

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 30 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 30 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 :

- सभी प्रश्न अनिवार्य हैं ।
- इस प्रश्न-पत्र में चार खण्ड A, B, C और D हैं । खण्ड A में 8 प्रश्न हैं जिनमें प्रत्येक का एक अंक है, खण्ड B में 10 प्रश्न हैं जिनमें प्रत्येक के दो अंक हैं, खण्ड C में 9 प्रश्न हैं जिनमें प्रत्येक के तीन अंक हैं तथा खण्ड D में 3 प्रश्न हैं जिनमें प्रत्येक के पाँच अंक हैं ।
- कोई समग्र चयन-विकल्प (ओवरऑल चॉइस) उपलब्ध नहीं है । फिर भी, 2 अंकों वाले एक प्रश्न में, 3 अंकों वाले एक प्रश्न में और 5 अंकों वाले सभी प्रश्नों में भीतरी चयन-विकल्प दिए गए हैं । ऐसे प्रश्नों में विद्यार्थी को केवल एक ही विकल्प का उत्तर देना है ।
- जहाँ भी आवश्यक हो, बनाए जाने वाले आरेख साफ-सुथरे तथा समुचित रूप में नामांकित हों ।



**General Instructions :**

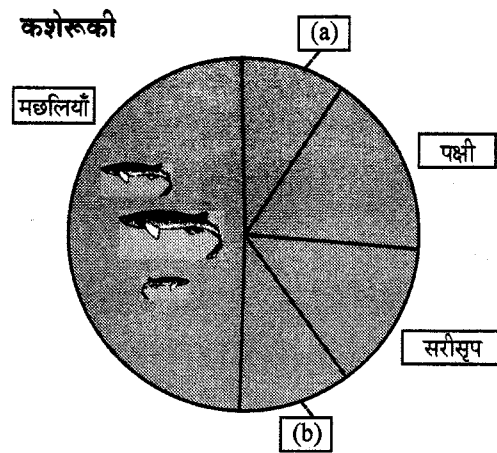
- (i) All questions are compulsory.
- (ii) This question paper consists of four Section A, B, C and D. Section – A contains 8 questions of one mark each, Section – B is of 10 questions of two marks each, Section – C is of 9 questions of three marks each and Section – D is of 3 questions of five marks each.
- (iii) There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.
- (iv) Wherever necessary, the diagrams drawn should be neat and properly labelled.

**खण्ड – A**

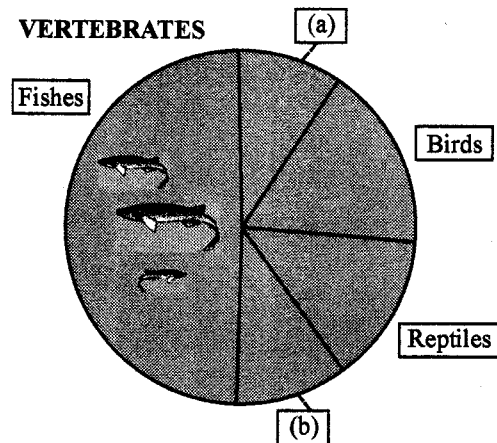
**SECTION – A**

**(1 × 8 = 8)**

1. त्वरित जलसुपोषण क्यों हो जाया करता है, बताइए । 1  
State the cause of Accelerated Eutrophication.
2. नीचे दिए जा रहे चित्र में जिसमें मुख्य कशेरुकी टैक्सॉनों की आनुपातिक संख्याएँ दर्शायी गयी हैं, “a” और “b” क्या हैं, पहचान कर बताइए । 1



Identify ‘a’ and ‘b’ in the figure given below representing proportionate number of major vertebrate taxa.



3. किसी एक ऐसे जीव का उदाहरण दीजिए जो उपरति (डायपौज़) अवस्था में चला जाया करता है, और बताइए वह ऐसा क्यों करता है । 1  
Give an example of an organism that enters 'diapause' and why.
4. उन दो मध्यवर्ती परपोषियों के नाम लिखिए जिन पर मानव यकृत-पर्णाभ अपना जीवन-चक्र पूरा करने के लिए निर्भर होता है ताकि उसके प्राथमिक परपोषी का परजीवीयन सुगमीकृत हो सके । 1  
Name the two intermediate hosts which the human liver fluke depends on to complete its life cycle so as to facilitate parasitization of its primary host.
5. उन परपोषी कोशिकाओं के प्ररूप का नाम लिखिए जो किसी विजातीय DNA को प्रवेश कराने के लिए जीन बंदूकों के रूप में उपयुक्त होती हैं । 1  
Mention the type of host cells suitable for the gene guns to introduce an alien DNA.
6. ऐसी किन्हीं दो प्रकार की कोशिकाओं के नाम लिखिए जो मानवों में सहज प्रतिरक्षा प्रदान करने के लिए 'कोशिकीय अवरोधों' के रूप में कार्य करती हैं । 1  
Name any two types of cells which act as 'Cellular barriers' to provide Innate Immunity in humans.
7. किसी समष्टि में DNA बहुरूपता का होना किस प्रकार होता है, बताइए । 1  
Mention how does DNA polymorphism arise in a population.
8. उस जीव का नाम लिखिए जिसे "बंगाल का आतंक" कहा जाता है । 1  
Write the name of the organism that is referred to as the 'Terror of Bengal'.

