CBSE · CLASS 12 · BIOLOGY

CBSE Class 12 Biology Important Questions 2027

53 question patterns that repeated across past papers · the years show every time each was asked

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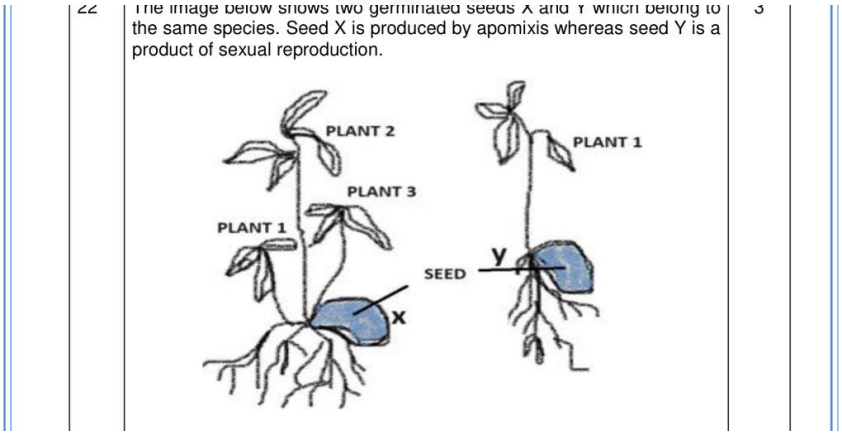
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Sexual Reproduction in Flowering Plants

1. Apomixis / polyembryony / parthenocarpy

Asked 2× · Sample 2025, Sample 2026 · 3/4 marks

The image below shows two germinated seeds X and Y which belong to the same species. Seed X is produced by apomixis whereas seed Y is a product of sexual reproduction.
A. Write the number of embryo(s), embryo sac(s) and ovules in the ovary of seed X.
B. How multiples embryos are formed in citrus fruits?
C. What advantage will plants developed from seed Y have over seed X?
[For visually impaired students] Each Mango fruit contains one seed. Two mango seeds, X and Y were sown in the soil. From Seed X, 3 plant saplings germinated but from seed Y only 1 plant sapling germinated. A. For seed X which is apomictic, calculate the number of: i) Embryo(s) ii) Embryo sac(s) iii) Ovules in this seed's ovary B. How multiples embryos are formed in citrus fruits? C. What advantage will plants developed from seed Y have over seed X?



2. Gamete/meiosis number calculation

Asked 3× · Board 2023, Board 2025, Sample 2025 · 1 marks

How many pollen grains and ovules are likely to be formed in the anther and the ovary of an angiosperm bearing 50 microspore mother cells and 50 megaspore mother cells respectively ?
(A) 100, 25
(B) 200, 50
(C) 50, 50
(D) 200, 100

3. Artificial hybridization / emasculation

Asked 2× · Board 2026, Sample 2026 · 1/2 marks

Identify the plant in which emasculation is not required for artificial hybridization. (A) Rice (B) Wheat (C) Pea (D) Papaya

4. Double fertilisation: fate of male nuclei / PEN

Asked 2× · Board 2023, Sample 2026 · 1/2 marks

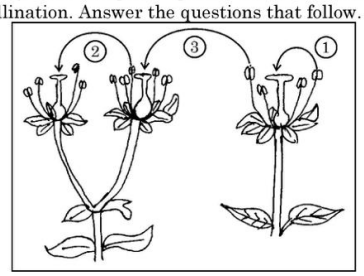
The primary endosperm nucleus is formed by fusion of which of the following?
A. A male gamete and a female gamete
B. A male gamete and two polar nuclei
C. A female gamete and two synergids
D. Two male gametes and an egg cell

