were more white winged –moth on trees than dark winged. $\frac{1}{2}$

- After industrialisation, tree trunks became dark, due to industrial smoke and soot $\frac{1}{2} + \frac{1}{2}$
- Under this condition the white winged moths did not survive, due to predation $\frac{1}{2} + \frac{1}{2}$
- And dark coloured moth survive/ able to camouflage to survive $\frac{1}{2}$

OR

Evolution of marsupial mammals has resulted in flying phalanger, through adaptive radiation. $\frac{1}{2} + \frac{1}{2}$

Evolution of placental mammals has led to the evolution of a flying squirrel (independently) .1

The resemblance between the two, proves convergent evolution. $\frac{1}{2} + \frac{1}{2}$

Q16.(a) What is the functional difference between B cells and T cells.

(b) Name the source used to produce hepatitis B vaccine using rDNA technology.

Ans. (a) T cell recognise the pathogen and trigger the B cells, B cells produce the antigens specific antibodies called Immunoglobulins 1+1=2

(b) By yeast using recombinant DNA technology. 1

Q17. How does the HIV breakdown the immune system of the AIDS patient?

Ans.

- Virus enters in macrophages
- RNA genome replicates to form viral DNA with help of reverse transcriptase,
- Viral DNA gets incorporated into host cells DNA to produce virus particles,
- HIV enters into helper 'T' lymphocytes and produces progeny virus,
- Which are released in the blood and attack other helper 'T' lymphocytes,
- This leads to progressive decrease number of helper 'T' lymphocytes and the persons start suffering from infections(loss of immunity) 6x ½ =3

Q18. How does a detritivore differ from a decomposer ? Explain with an example each.

Ans.

	Detritivore	Decomposer
1	feeds on waste dead plant and animal remains including faecal matter.	degrades dead organic matter
2	breaks feeding material into fragments	Secretes enzymes to into dead organic matter for decomposition
3	Eg. Earth worm	eg- Bacteria / Fungi

1+1+1=3

Q19. Why is Taq polymerase preferred in PCR ? Mention the source of this enzyme.

Ans. Taq polymerase is used for amplification of DNA /gene, (Usually enzymes also get denatured) Taq polymerase remains active at high temperature, Thermus aquaticus (If bacteria written give only ½) 1+1+1=3

Q20. Explain the events in a normal woman during her menstrual cycle on the following days.

(a) Ovarian event from 13-15 days

(b) Ovarian hormones level from 16 to 23 days

(c) Uterine events from 24 to 29 days

Ans. a. Rupture of Graafian follicle leads to ovulation/release of ovum

b. Estrogen level is low

c. Disintegration of endometrium and menstrual cycle begins 1+1+1=3

Q21. a) Differentiate between a template strand and coding strand of DNA.

(b) Name the source of energy for the replication of DNA.

Ans. (a)

Role/Strand	Template strand	Coding strand
function	codes for the protein molecule	Does not code for anything
polarity	3'→5'	5'→3'

1+1=2

b. Deoxynucleoside triphosphates

1

Q22. Our farmers still use DDT. How is this affecting the local bird population?

Ans. As a result of Biomagnification, through an aquatic food chain, high concentration of DDT disturbs calcium metabolism in birds, which causes thinning of egg shell, and premature breaking, eventually leading to decline in bird population.

$$6 \times \frac{1}{2} = 3$$

SECTION - D

Q no 23 is of four marks

Q23. A youth in his twenties met with an accident and succumbed to the injuries. His parents agreed to donate his organs. List any two essential clinical steps to be undertaken before any organ transplant. Why is the transplant rejected sometimes ? What views would you share with your health club members to promote organ donation?

Ans. Ans. Blood group matching, and tissue matching should be done prior to the organ transplant, the body is able to identify the 'non-self' graft, triggers the cell mediated immune response, this rejects the graft

$$5 \times \frac{1}{2} = 2 \frac{1}{2}$$

Views-

Cornea can be transplanted to any one and a blind can see the world, Heart / lung/ Kidney can be transplanted and a person is gifted with life, the mind set to volunteer to register for organ donation – (particularly eye donation) (any other valid views)

$$3 \times \frac{1}{2} = 1 \frac{1}{2}$$

SECTION – E

Q nos 24-26 are of five marks each

Q24. Mention the site of fertilization of a human ovum. List the events that follow in sequence until the implantation of the blastocyst.

OR

- (a) Draw a diagram of a fertilized embryo sac of a dicot flower. Label all its cellular components.**
(b) Explain the development of a mature embryo from this embryo sac.