**खण्ड - B**  
**SECTION - B**

(2 × 10 = 20)

9. आवृतबीजी पराग कणों के एक्साइन तथा इंटाइन (बाह्यचोल एवं अंतःचोल) जिन-जिन कार्बनिक पदार्थों के बने होते हैं, उनके नाम लिखिए । इनमें से एक्साइन की भूमिका समझाइए । 2  
Name the organic materials the exine and intine of an angiosperm pollen grains are made up of . Explain the role of exine.
10. (i) उस वैज्ञानिक का नाम लिखिए जिसने सुझाव दिया था कि आनुवंशिक कूट तीन न्यूक्लियोटाइडों के संयोजन से बना होना चाहिए ।  
(ii) वह जिस आधार पर इस निष्कर्ष पर पहुँचा उसके विषय में समझाइए । 2  
(i) Name the scientist who suggested that the genetic code should be made of a combination of three nucleotides.  
(ii) Explain the basis on which he arrived at this conclusion.

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11. मानवों में जीन I द्वारा ABO रक्त समूहों का किस प्रकार नियंत्रण होता है ? लाल रक्त कोशिकाओं की संरचना पर जीन का क्या प्रभाव होता है, लिखिए । 2

अथवा

निम्नलिखित संकरणों में पायी जाने वाली लिंग-निर्धारण क्रियाविधि के प्ररूपों के नाम लिखिए । प्रत्येक का एक-एक उदाहरण भी दीजिए ।

- (i) मादा XX का नर XO के साथ  
(ii) मादा ZW का नर ZZ के साथ

How does the gene 'I' control ABO blood groups in humans ? Write the effect the gene has on the structure of red blood cells.

OR

Write the types of sex-determination mechanisms the following crosses show. Give an example of each type.

- (i) Female XX with Male XO  
(ii) Female ZW with Male ZZ

12. मटर के ऐसे दो पौधों के बीच संकरण कराया गया जिनमें पौधे की ऊँचाई के परस्पर विपरीत लक्षण थे । संकरण के परिणाम में पाया गया कि उनमें जनकीय लक्षण 50% ही थे ।

- (i) एक पनेट वर्ग की सहायता से संकरण का हिसाब लगाइए ।  
(ii) किए गए संकरण के प्ररूप का नाम लिखिए । 2

A cross was carried out between two pea plants showing the contrasting traits of height of the plant. The result of the cross showed 50% of parental characters.

- (i) Work out the cross with the help of a Punnett square.  
(ii) Name the type of the cross carried out.

13. वायरस (विषाणु) संक्रमित किसी वांछित किस्म के आलू से स्वस्थ आलू पौधे कैसे प्राप्त किए जा सकते हैं ? समझाइए । 2

How can healthy potato plants be obtained from a desired potato variety which is viral infected ? Explain.

14. DNA सूत्र पर "चिपकदार सिरे" कैसे बनते हैं ? उन्हें यह नाम क्यों दिया गया ? 2  
How are 'sticky ends' formed on a DNA strand ? Why are they so called ?

15. बायोपाइरेसी (जैवअपहरण) किसे कहते हैं ? इसके संबंध में भारतीय संसद ने क्या पहल की थी, लिखिए । 2  
What is Bio piracy ? State the initiative taken by the Indian Parliament towards it.

16. एक ऐसा आयु पिरामिड बनाइए जिसमें मानव जनसंख्या की एक स्थायी स्थिति बनी हुई दिखायी गयी हो । 2  
Construct an age pyramid which reflects a stable growth status of human population.

17. आहार शृंखला का भाग होने के अतिरिक्त, परभक्षियों की और भी महत्वपूर्ण भूमिकाएँ होती हैं । उदाहरण देते हुए ऐसी कोई दो भूमिकाएँ बताइए । 2  
Apart from being part of the food chain, predators play other important roles. Mention any two such roles supported by examples.

18. क्लोनिंग वेक्टर pBR322 में "Ori" तथा "कर्टन स्थल" की भूमिका बताइए । 2  
Write the role of 'Ori' and 'restriction' site in a cloning vector pBR322.

खण्ड - C

SECTION - C

(3 × 9 = 27)

19. एक सामान्य युगल दम्पति के यहाँ एक वर्णांध (रंगांध) बच्चा पैदा हुआ। एक संकरण द्वारा दर्शाइए कि ऐसा कैसे संभव हुआ। इस बच्चे का लिंग क्या था ?

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अथवा

मेंडल ने लक्षणों की वंशागति पर किये गए अपने काम का प्रकाशन 1865 में किया था, परंतु सन् 1900 तक यह बिना पहचान बना रहा। उसके काम को स्वीकारे जाने में देरी क्यों हुई, तीन कारण बताइए।

A colourblind child is born to a normal couple. Work out a cross to show how it is possible. Mention the sex of this child.

OR

Mendel published his work on inheritance of characters in 1865, but it remained unrecognized till 1900. Give three reasons for the delay in accepting his work.

20. एक सामान्य दम्पति में संकरण होने पर एक पुत्र पैदा हुआ जो हीमोफिलियाग्रस्त था तथा एक सामान्य पुत्री पैदा हुई। समय बीतने के साथ जब पुत्री का एक सामान्य पुरुष के साथ विवाह हुआ तो आश्चर्य की बात यह हुई कि धेवता भी हीमोफिलियाग्रस्त था।

(a) इस संकरण को एक वंशावली चार्ट के रूप में दर्शाइए। पुत्री और उसके पति का जीनप्ररूप बताइए।

(b) इस रोग के वंशागति प्रतिरूप से जो निष्कर्ष आप निकालते हैं, लिखिए।

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A cross between a normal couple resulted in a son who was haemophilic and a normal daughter. In course of time, when the daughter was married to a normal man, to their surprise, the grandson was also haemophilic.

