



प्रश्न-पत्र

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

Please be aware that this question paper contains 33 printed pages.

(II)

33



* (II)



* (I)



- (I)

को पढ़ने के लिए 15

पूर्वाह्न में 10.15

10.15 10.30

-पत्र को पढ़ेंगे और इस अवधि के दौरान

d r d d

33 questions.

(III) .P. Code 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 write down the serial number of the question in the answer-book 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 (सैद्धांतिक)

BIOLOGY (Theory)

निर्धारित समय घण्टे

अधिकतम अंक





सामान्य निर्देश:

निम्नलिखित निर्देशों को ध्यानपूर्वक पढ़िए और उनका पालन कीजिए

इस प्रश्न-पत्र में 33 प्रश्न हैं। सभी प्रश्न अनिवार्य हैं।

प्रश्न-पत्र पाँच खण्डों में विभाजित है – खण्ड क, ख, ग, घ एवं ङ।

खण्ड क – प्रश्न संख्या 1 से 16 तक बहुविकल्पीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 1 अंक का है।

खण्ड ख – प्रश्न संख्या 17 से 21 तक अति लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 2 अंकों का है।

खण्ड ग – प्रश्न संख्या 22 से 28 तक लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 3 अंकों का है।

खण्ड घ – प्रश्न संख्या 29 तथा 30 केस-आधारित प्रश्न हैं। प्रत्येक प्रश्न 4 अंकों का है। इन उप-प्रश्नों में से एक उप-प्रश्न में आंतरिक विकल्प का चयन दिया गया है।

खण्ड ङ – प्रश्न संख्या 31 से 33 तक दीर्घ-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न 5 अंकों का है।

प्रश्न-पत्र में समग्र विकल्प नहीं दिया गया है। यद्यपि, खण्ड ख, ग तथा घ में आंतरिक विकल्प का प्रावधान दिया गया है। परीक्षार्थी को इन प्रश्नों में से किसी एक प्रश्न का उत्तर लिखना है।

ध्यान दें कि दृष्टिबाधित परीक्षार्थियों के लिए अलग प्रश्न-पत्र है।

जहाँ कहीं आवश्यक हो, साफ सुथरे और उचित रूप से नामांकित चित्र बनाए जाने चाहिए।

प्रश्न संख्या 1 से 16 तक बहुविकल्पीय प्रकार के 1 अंक के प्रश्न हैं।

×

1.

मक्का

2.

क्सिन

अ

ऑक्सी

क्टा

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**General Instructions :**

|                    |          |              |            |                    |
|--------------------|----------|--------------|------------|--------------------|
|                    |          | <b>33</b>    | <b>All</b> | <b>compulsory</b>  |
|                    |          | <b>five</b>  | <b>-</b>   | <b>A B, C, D E</b> |
| <b>Section A -</b> |          | <b>1 16</b>  |            |                    |
|                    | <b>1</b> |              |            |                    |
| <b>Section B -</b> |          | <b>17 21</b> |            |                    |
|                    | <b>2</b> |              |            |                    |
| <b>Section C -</b> |          | <b>22 28</b> |            |                    |
|                    | <b>3</b> |              |            |                    |
| <b>Section D -</b> |          | <b>29 30</b> |            |                    |
|                    | <b>4</b> |              |            |                    |
| <b>Section E -</b> |          | <b>31 33</b> |            |                    |
|                    | <b>5</b> |              |            |                    |

**one**

**SECTION A**

**1 16**

**1**

×

**1.** In which of the following plants are both male and female flowers born on the same plant and the mode of pollination can be geitonogamy or xenogamy ?

Papaya

Date Palm

Maize

Spinach

**2.** Which one of the following hormones is secreted by the human placenta that helps in the maintenance of pregnancy ?

Relaxin

Human Chorionic Gonadotropin

Oxytocin

Human Placental Lactogen





3.

4.

गलत जोड़े का चयन कीजिए :

मानव कैरियोटाइप

लक्षण

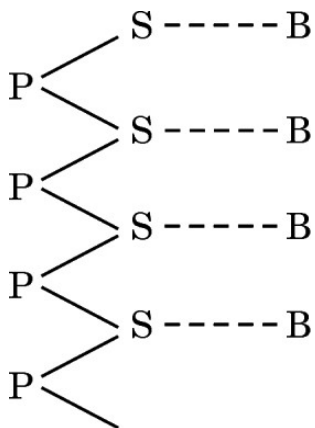
- चौड़ी हथेली में अभिलाक्षणिक पाम क्रीज़
- 
- 
- 

5.

6.

न्यूक्लियोटाइड २

‘-----’





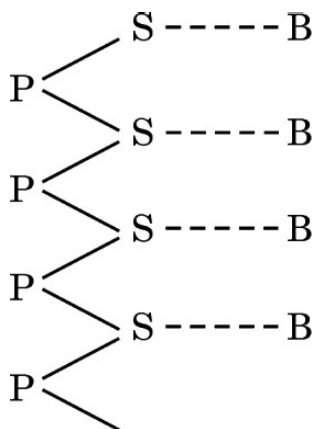
3. Periodic abstinence by a couple for family planning should be from :
- Day 5 to 10 of menstrual cycle
  - Day 13 to 15 of menstrual cycle
  - Day 10 to 17 of menstrual cycle
  - Day 16 to 20 of menstrual cycle

4. Select the **incorrect** match from the following :

- 
- 
- 
- 

5. You know that there are twenty different types of naturally occurring amino acids and four different types of bases in the DNA. A combination of 3 such bases code for a specific amino acid.