Ans. The site of fertilisation is the ampullary - isthmic junction fallopian tube $\frac{1}{2}$

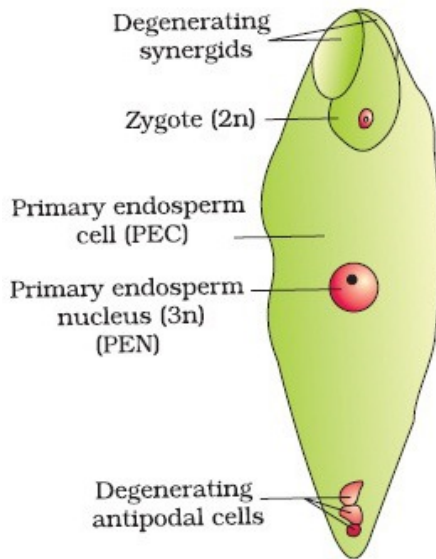
Events:

Fertilisation(Zygote formation), → Cleavage, → 8-16 Blastomeres stage- Morula, → Continuously divides and transforms in blastocysts(as it moves into uterus), → Blastomeres in the Blastocyst arrange to form outer layer trophoblast and inner cell mass, → Trophoblast attaches to endometrium, and inner cell mass differentiates as embryo, → After attachment of blastocyst the uterine cells cover it, → Embed blastocyst in the endometrium- implantation

$$(9 \times \frac{1}{2} = 4 \frac{1}{2})$$

OR

(a)



(Five correct labelling $5 \times \frac{1}{2} = 2 \frac{1}{2}$)

Zygote starts mitotic division and gives rise to pro-embryo, $\rightarrow$ globular and heart shaped, $\rightarrow$ mature embryo with radicle- plumule and two cotyledons, primary endosperm nucleus divides and forms endosperm, which may persist or gets used up in nourishing the embryo.

($5 \times \frac{1}{2} = 2 \frac{1}{2}$)

Q25. How did Griffith prove transforming principle in Genetics. Explain the procedure.

OR

How do “Pleiotropy”, “incomplete dominance”, “co-dominance” and “polygenic inheritance” deviate from the observation made by Mendel ? Explain with the help of one example for each.

Ans. Griffith took two strains of streptococcus pneumonia – R strain rough colony – non virulent, S- strain-smooth colony highly virulent

R- Injected into mice $\rightarrow$ mice alive

S- strain injected into mice $\rightarrow$ mice die due to pneumonia

Heat killed ,S train injected into mice $\rightarrow$ mice alive

Heat killed S train + live R strain, $\rightarrow$ injected into mice $\rightarrow$ mice die

Reason $\rightarrow$ The heat killed S train had the DNA which transformed R strain into virulent S type , This proves that there is a transfer of DNA to transform R to S type.

OR

No.	Mendel's Observations	Deviations
1	One gene responsible for a single phenotype	Pleiotropy - Single gene exhibits multiple phenotypic expressions eg. Disease Phenylketonuria(a single gene codes for enzyme phenylalanine hydroxylase which manifests in form of mental retardation and a reduction in hair and skin pigmentation $\frac{1}{2} + \frac{1}{2}$
2	Only one of the parental characters appear in a monohybrid cross (with contrasting character) in the F1 generation	Incomplete dominance -In a monohybrid cross (with contrasting character) phenotype in the F1 generation did not resemble either of the two parents and was in between the two.eg.Dogflower/snapdragon/Antirrhinum $\frac{1}{2} + \frac{1}{2}$

3	Only one of the parental characters appear in a monohybrid cross (with contrasting character) in the F1 generation	Co-dominance- In a monohybrid cross (with contrasting character) phenotype in the F1 generation resembles both the parents eg.ABO blood group $\frac{1}{2} + \frac{1}{2}$
4	All the traits have distinct alternate forms since One gene responsible for a single phenotype	Polygenic inheritance- The occurrence of traits are spread across a gradient. Such traits are controlled by three or more genes.eg.Human height/skin colour $\frac{1}{2} + \frac{1}{2}$

Two types of Mendel's observations ---- $\frac{1}{2} + \frac{1}{2}$

Q26. Explain the application of biotechnology in producing Bt cotton.

OR

Unless the vector and source DNA are cut, fragments separated and joined, the desired recombinant vector molecule cannot be created.

(a) How are the desirable DNA sequences cut?

(b) Explain the technique used to separate the cut fragments.

(c) How are the resultant fragments joined to the vector DNA molecule?

Ans. Bt toxin gene has been cloned from the bacteria, and has been expressed in plants, to provide resistance to insects (without the need for insecticide), Bt toxin gene forms protein crystals, these crystals contain a toxic insecticidal protein, Bt toxin protein exists as inactive protoxin in the host, but once the insect ingests the inactive toxin, it is converted in active form of toxin, due to alkaline pH of the gut which solubilises the crystals, causing death of the insect. (10 x $\frac{1}{2}$ = 5)

OR

(a) DNA sequences of the vector as well as the source are cut by the same restriction enzyme like EcoRI, in a palindromic Sequence $\frac{1}{2} + \frac{1}{2}$

(The Cut ends overhang as sticky ends in the medium.)

(b) These cut ends fragments are to be extracted from the culture medium using gel electrophoresis. $\frac{1}{2}$

This has an agarose gel matrix $\frac{1}{2}$

Fragments are fed in the wells $\frac{1}{2}$

They are negatively charged $\frac{1}{2}$

So move towards anode under an electric field through the gel $\frac{1}{2}$

Smaller fragments move faster, thus separated $\frac{1}{2}$

(c) Fragments are now added to the medium containing the vector DNA $\frac{1}{2}$

The sticky ends facilitate the action of the enzyme ligase joins the source DNA

to the Vector $\frac{1}{2}$

(10 x $\frac{1}{2}$ = 5)