(a) Represent this cross in the form of a pedigree chart. Give the genotypes of the daughter and her husband.

(b) Write the conclusion you draw of the inheritance pattern of this disease.

21. अक्सर औरतों को ही दोष दिया जाता रहा है कि उनके मादा बच्चे ही क्यों पैदा होते हैं। परिणामस्वरूप उनके साथ अभद्र व्यवहार तथा उनका बहिष्कार किया जाता रहा है। अगर आपको वैज्ञानिक तौर पर ऐसे मामलों में निहित मूल्यों के बारे में सजगता कार्यक्रम करने हों तो वे आप कैसे करेंगे ?

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Women are often blamed for producing female children. Consequently, they are ill treated and ostracized. How will you address this issue scientifically if you were to conduct an awareness programme to highlight the values involved ?

22. मानव शुक्रधर नलिका के काट दृश्य का एक नामांकित आरेख बनाइए। (छः भागों को नामांकित कीजिए)
- Draw a labelled diagram of the sectional view of a human seminiferous tubule. (six parts to be labelled)

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23. (i) प्राथमिक उत्पादकता किसे कहते हैं ? विभिन्न प्रकार के पारितंत्रों में यह भिन्न-भिन्न क्यों होती है ?
- (ii) सकल और शुद्ध प्राथमिक उत्पादकता में क्या सम्बन्ध होता है, लिखिए।
- (i) What is primary productivity ? Why does it vary in different types of eco-systems ?
- (ii) State the relation between gross and net primary productivity.

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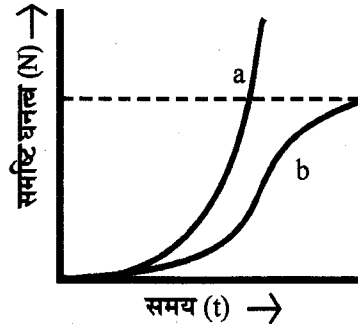
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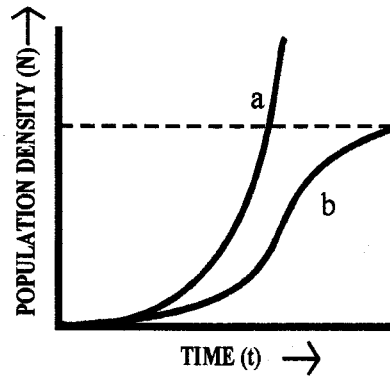
24. नीचे दिये गये ग्राफ का अध्ययन कीजिए और पूछे जा रहे प्रश्नों के उत्तर दीजिए :

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- वक्र (a) एवं (b) में आहार और स्थान की दशा बताइए ।
- परभक्षियों की अनुपस्थिति की दशा में, इन दो में से कौन सा एक वक्र शिकार समष्टि को सही प्रकार से दर्शाएगा ?
- समय को X-अक्ष पर दिखाया गया है और उसके ऊपर एक समांतर बिंदु रेखा दर्शायी गयी है । इस बिंदु रेखा का महत्त्व बताइए ।

Study the graph given below and answer the questions that follow :



- Write the status of food and space in the curves (a) and (b).
- In the absence of predators, which one of the two curves would appropriately depict the prey population ?
- Time has been shown on X-axis and there is a parallel dotted line above it. Give the significance of this dotted line.

25. RNA व्यतिकरण की प्रक्रिया के द्वारा तम्बाकू के पौधों की जड़ों में नीमैटोड के संक्रमण में बाधा डालने में किस प्रकार सहायता मिली ? समझाइए ।

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How did the process of RNA interference help to control the nematode from infecting roots of tobacco plants ? Explain.

26. फ़सल खेतों में पुष्पन काल के दौरान, मधुमक्खियों के छत्तों को क्यों रखा जाता है ? ऐसे किन्हीं दो फ़सल खेतों के नाम लिखिए जहाँ यह प्रचलन होता है ।

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Why are beehives kept in crop field during flowering period ? Name any two crop fields where this is practiced.

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27. (a) दक्षिण भारत में उगाये जाने वाले उष्णकटिबंधीय गन्ने की किस्म का नाम लिखिए । इसके द्वारा उस गन्ने की गुणवत्ता कैसे सुधारी गयी जो उत्तर भारत में उगाया जाता है ?
- (b) निम्नलिखित तालिका में "a", "b" तथा "c" को पहचान कर बताइए वे क्या हैं :

संख्या	फसल	किस्म	कीट पीड़क
1.	ब्रैसिका	पूसा गौरव	(a)
2.	चपटी सेम	पूसा सेम 2 पूसा सेम 3	(b)
3.	(c)	पूसा सावनी पूसा A-4	प्रतान तथा फल छेदक

- (a) Name the tropical sugar cane variety grown in South India. How has it helped in improving the sugar cane quality grown in North India ?
- (b) Identify 'a', 'b' and 'c' in the following table :

No.	Crop	Variety	Insect Pests
1.	Brassica	Pusa Gaurav	(a)
2.	Flat bean	Pusa Sem 2 Pusa Sem 3	(b)
3.	(c)	Pusa Sawani Pusa A-4	Shoot and fruit borer

#### खण्ड - D

#### SECTION - D

(5 × 3 = 15)

28. (a) एक योजना आरेख की सहायता से DNA प्रतिकृति की प्रक्रिया समझाइए ।
- (b) सुकेंद्रकियों में कोशिका-चक्र की किस प्रावस्था में प्रतिकृति होती है ? यदि DNA प्रतिकृति के बाद कोशिका विभाजन नहीं होता तो क्या होगा ?