6. \_\_\_\_\_





7. निम्नलिखित में से किस प्रकार की परिस्थितियों रोग में मानव शरीर में मास्ट कोशिकाओं की अतिक्रियाशीलता (में वृद्धि) प्रेक्षित होती है

8. *लैक्टोबैसिलस*  
बैक्टीरिया (आद्य) बैक्टीरिया  
संश्लेषी बैक्टीरिया विषमपोषी बैक्टीरिया

9. (वैक्सीन)

भेड़

10. प्रतिबंधन एंडोन्यूक्लिए -

11. वह समुन्नत विशेषक जो -

लाइसिन की उच्च  
पीड़क प्रतिरोधी

12.





7.

8.

9.

10. —

11. —

12.





प्रश्न संख्या 13 से 16 के लिए, दो कथन दिए गए हैं — जिनमें एक को अभिकथन तथा दूसरे को कारण द्वारा अंकित किया गया है। इन प्रश्नों के सही उत्तर नीचे दिए गए कोडों और में से चुनकर दीजिए।

अभिकथन और कारण दोनों सही हैं और कारण , अभिकथन की सही व्याख्या करता है।

अभिकथन और कारण दोनों सही हैं, परन्तु कारण , अभिकथन की सही व्याख्या नहीं करता है।

अभिकथन सही है, परन्तु कारण ग़लत है।

अभिकथन ग़लत है, परन्तु कारण सही है।

13. अभिकथन

कारण हीन बच्चों को कानूनी

14. अभिकथन

कारण

15. अभिकथन ऐग्रीबैक्टीरियम ट्यूमीफेशियन्स

कारण

“T”

16. अभिकथन

‘ (GEAC) ’

कारण

कोई प्रभाव नहीं पड़ता।







**13 16**

—

***not***

**13.**

**14.**

**15.**

‘ ’

**16.**





## खण्ड ख

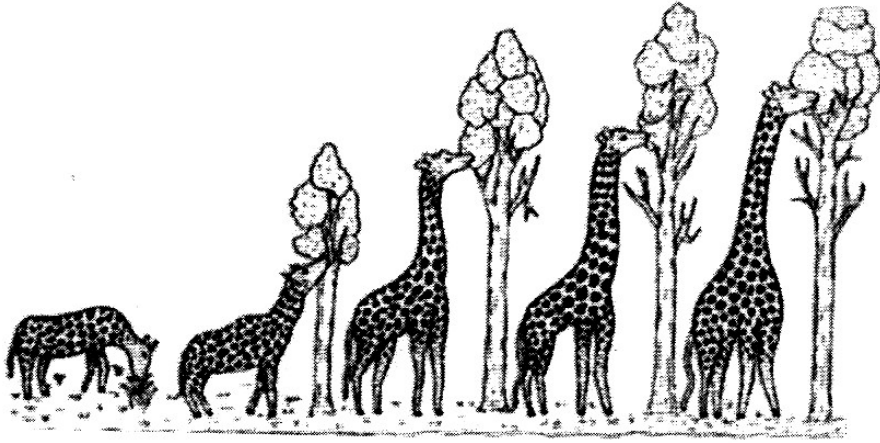
17.

‘ ’

×—

| पारिभाषिक शब्द | पौधे का भाग जिसे यह निरूपित करता है |
|----------------|-------------------------------------|
|                | ‘ ’                                 |
| ‘ ’            |                                     |
|                | ‘ ’                                 |
| ‘ ’            |                                     |

18.



19.

क्यों कहा जाता है

20. (क)

ने उसे एक इंजेक्शन लगाया ।

चिकित्सक ने किस पदार्थ को निवेशित किया तथा क्यों

—

इस इंजेक्शन (निवेशन) से किस

—

अथवा

(ख) कार्बनिक कृषि करने वाले किसान पीड़क कीटों के समूल उन्मूलन का नुमोदन क्यों





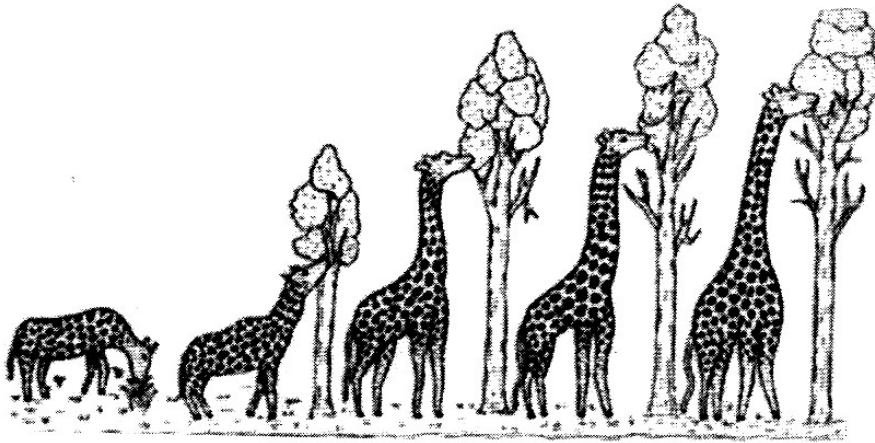
## SECTION B

17.

×—

|     |     |
|-----|-----|
|     |     |
|     | 'A' |
| 'B' |     |
|     | 'C' |
| 'D' |     |

18.



19.

20.

OR





21.

शस्य (खड़ी

‘A’ ‘B’



खण्ड ग

22.

23.

24.

— —

—

—





21. standing crops that could be occupying level 'A' and level 'B' in it.



### SECTION C

22.

23.

24.

— —  
  
—  
  
—





25.

| मानव रोग का नाम | रोग जनक                | अभिलक्षण                           |
|-----------------|------------------------|------------------------------------|
|                 | स्ट्रेप्टोकोकस         | 'A'                                |
|                 | 'B'                    | उच्च ज्वर, कमजोरी, सि<br>में पीड़ा |
|                 |                        | 'C'                                |
|                 | 'D'                    |                                    |
|                 | ऐस्कारिस               | 'E'                                |
| 'F'             | एंटांमीबा हिस्टोलिटिका | , ऐंठन, श्लेषमल एवं रक्त के थक्के  |

26.

आपके विचार में क्या पुत्र और पुत्री में इस विकार की वंशागति उनके पिता से

27. (क) पारजीवी जंतु (ट्रांसजेनिक एनिमल्स) क्या हैं

अथवा

(ख)

न्यूक्लियोटाइड

28. (क) ऑफ्रीस

(ख)





25.

|     |     |     |
|-----|-----|-----|
|     |     |     |
|     |     | 'A' |
|     | 'B' |     |
|     |     | 'C' |
|     | 'D' |     |
|     |     | 'E' |
| 'F' |     |     |

26.

27.

**OR**

28.





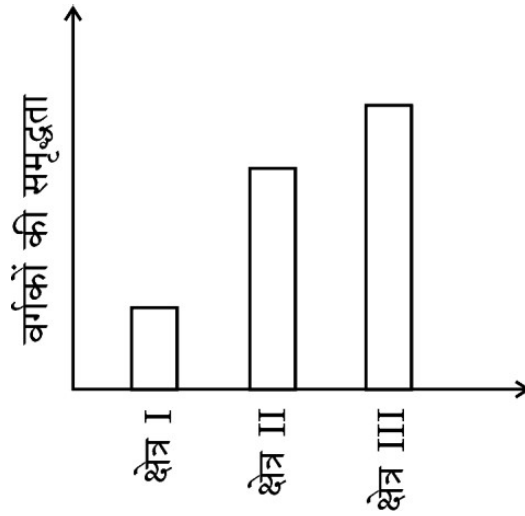
### खण्ड घ

प्रश्न संख्या 29 तथा 30 केस-आधारित प्रश्न हैं। प्रत्येक प्रश्न के 3 उप-प्रश्न हैं जिसके एक उप-प्रश्न में आंतरिक विकल्प दिया गया है।

29. निम्नलिखित परिच्छेद को पढ़कर  
क्या

कड़

कड़ों को नीचे दिए दंड (बार)



(क) मृद्धि) सर्वाधिक क्यों है

अथवा

(क) मृद्धि) न्यूनतम क्यों है

अभिलक्षित होता है। उल्लेख कीजिए कि इस प्रकार की विविधता को क्या कहते हैं।

(ग) ऐसा क्यों है कि प्रोकैरियोट्स में पौधों और







## SECTION D

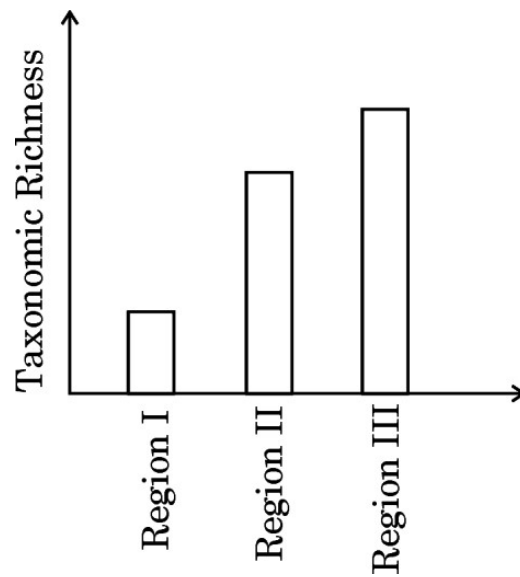
29

30

3

29.

Isn't it incredible that India's land area is only 2.4 per cent of the world's

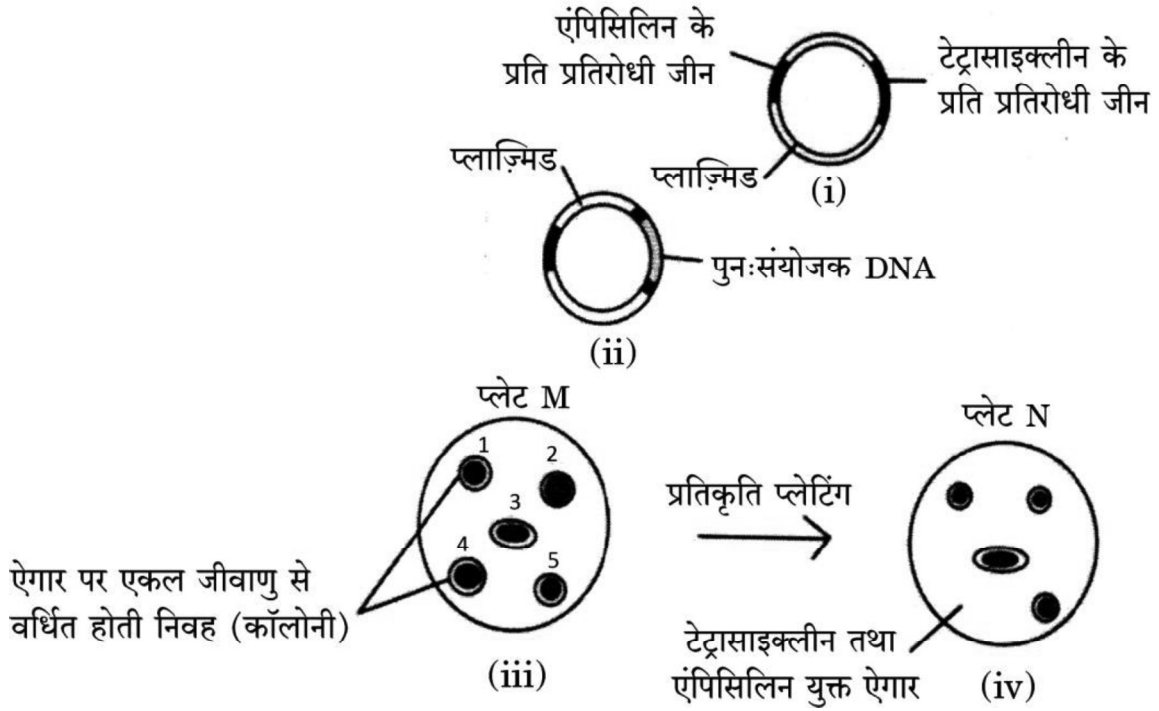


OR





30.