#### अथवा

- (a) एक उपयुक्त उदाहरण देते हुए डार्विन का जीव-विकास संबंधी सिद्धान्त समझाइए । सिद्धान्त की दो कुंजी अवधारणा (two key concepts) बताइए ।
- (b) उस नीएंडरथल मानव की कोई तीन विशिष्टताएँ लिखिए जो पूर्वी एवं केंद्रीय एशिया के पास रहा करता था ।
- (a) Explain the process of DNA replication with the help of a schematic diagram.
- (b) In which phase of the cell cycle does replication occur in Eukaryotes ? What would happen if cell-division is not followed after DNA replication ?

#### OR

- (a) Explain Darwinian theory of evolution with the help of one suitable example. State the two key concepts of the theory.
- (b) Mention any three characteristics of Neanderthal man that lived in near east and central Asia.

29. (a) उस प्रौद्योगिकी का नाम लिखिए जिसने वैज्ञानिकों की इस काम में मदद की कि वे थोड़ी सी ही कालावधि में वांछित फ़सलों का बड़े पैमाने पर प्रवर्धन कर सकें। उस तकनीक के द्वारा फ़सलों के प्रवर्धन में किये जाने वाले चरणों की सूची बनाइए।

(b) कायिक संकर किस प्रकार प्राप्त किये जाते हैं ?

5

अथवा

(a) मानवों के रोगों में कैंसर एक सर्वाधिक भयानक रोग है। इस रोग के संबंध में “स्पर्श संदमन” तथा “मेटास्टैसिस” क्या होते हैं, समझाइए।

(b) सामान्य कोशिकाओं में पहचाने गए उन जीनों के समूह का नाम लिखिए जिनसे कैंसर पैदा हो सकता है और ऐसा उनके द्वारा कैसे होता है, लिखिए।

(c) ऐसी किन्हीं दो तकनीकों के नाम लिखिए जो भीतरी अंगों के कैंसरों की पहचान में उपयोगी होती हैं।

(d) कैंसर रोगियों को उपचार के अंश के रूप में अक्सर  $\alpha$ -इंटरफ़ेरॉन क्यों दिया जाता है ?

(a) Name the technology that has helped the scientists to propagate on large scale the desired crops in short duration. List the steps carried out to propagate the crops by the said technique.

(b) How are somatic hybrids obtained ?

OR

(a) Cancer is one of the most dreaded diseases of humans. Explain ‘Contact inhibition’ and ‘Metastasis’ with respect to the disease.

(b) Name the group of genes which have been identified in normal cells that could lead to cancer and how they do so ?

(c) Name any two techniques which are useful to detect cancers of internal organs.

(d) Why are cancer patients often given  $\alpha$ -interferon as part of the treatment ?

30. मानव मादा में क्रमशः पीयूष एवं अंडाशयी हार्मोनों के प्रभावों के अंतर्गत रजो चक्र के दौरान होने वाली अंडाशयी एवं गर्भाशयी घटनाएँ समझाइए।

5

अथवा

(a) आवृतबीजी बीजों में भ्रूण परिवर्धन से पहले भ्रूणपोष परिवर्धन क्यों होता है ? परिपक्व ऐल्बुमिनी बीजों में भ्रूणपोष की भूमिका बताइए।

(b) द्विबीजपत्री पौधों के परिपक्व भ्रूण को शामिल करने वाली विभिन्न भ्रूण अवस्थाओं का तीन नामांकित आरेखों की सहायता से वर्णन कीजिए।

Explain the ovarian and uterine events that occur during a menstrual cycle in a human female, under the influence of Pituitary and Ovarian hormones respectively.

OR

(a) Why does endosperm development precede embryo development in angiosperm seeds ? State the role of endosperm in mature albuminous seeds.

(b) Describe with the help of **three** labelled diagrams the different embryonic stages that include mature embryo of dicot plants.





# Question Paper Code 57/1/2

## SECTION – A

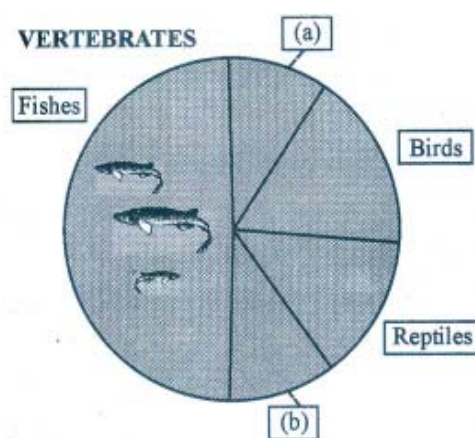
*Q. Nos. 1 - 8 are of one marks each*

**1. State the cause of Accelerated Eutrophication**

Ans. Pollutants from human activities /effluents from industries / effluents from home / sewage / agricultural (chemical) wastes radically accelerate the ageing process.

[1 mark]

**2. Identify 'a' and 'b' in the figure given below representing proportionate number of major vertebrate taxa.**



Ans. (a) Mammals ,

(b) Amphibians =  $\frac{1}{2} + \frac{1}{2}$

[1 mark]

**3. Give an example of an organism that enters 'diapause' and why.**

Ans. (Many species of) Zooplankton, unfavourable condition =  $\frac{1}{2} + \frac{1}{2}$

[1 mark]

**4. Name the two intermediate hosts which the human liver fluke depends on to complete its life cycle so as to facilitate parasitization of its primary host.**

Ans. Snail and Fish =  $\frac{1}{2} + \frac{1}{2}$

[1 mark]

**5. Mention the type of host cells suitable for the gene guns to introduce an alien DNA.**

Ans. Plant cells

[1 mark]

**6. Name any two types of cells which act as 'Cellular barriers' to provide Innate Immunity in humans.**

Ans. Polymorpho-nuclear Leukocytes / Neutrophils / Monocyte , Natural Killer (type of lymphocyte), macrophages

(Any two) =  $\frac{1}{2} + \frac{1}{2}$

[1 mark]



7. **Mention how does DNA polymorphism arise in a population.**

Ans. Inheritable mutations (in a population) , at high frequency =  $\frac{1}{2} + \frac{1}{2}$

[1 mark]

8. **Write the name of the organism that is referred to as the ‘Terror of Bengal’.**

Ans. *Eicchornia crassipes* / Water Hyacinth

[1 mark]

### SECTION - B

9. **Name the organic materials the exine and intine of an angiosperm pollen grains are made up of. Explain the role of exine.**

Ans. Exine - Sporopollenin =  $\frac{1}{2}$

Intine - Cellulose and pectin =  $\frac{1}{2}$

Role - most resistant organic material // can withstand high temperature , acid and alkali = 1

[2 marks]

10. (i) **Name the scientist who suggested that the genetic code should be made of a combination of three nucleotides.**

(ii) **Explain the basis on which he arrived at this conclusion.**

Ans. (i) George Gamow =  $\frac{1}{2}$

(ii) There are four bases and 20 amino acids =  $\frac{1}{2}$

(There should be atleast 20 different genetic codes for these 20 amino acids)

Only possible combinations that would meet the requirement is combinations of 3 bases that will give 64 codons = 1

[2 marks]

11. **How does the gene ‘I’ control ABO blood groups in humans ? Write the effect the gene has on the structure of red blood cells.**

[2 marks]

Ans. – Gene ‘I’ has three different alleles  $I^A, I^B, i = \frac{1}{2}$

–  $I^A$  produces A type of sugar / Antigen  $\longrightarrow$  A group  
–  $I^B$  produces B type of sugar / Antigen  $\longrightarrow$  B group } =  $\frac{1}{2}$

– i - No sugar - O group =  $\frac{1}{2}$

– Structure - sugar polymers protrude from the surface of plasma membrane of RBCs =  $\frac{1}{2}$

[2 marks]

OR

**Write the types of sex-determination mechanisms the following crosses show. Give an example of each type.**

(i) **Female XX with Male XO**

(ii) **Female ZW with Male ZZ**



Ans. (i) Male heterogamety , Grasshopper =  $\frac{1}{2} + \frac{1}{2}$

(ii) Female heterogamety , Birds =  $\frac{1}{2} + \frac{1}{2}$

[2 marks]

12. A cross was carried out between two pea plants showing the contrasting traits of height of the plant. The result of the cross showed 50% of parental characters.

(i) Work out the cross with the help of a Punnett square.

(ii) Name the type of the cross carried out.

Ans. (i)  $Tt \times tt = \frac{1}{2}$

	Ⓙ	Ⓣ	
Ⓣ	Tt	tt	}
Ⓣ	Tt	tt	
	= $\frac{1}{2}$		

(ii) Test cross =  $\frac{1}{2}$

[2 marks]

13. How can healthy potato plants be obtained from a desired potato variety which is viral infected ? Explain.

Ans. Remove meristem (apical or axillary) and grow = 1 ,

in vitro / sterile and special nutrient medium / culture medium = 1

[2 marks]

14. How are 'sticky ends' formed on a DNA strand ? Why are they so called ?

Ans. Restriction enzymes cut the strands of the DNA , a little away from the centre of the palindromic sites , but between the same two bases on opposite strands. =  $\frac{1}{2} \times 3 = 1\frac{1}{2}$

They form hydrogen bonds with their complementary cut counterparts. =  $\frac{1}{2}$

[2 marks]

15. What is Bio piracy? State the initiative taken by the Indian Parliament towards it.

Ans. (i) Use of bio resources without authorisation , compensation =  $\frac{1}{2} + \frac{1}{2}$

(ii) The govt has cleared patent terms , emergency provisions , research and development initiative (*Any two*) =  $\frac{1}{2} + \frac{1}{2}$

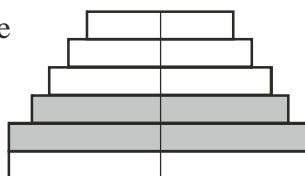
[2 marks]

16. Construct an age pyramid which reflects a stable growth status of human population.

Ans. (1/2) Post-reproductive

(1/2) Reproductive

(1/2) Pre-reproductive



Construction of pyramid =  $\frac{1}{2}$

**NOTE : Proceed marking only when pyramid is correctly drawn.**

[2 marks]



17. Apart from being part of the food chain, predators play other important roles. Mention any two such roles supported by examples.