मड में उन स्थलों को क्या कहा जाता है जहाँ ऐंपिसिलिन तथा टेट्रासा क्लीन के

अथवा

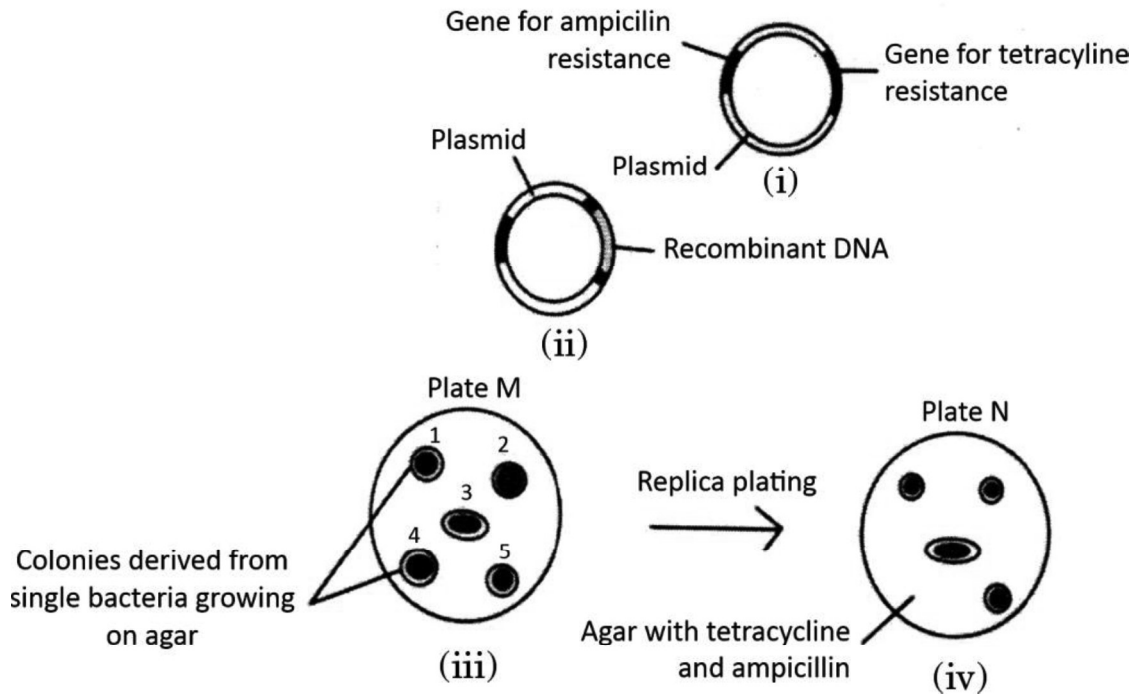
नएकटीवेश

$\beta$  कटोसाइडे





30.



**OR**

$\beta$





खण्ड ड

31.

अथवा

32.

अथवा





**SECTION E**

**31.**

—  
—

**OR**

—

—

**32.**

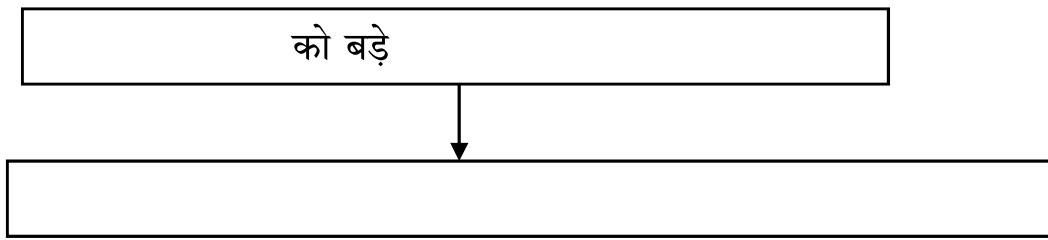
**OR**





33.

अथवा



को बड़े वायुवीय टैंको से क्यों ज़  
' ' को क्या कहते हैं

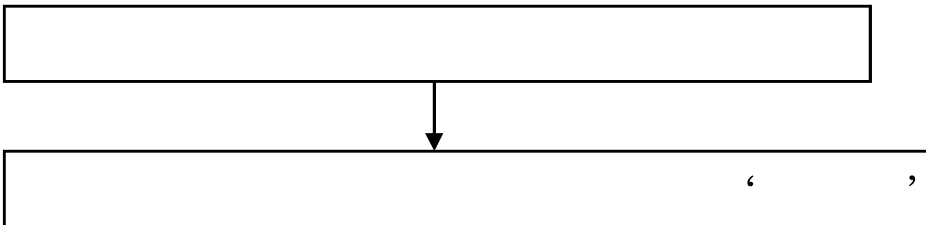
लिखिए कि इनमें से





33.