- Ans. - Keeps prey population under control  
 - Biological control methods  
 - Maintains species diversity  
 - Reduces intensity of competition among prey species

(Any two roles and relevant examples each)

[2 marks]

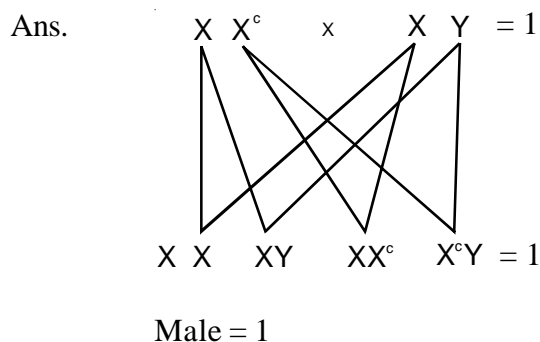
18. Write the role of 'Ori' and 'restriction' site in a cloning vector pBR322.

- Ans. Ori - site where replication starts , responsible for controlling copy number =  $\frac{1}{2} + \frac{1}{2}$   
 Restriction site - site of ligation of alien / foreign DNA , in one of the two antibiotic resistance site / coding sequence of  $\alpha$  galactosidase =  $\frac{1}{2} + \frac{1}{2}$

[2 marks]

### SECTION - C

19. A colourblind child is born to a normal couple. Work out a cross to show how it is possible. Mention the sex of this child.



[3 marks]

OR

Mendel published his work on inheritance of characters in 1865, but it remained unrecognized till 1900. Give three reasons for the delay in accepting his work.

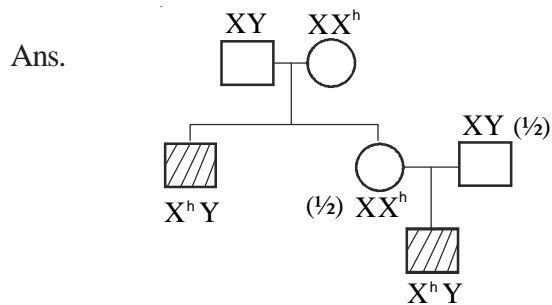
- Ans. - The communication was not easy in those days and his work could not be widely publicised.  
 - His concept of genes as stable and discrete units that controlled the expression of traits and of the pair of alleles which did not 'blend' with each other was not accepted by contemporaries as an explanation for the apparently continuous variation seen in nature.  
 - Mendel's approach of using mathematics to explain biological phenomena was totally new and unacceptable to many of the biologists of his time.  
 - Though Mendel's work suggested that factors (genes) were discrete units, he could not provide any physical proof for the existence of factors and what they were made of.

(Any three points) = 1 + 1 + 1

[3 marks]

20. A cross between a normal couple resulted in a son who was haemophilic and a normal daughter. In course of time, when the daughter was married to a normal man, to their surprise, the grandson was also haemophilic.

- (a) Represent this cross in the form of a pedigree chart. Give the genotypes of the daughter and her husband.  
 (b) Write the conclusion you draw of the inheritance pattern of this disease.



Construction of pedigree chart = 1

- (b) Sex - linked recessive inheritance pattern = 1

[3 marks]

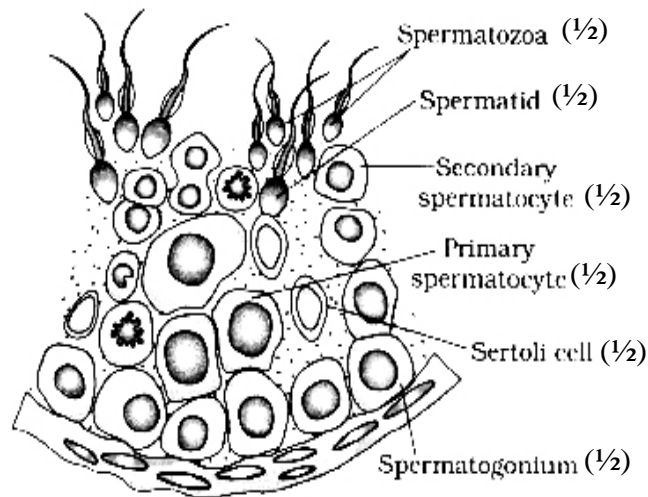
21. Women are often blamed for producing female children. Consequently, they are ill treated and ostracized. How will you address this issue scientifically if you were to conduct an awareness programme to highlight the values involved ?

- Ans. – Male produces two types of sperms ( X & Y type in the ratio 1 : 1) , Female produces only one type of ovum (X type) , hence the sex of baby is determined by the type of sperm fertilising the ovum therefore women should not be blamed // A genetic cross showing sex determination in human beings covering above value points can be considered in lieu of the above explanation =  $\frac{1}{2} \times 3$
- Sensitivity towards community / Social awareness / Self discipline / Responsible behaviour / Leadership quality / Caring attitude / Responsible attitude towards society / Concern for others / Sharing of knowledge or information / Presence of mind / Being proactive / any other relevant value.