OR



‘ ’



**Marking Scheme**  
**Strictly Confidential**  
**(For Internal and Restricted use only)**  
**Senior Secondary School Certificate Examination,2024**  
**SUBJECT NAME BIOLOGY (Q.P. CODE 57/1/1)**

**General Instructions: -**

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.                                                                                                                                                                                                                                                                           |
| <b>2</b> | <b>“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its’ leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under various rules of the Board and IPC.”</b>                                                                                                                                                                                                |
| <b>3</b> | Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one’s own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. <b>However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-XII, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.</b> |
| <b>4</b> | The Marking scheme carries only suggested value points for the answers<br><br>These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>5</b> | The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.                                                                                                                                                                                                                     |
| <b>6</b> | Evaluators will mark(√) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right (√)while evaluating which gives an impression that answer is correct and no marks are awarded. <b>This is most common mistake which evaluators are committing.</b>                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>7</b> | If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>8</b> | If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>9</b> | If a student has attempted an extra question, answer of the question deserving more marks should                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |





|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | be retained and the other answer scored out with a note “ <b>Extra Question</b> ”.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>10</b> | No marks to be deducted for the cumulative effect of an error. It should be penalized only once.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>11</b> | A full scale of marks 70 has to be used. Please do not hesitate to award full marks if the answer deserves it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>12</b> | Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>13</b> | <p>Ensure that you do not make the following common types of errors committed by the Examiner in the past:-</p> <ul style="list-style-type: none"> <li>● Leaving answer or part thereof unassessed in an answer book.</li> <li>● Giving more marks for an answer than assigned to it.</li> <li>● Wrong totaling of marks awarded on an answer.</li> <li>● Wrong transfer of marks from the inside pages of the answer book to the title page.</li> <li>● Wrong question wise totaling on the title page.</li> <li>● Wrong totaling of marks of the two columns on the title page.</li> <li>● Wrong grand total.</li> <li>● Marks in words and figures not tallying/not same.</li> <li>● Wrong transfer of marks from the answer book to online award list.</li> <li>● Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)</li> <li>● Half or a part of answer marked correct and the rest as wrong, but no marks awarded.</li> </ul> |
| <b>14</b> | While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>15</b> | Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>16</b> | The Examiners should acquaint themselves with the guidelines given in the “ <b>Guidelines for Spot Evaluation</b> ” before starting the actual evaluation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>17</b> | Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>18</b> | The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



**MARKING SCHEME**  
**Senior Secondary School Examination, 2024**  
**BIOLOGY (Subject Code–044)**  
**[ Paper Code: 57/1/1]**

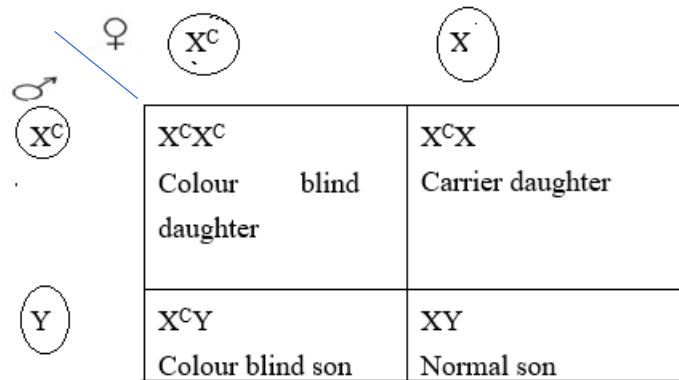
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |   |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---|
| 1                  | (C) / Maize                                                                                                                                                                                                                                                                                                                                                                                                                      | 1                | 1 |
| 2.                 | (B) / Human Chorionic Gonadotropin                                                                                                                                                                                                                                                                                                                                                                                               | 1                | 1 |
| 3.                 | (C) / Day 10 to 17 of menstrual cycle.                                                                                                                                                                                                                                                                                                                                                                                           | 1                | 1 |
| 4.                 | (B) / 44 × XXY– Overall feminine development                                                                                                                                                                                                                                                                                                                                                                                     | 1                | 1 |
| 5.                 | (C) / 2                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                | 1 |
| 6.                 | (C) / N–glycosidic linkage                                                                                                                                                                                                                                                                                                                                                                                                       | 1                | 1 |
| 7.                 | (B) / Allergy                                                                                                                                                                                                                                                                                                                                                                                                                    | 1                | 1 |
| 8.                 | (D) / Heterotrophic bacteria                                                                                                                                                                                                                                                                                                                                                                                                     | 1                | 1 |
| 9.                 | (D) / Mice                                                                                                                                                                                                                                                                                                                                                                                                                       | 1                | 1 |
| 10.                | (A) / Six base pairs                                                                                                                                                                                                                                                                                                                                                                                                             | 1                | 1 |
| 11.                | (D) / High vitamin – A content                                                                                                                                                                                                                                                                                                                                                                                                   | 1                | 1 |
| 12.                | (C) / Secondary productivity and Net primary productivity                                                                                                                                                                                                                                                                                                                                                                        | 1                | 1 |
| 13.                | (C) / Assertion (A) is true, but Reason (R) is false.                                                                                                                                                                                                                                                                                                                                                                            | 1                | 1 |
| 14.                | (A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).                                                                                                                                                                                                                                                                                                                     | 1                | 1 |
| 15.                | (D) / Assertion (A) is false, but Reason (R) is true                                                                                                                                                                                                                                                                                                                                                                             | 1                | 1 |
| 16.                | (C) / Assertion (A) is true, but reason (R) is false.                                                                                                                                                                                                                                                                                                                                                                            | 1                | 1 |
| <b>SECTION – B</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |   |
| 17.                | A – Wall of fruit / Wall of ripened ovary ,<br>B – Scutellum,<br>C – Radicle / Plumule / epicotyl / hypocotyl,<br>D –Perisperm,                                                                                                                                                                                                                                                                                                  | ½ x4             | 2 |
| 18                 | Name of the Naturalist –Lamarck<br>-Evolution of life forms driven by use and disuse of organs.<br>-He said Giraffes in an attempt to forage leaves on tall trees had to adapt by elongation of their necks.<br>-They passed on this acquired character of elongated neck to their succeeding generations and slowly over the years all the future generations had long necks.                                                   | ½<br>½<br>½<br>½ | 2 |
| 19.                | <ul style="list-style-type: none"> <li>• Ova from wife or female donor and sperm from husband or male donor are collected , induced to form a zygote under simulated conditions in the laboratory (<i>In vitro</i>) (outside body) , Zygote or embryo are transferred into the female body for development.</li> <li>• Test tube baby programme – because initial process is carried out in the laboratory / in vitro</li> </ul> | ½x3<br>½         | 2 |