(Any three values) =  $\frac{1}{2} \times 3$

[3 marks]

22. Draw a labelled diagram of the sectional view of a human seminiferous tubule (six parts to be labelled)



(Any six) =  $\frac{1}{2} \times 6$

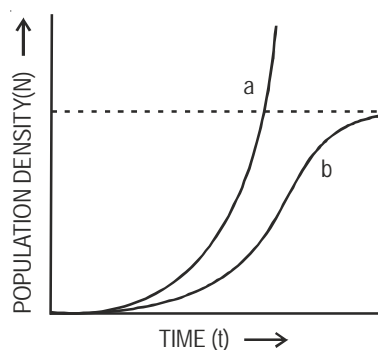
[3 marks]

23. (i) **What is primary productivity ? Why does it vary in different types of eco - systems ?**
- (ii) **State the relation between gross and net primary productivity.**

- Ans. (i) – Production of biomass / energy per unit area in a given time (per year) by plants during photosynthesis. = 1
- Depends upon - plant species inhabiting a particular area , environmental factors availability of nutrients , photosynthetic capacity of plants (**Any two**) =  $\frac{1}{2} + \frac{1}{2}$
- (ii)  $GPP - R = NPP = 1$

[3 marks]

24. **Study the graph given below and answer the question that follow :**



- (i) **Write the status of food and space in the curves (a) and (b).**
- (ii) **In the absence of predators, which one of the two curves would appropriately depict the prey population ?**
- (iii) **Time has been shown on X-axis and there is a parallel dotted line above it. Give the significance of this dotted line.**

- Ans. (i) a - unlimited food and space =  $\frac{1}{2}$   
 b - limited food and space =  $\frac{1}{2}$
- (ii) Curve a = 1
- (iii) Carrying capacity / a given habitat has enough resources to support maximum possible number - beyond which no further growth is possible = 1

[3 marks]

**25. How did the process of RNA interference help to control the nematode from infecting roots of tobacco plants ? Explain.**

Ans. Using *Agrobacterium* vectors , nematode specific genes introduced into host plant , produced sense - antisense RNA in host cells , ds RNA - initiated RNAi , silenced specific mRNA of nematode , parasite could not survive in transgenic host =  $\frac{1}{2} \times 6$

[3 marks]

**26. Why are beehives kept in crop field during flowering period ? Name any two crop fields where this is practiced.**

Ans. To increase pollination efficiency , increase crop yield / honey yield = 1 + 1  
 Sunflower , *Brassica* , apple , pear

(Any two) =  $\frac{1}{2} + \frac{1}{2}$

[3 marks]

- 27. a) Name the tropical sugar cane variety grown in South India. How has it helped in improving the sugar cane quality grown in North India ?**
- b) Identify 'a', 'b' and 'c' in the following table :**

No.	Crop	Variety	Insect Pests
1.	<i>Brassica</i>	Pusa Gaurav	(a)
2.	Flat bean	Pusa Sem 2 Pusa Sem 3	(b)
3.	(c)	Pusa Sawani Pusa A-4	Shoot and fruit borer

Ans. (a) *Saccharum officinarum* , crossed with , North Indian variety (*Saccharum barberi*) to increase quality =  $\frac{1}{2} \times 3$

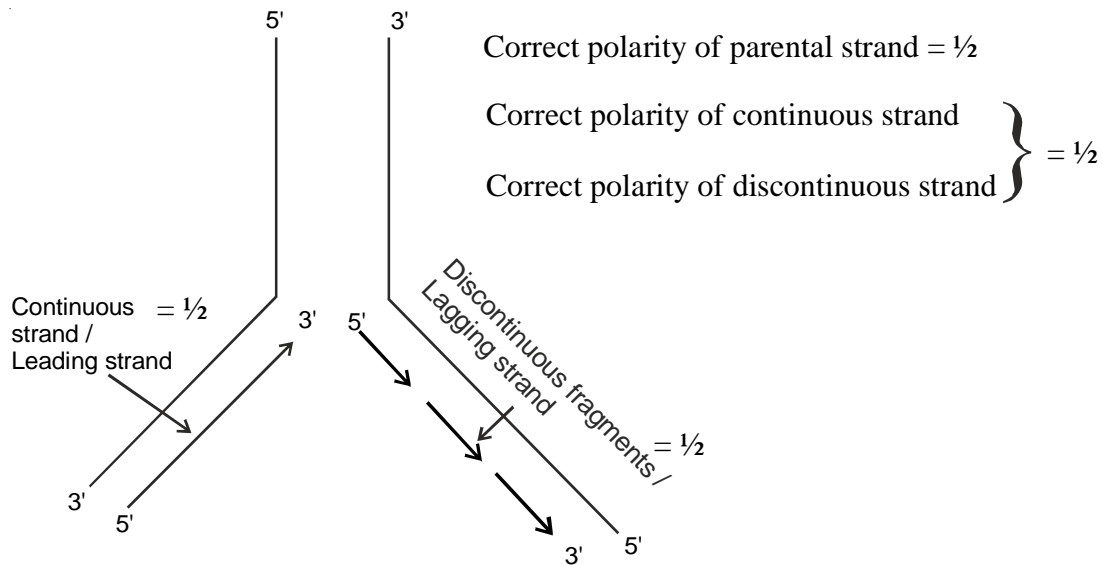
- (b) (a) Aphids  
 (b) Jassids / aphids / fruit borer  
 (c) Okra (Bhindi) =  $\frac{1}{2} \times 3$

[ $1\frac{1}{2} + 1\frac{1}{2} =$  marks]

SECTION - D (5 × 3 = 15)

28. a) Explain the process of DNA replication with the help of a schematic diagram.  
 b) In which phase of the cell cycle does replication occur in Eukaryotes? What would happen if cell-division is not followed after DNA replication?