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                          |   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|---|
| 20.                | <p>(a)</p> <p>(i)</p> <p>-Readymade or preformed antibodies or antitoxins against the snake venom ,</p> <p>-A quick immune response is required in this case.</p> <p>(ii) Passive immunity</p> <p style="text-align: center;"><b>OR</b></p> <p>(b)The organic farmers hold the view that complete eradication of pests is not only possible but also undesirable because without them beneficial predatory and parasitic insects which depend upon them as food or hosts will not survive /</p> <p>One of the key belief of organic farmers is that biodiversity furthers health. Greater biodiversity leads to more sustainable ecosystem.</p> | <p><math>\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p>2</p>                                                        | 2 |
| 21.                | <p>A – Zooplankton ,</p> <p>B – Phytoplankton ,</p> <p>-Inverted pyramid of biomass ,</p> <p>-Sea Ecosystem/ Aquatic ecosystem</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p><math>\frac{1}{2} \times 4</math></p>                                                                                                 | 2 |
| <b>SECTION – C</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                          |   |
| 22.                | <ul style="list-style-type: none"> <li>• -Pills contain progestogens or progestogen – estrogen combination.</li> <li>-They inhibit ovulation , and implantation as well as, alter the quality of cervical mucus to prevent or retard the entry of sperms.</li> <li>• -Pills have to be taken daily for a period of 21 days starting within first five days of menstrual cycle.</li> <li>-After a gap of 7 days it has to be repeated in the same pattern till the female desires to prevent conception.</li> </ul>                                                                                                                              | <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2} \times 3</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> | 3 |
| 23.                | <p>(a)</p> <p>-Satellite DNA / Repetitive DNA/ VNTR</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1                                                                                                                                        |   |



|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                      |   |        |                             |   |                             |                  |  |              |                                                                                                             |  |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---|--------|-----------------------------|---|-----------------------------|------------------|--|--------------|-------------------------------------------------------------------------------------------------------------|--|
|                             | <p>-Do not code for any protein , form a large portion of human genome, show high degree of polymorphism</p> <p style="text-align: center;"><b>(any two points)</b></p> <p>(b)</p> <p>useful in forensic applications , helps in determining population and genetic diversities ,forms the basis of paternity testing , to study evolution, to trace path of hereditary diseases.</p> <p style="text-align: right;"><b>(any two applications)</b></p>                                          | <p><math>\frac{1}{2}+\frac{1}{2}</math></p> <p><math>\frac{1}{2}+\frac{1}{2}</math></p>                              | 3 |        |                             |   |                             |                  |  |              |                                                                                                             |  |
| 24.                         | <p>(a)</p> <ul style="list-style-type: none"> <li>• Miller experimentally showed formation of amino acids ,</li> </ul> <p>and this proved theory of chemical evolution of life / formation of organic molecules from inorganic molecules.</p> <ul style="list-style-type: none"> <li>• Oparin , Haldane</li> </ul> <p>(b)</p> <p>Analysis of meteorite content also revealed similar compounds indicating that similar processes are occurring in space.</p>                                   | <p><math>\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2}+\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> | 3 |        |                             |   |                             |                  |  |              |                                                                                                             |  |
| 25.                         | <p>A – Fever / chills / cough / headache / greyish blue lips and nails / severe problem in Respiration ,</p> <p>B – <i>Salmonella typhi</i> ,</p> <p>C – Nasal congestion / discharge / sore throat / cough / hoarseness /tiredness,</p> <p>D – <i>Microsporium / Trichophyton / Epidermophyton</i> ,</p> <p>E – Internal bleeding / fever / muscular pain / anaemia / blockage of intestinal passage,</p> <p>F – Amoebiasis / Amoebic dysentery.</p>                                          | $\frac{1}{2} \times 6$                                                                                               | 3 |        |                             |   |                             |                  |  |              |                                                                                                             |  |
| 26.                         | <p>No,</p> <p>Son inherited disease from the mother and daughter inherited disease from both mother and father.</p> <p style="text-align: center;"> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Mother</td> <td style="width: 10%;"></td> <td style="width: 30%;">Father</td> </tr> <tr> <td>X<sup>C</sup>X (1/2 Mark)</td> <td>X</td> <td>X<sup>C</sup>Y (1/2 Mark)</td> </tr> <tr> <td>Normal (Carrier)</td> <td></td> <td>Colour blind</td> </tr> </table> </p> | Mother                                                                                                               |   | Father | X <sup>C</sup> X (1/2 Mark) | X | X <sup>C</sup> Y (1/2 Mark) | Normal (Carrier) |  | Colour blind | <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}+\frac{1}{2}</math></p> |  |
| Mother                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Father                                                                                                               |   |        |                             |   |                             |                  |  |              |                                                                                                             |  |
| X <sup>C</sup> X (1/2 Mark) | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | X <sup>C</sup> Y (1/2 Mark)                                                                                          |   |        |                             |   |                             |                  |  |              |                                                                                                             |  |
| Normal (Carrier)            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Colour blind                                                                                                         |   |        |                             |   |                             |                  |  |              |                                                                                                             |  |





1

3

27. (a) (i) Transgenic animals are those which have their DNA manipulated to possess and express a foreign gene.