- Ans. (a) - Replication of DNA begins at ori, to form a replication fork =  $\frac{1}{2} + \frac{1}{2}$   
 - DNA dependant DNA polymerase forms a new strand in 5' → 3' direction =  $\frac{1}{2}$   
 - Role of DNA ligase is to join discontinuously synthesised fragments =  $\frac{1}{2}$



- b. S phase =  $\frac{1}{2}$   
 Polyploidy =  $\frac{1}{2}$

[5 marks]

OR

- (a) Explain Darwinian theory of evolution with the help of one suitable example. State the two key concepts of the theory.  
 (b) Mention any three characteristics of Neanderthal man that lived in near east and central Asia.

- Ans : (a)
- Competition
  - Useful variations
  - Survival of the fittest
  - Natural selection
  - Relevant example
  - Explanation of the above points  $\frac{1}{2} \times 5 = 2\frac{1}{2}$

Key concepts

- Branching descent  $\frac{1}{2}$
- Natural Selection  $\frac{1}{2}$

- (b) Neanderthal man



- Brain size 1400 cc
- They used hides to protect their bodies
- They buried their dead  $\frac{1}{2} \times 3 = 1\frac{1}{2}$

[ $3\frac{1}{2} + 1\frac{1}{2} = 5$  marks]

29. (a) **Name the technology that has helped the scientists to propagate on large scale the desired crops in short duration. List the steps carried out to propagate the crops by the said technique.**
- b) **How are somatic hybrids obtained ?**

Ans. (a) Tissue culture / micro propagation = 1

Explants, grown in a test tube , under sterile condition , in special nutrient medium / culture medium  $\frac{1}{2} \times 4 = 2$

- (b) Isolated single cells , digests cell walls , to obtain protoplast from two different varieties , fusion of protoplast.  $\frac{1}{2} \times 4 = 2$

[5 marks]

**OR**

- (a) **Cancer is one of the most dreaded diseases of humans. Explain ‘Contact inhibition’ and ‘Metastasis’ with respect to the disease.**
- (b) **Name the group of genes which have been identified in normal cells that could lead to cancer and how they do so ?**
- (c) **Name any two techniques which are useful to detect cancers of internal organs.**
- (d) **Why are cancer patients often given  $\alpha$ -interferon as part of the treatment ?**

Ans. (a) Contact with other cells inhibits their uncontrolled growth = 1

tumour cells reach distant sites, through blood. =  $\frac{1}{2} + \frac{1}{2}$

- (b) Proto oncogenes =  $\frac{1}{2}$

when activated under certain condition could lead to oncogenic transformation of the cells. =  $\frac{1}{2}$

- (c) Biopsy / radiography / CT / MRI

(Any 2) =  $\frac{1}{2} + \frac{1}{2}$

- (d) It activates immune system, destroys tumour =  $\frac{1}{2} + \frac{1}{2}$

[5 marks]

30. **Explain the ovarian and uterine events that occur during a menstrual cycle in a human female, under the influence of Pituitary and Ovarian hormones respectively.**

Ans. Release of FSH and LH from pituitary , during follicular phase or between 5th - 14th day of menstrual cycle leads to growth of primary follicle to Graafian follicle (G.F.) in the ovary , Estrogen from growing follicle helps proliferation of uterine endometrium or its repair , high level of LH at middle / 14th day of the menstrual cycle leads to rupture of GF causing release of ovum / ovulation , remaining

cells of GF transform into Corpus Luteum (CL) under the influence of LH, CL secretes progesterone that maintains endometrium in preparation for pregnancy, level of FSH and LH fall due to rise of progesterone and estrogen (25th day of the cycle), leading to degeneration of CL, level of progesterone falls, leading to disintegration of uterine endometrium and menstruation starts (0-5 day of the cycle)

$$= \frac{1}{2} \times 10$$

[ $\frac{1}{2} \times 10 = 5$  marks]

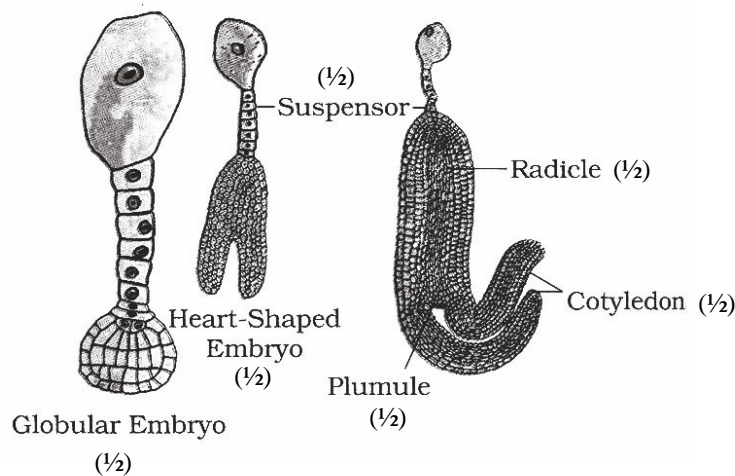
OR

- (a) Why does endosperm development precede embryo development in angiosperm seeds? State the role of endosperm in mature albuminous seeds.
- (b) Describe with the help of three labelled diagrams the different embryonic stages that include mature embryo of dicot plants.

Ans. (a) As it provides nutrition for the developing embryo / It is an adaptation to provide assured nutrition to the developing embryo =  $\frac{1}{2}$

Provides nutrition during seed germination =  $\frac{1}{2}$

- (b) The zygote (in the embryo sac) divides to give rise to pro embryo and subsequently to the globular, heart shaped and mature embryo as shown in the diagram = 1



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

[1 + 4 = 5 marks]