1

(ii) First transgenic Cow – Rosie,

1

-Produced human protein enriched milk (2.4 g/litre) / cow milk containing human alpha lactalbumin protein is nutritionally more balanced product for human babies than natural cow milk.

1

OR

(b) (i) In EcoRI (comes from *Escherichia coli* RY13)

-E represent Genus *Escherichia*,

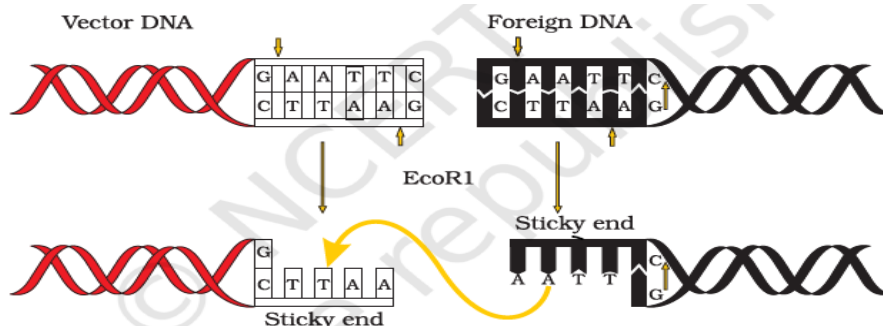
-co represent species *coli*,

-R represent RY 13 strain,

-I represent order in which the enzyme were isolated from that strain of bacteria.

1/2x4

(ii)



1/2

1/2

3

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                          |   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---|
| 28.                | <p>(a)</p> <ul style="list-style-type: none"> <li>-Orchid Ophrys employs ‘Sexual Deceit’ to get pollinated by a species of bee</li> <li>-one petal of flower resembles female of bee in size, colour and markings</li> <li>-Male bee attracted and pseudocopulates the flower and gets dusted with pollens.</li> <li>-When same bee ‘pseudocopulates’ with other flower, it transfers the pollens to it.</li> </ul> <p>(b)</p> <p>If female bee pattern changes during evolution the flower needs to co-evolve to resemble the female bee to get pollinated.</p>                                                                                                                                                                                                                                                                                                                                                                                                    | <p><math>\frac{1}{2} \times 4</math></p> <p>1</p>                        | 3 |
| <b>SECTION – D</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                          |   |
| 29.                | <p>(a)</p> <p>This region is less seasonal with constant and more predictable environment / More solar energy so higher productivity and higher diversity / it represent tropical latitudes which remain relatively undisturbed for millions of years and had a long evolutionary time for species diversification .</p> <p style="text-align: center;"><b>OR</b></p> <p>(a)</p> <p>Region I represent temperate region subjected to frequent glaciation and get lesser evolutionary time for species diversification / has more seasonal with less constant and less predictable environment which lead to lower specie diversification / have lower solar energy available which reduces productivity and inturn contributes to lesser diversity.</p> <p>(b) Latitudinal gradient in diversity</p> <p>(c) Conventional taxonomic methods are not suitable for identifying microbial species, and many species are not culturable under laboratory conditions.</p> | <p>1</p> <p>1</p> <p>1</p> <p>1+1</p>                                    | 4 |
| 30.                | <p>(a) Colony 4 is transformed with plasmid containing recombinant DNA, as they will not show resistance towards tetracycline.</p> <p>(b) <b>Award 2 marks to each student .</b></p> <p>(c) Restriction endonuclease / ligase / <i>Taq</i> DNA Polymerase</p> <p style="text-align: center;"><b>OR</b></p> <p>(c) Insertional inactivation of gene encoding for <math>\beta</math>- galactosidase will lead to colorless bacterial colonies (recombinant)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p>2</p> <p>1</p> <p>1</p> | 4 |



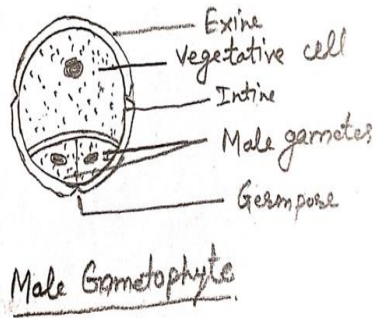
SECTION – E

31. (a)

(i) Each microspore mother cell in sporogenous tissue undergoes meiosis, forming microspores tetrad by the process called microsporogenesis, microspores form cluster of four cells called microspore tetrad, as the anther matures and dehydrates, each microspore undergo assymetric division to produce a vegetative cell and a generative cell.

1/2x5

(ii)

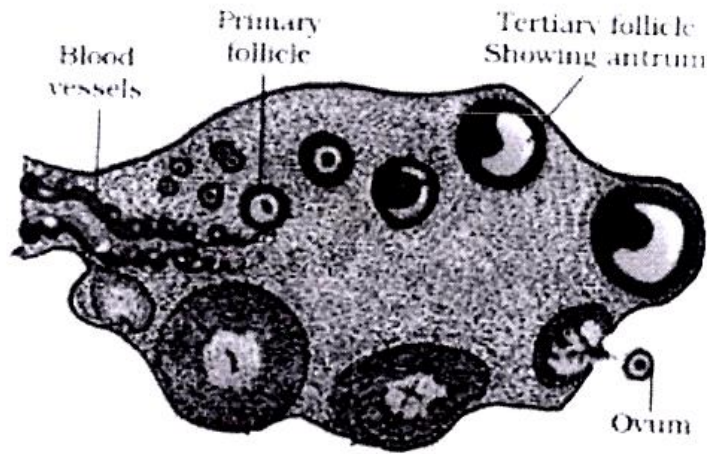


1/2x5

OR

(b)

(i)



1/2x4

(ii) At embryonic stage

1/2

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                  |          |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------|
|            | <p>(iii) Both LH and FSH attain a peak level in mid of menstrual cycle rapid secretion of LH leading to maximum level is called LH surge , which induces rupture of graffian follicle and cause ovulation , ovulatory phase is followed by luteal phase during which remaining parts of graffian follicle transform as corpus luteum , it produces large amount of progesterone needed for maintaining endometrium , in absence of fertilization corpus luteum degenerates which causes disintegration of the endometrium leading to menstruation.</p>                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>½x5</p>                                                                       | <p>5</p> |
| <p>32.</p> | <p>(a)</p> <p>-Frederick Griffith</p> <p>Took two strains of <i>Streptococcus pneumoniae</i> bacteria and inject them into mice</p> <p>- R strain – Rough and Non–virulent</p> <p>-S strain – Smooth and virulent (with mucous coat)</p> <p>S strain → Inject into mice → Mice die</p> <p>R strain → Inject into mice → Mice live</p> <p>S strain (heat-killed) → Inject into mice → Mice live</p> <p>S strain (heat-killed) + R strain (live) → Inject into mice → Mice die</p> <p>Conclusion :</p> <ul style="list-style-type: none"> <li>• -R–strain bacteria had been transformed by heat killed S – strain.</li> <li>• -‘Transforming principle’ transferred from heat killed S-Strain and enabled R–strain to synthesise a smooth polysaccharide coat. This must be due to the transfer of the genetic material.</li> <li>• -Heat which killed bacteria did not destroy some of the properties of genetic material which shows stability of genetic material.</li> </ul> | <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> |          |





**Case III-**

Tt Vv × Tt Vv



| Gametes | TV                  | Tv                  | tV                   | tv                   |
|---------|---------------------|---------------------|----------------------|----------------------|
| TV      | TTVV<br>Tall violet | TTVv<br>Tall Violet | TtVV<br>Tall Violet  | TtVv<br>Tall Violet  |
| Tv      | TTVv<br>Tall Violet | TTvv<br>Tall white  | TtVv<br>Tall Violet  | Ttvv<br>Tall white   |
| tV      | TtVV<br>Tall violet | TtVv<br>Tall Violet | ttVV<br>dwarf violet | ttVv<br>dwarf Violet |
| Tv      | TtVv<br>Tall violet | Ttvv<br>Tall white  | ttVv<br>dwarf violet | ttvv<br>dwarf white  |

**Phenotypic ratio** - Tall Violet : Dwarf violet:Tall white: dwarf white

9 : 3 : 3: 1

**Genotypic ratio-** TTVV: TTVv:TtVV:TtVv:TTvv:ttVV: ttVv: Ttvv: ttvv

1 : 2 : 2 : 4 : 1 :1 :2 :2 :1

1/2

1/2

**Case IV**

TTVv X TTVv



| Gametes | TV                  | Tv                  |
|---------|---------------------|---------------------|
| TV      | TTVV<br>Tall Violet | TTVv<br>Tall Violet |
| Tv      | TTVv<br>Tall Violet | TTvv<br>Tall White  |

**Phenotypic ratio-** Tall violet Tall white

3 : 1

**Genotypic ratio-** TTVV : TTVv : TTvv

1 : 2 : 1

1/2

1/2

- (Any three self cross shown and explained with genotypic and phenotypic ratio)

5



|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                         |  |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 33. | <p>(a)</p> <p>(i)<br/>-Contact Inhibition is present in normal cells but not in cancer cells,<br/>-When normal cells come in contact with other cells it inhibits their uncontrolled growth.</p> <p>(ii)<br/>Cellular oncogenes / Proto-oncogenes , when activated under certain conditions could lead to oncogenic transformation of the cells.</p> <p>(iii)<br/>(1) Biopsy and histopathology– A piece of suspected tissue cut into thin sections is stained , and examined under microscope by pathologist for increased cell counts.</p> <p>(2) MRI – detects cancer of internal organs ,<br/>uses strong magnetic fields and non-ionising radiations to detect pathological and physiological changes in living tissue</p> <p style="text-align: center;"><b>OR</b></p> <p>(b)</p> <p>(i)<br/>(1) In aeration tanks there is growth of aerobic microbes and fungi (flocs) that consume major part of organic matter in effluent thus reducing BOD</p> <p>(2)</p> <ul style="list-style-type: none"> <li>• -Activated sludge</li> <li>• -Used as inoculum in aeration tanks.</li> </ul> <p>(3) Bacterial flocs are allowed to sediment. ( Activated sludge)</p> <p>(ii)<br/>-<i>Rhizobium</i> (Bacteria), live symbiotically in nodules of roots of leguminous plants and fix atmospheric nitrogen into organic form and provide nitrogen to the plant.</p> | <p><math>\frac{1}{2}</math><br/>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2}</math><br/>1</p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> |  |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|  |                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                             |          |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------|
|  | <p>-<i>Glomus</i> (fungi), live in symbiotic association with roots of higher plants and absorb phosphorus from the soil and passes it to plants.</p> <p>-Cyanobacteria (<i>Anabaena</i>, <i>Nostoc</i>, <i>Oscillatoria</i>),</p> <p>Add organic matter to the soil and increase fertility (Paddy fields)</p> <p style="text-align: center;"><b>(Any two can be explained)</b></p> | <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> | <p>5</p> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------|