5. Modes of pollination diagram + aquatic pollination

Asked 2× · Board 2023, Board 2025 · 5 marks

Student to attempt either option-(A) or (B) :
(A) (a) Distinguish between the two cells enclosed in a mature male gametophyte of an angiosperm. (b) Study the diagram given below showing the modes of pollination. Answer the questions that follow. [Diagram: three flowers showing pollen transfer methods labelled 1, 2 and 3.] (i) The given diagram shows three methods of pollen transfer in plants. Examine them carefully and write the technical terms used for pollen transfer methods '1', '2' and '3'. (ii) How do the following plants achieve pollination successfully ? (a) Water lily (b) Vallisneria. (iii) Write advantages of pollen transfer in method '3'.
OR
(B) Given below is the diagram of human ovum surrounded by a few sperms. Observe the diagram and answer the questions that follows : [Diagram: ovum with zona pellucida, perivitelline space, cells of the corona radiata, and sperms labelled P, Q and R.] (i) Compare the fate of sperms 'P', 'Q' and 'R' shown in the diagram. (ii) Write the role of Zona pellucida in this process. (iii) Analyse the changes occurring in the ovum after the entry of sperm. (iv) How acrosome and middle piece of a human sperm are able to play an important role in human fertilization ?

32. Student to attempt **either** option-(A) or (B) :
(A) (a) Distinguish between the two cells enclosed in a mature male gametophyte of an angiosperm.
(b) Study the diagram given below showing the modes of pollination. Answer the questions that follow.



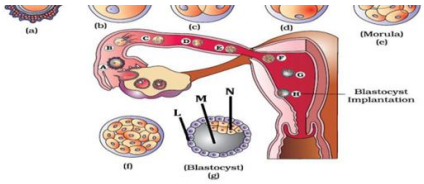
57/1/1 ~ 21 | P a g e P.T.O.

Human Reproduction

6. Trace fertilisation to implantation

Asked 2× · Board 2026, Sample 2026 · 3/5 marks

Given below is a figure showing transport of ovum, fertilisation and passage of growing embryo through fallopian tube in a human female. Answer the questions that follow:
(i) What will be the ploidy of cells shown in (a) and (c) stage in the figure given below?
(ii) What will happen if component L as shown in the figure (g) given below does not attach properly to the endometrium?
(iii) In a pregnant mother (case X), during early pregnancy, the fertilised egg splits into two embryos at stage C shown in the figure given below, resulting in the formation of twins. Will the genome of cells of these two embryos exhibit variation? Justify your answer.
[For Visually impaired students: Explain the events and journey of an ovum in the fallopian tube of a mother from fertilisation stage to implantation.]



	For Visually impaired students Explain the events and journey of an ovum in the fallopian tube of a mother from fertilisation stage to implantation.	
24	In guinea pigs, black coat colour (G) dominates over white (g) and brown eyes (B) dominate over blue (b). The alleles for coat colour and eye colour	3

7. First meiotic division in oogenesis

Asked 2× · Board 2026, Sample 2025 · 2/3 marks

Identify the stage of follicle where primary oocyte undergoes first meiotic division. Also mention the products of this division.

8. hCG and placental hormones

Asked 2× · Board 2024, Sample 2025 · 1/2 marks

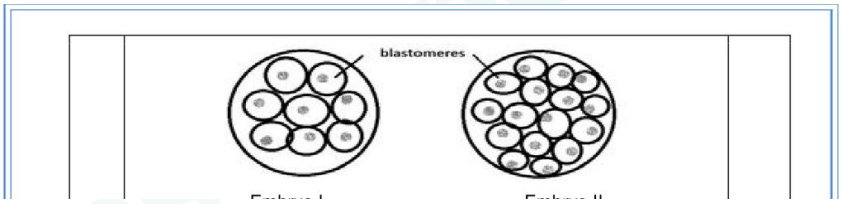
Attempt either option A or B.
A. (i) A blood test reported negative for hCG. What does negative hCG imply? Name the tissue which produces hCG?
(ii) If a blood test reported positive for hCG in a person, then which other hormones would also be secreted by the tissue secreting hCG?
OR
B. (i) The human male ejaculates about 200 to 300 million sperm during a coitus, however the ovum is fertilized by only one sperm. How does the ovum block the entry of additional sperms?
(ii) All copulations will not lead to fertilization. Why?

Reproductive Health

9. Suggest ART for infertility cases

Asked 2× · Board 2026, Sample 2025 · 5 marks

Attempt either option A or B.
A. Cryptorchidism is a condition in which the testes fail to descend into the scrotum. It can also lead to compromised Sertoli cell function and has an impact on Leydig cell function.
(i) Identify at least 3 parameters of male fertility which get affected due to cryptorchidism.
(ii) Which process will be affected if mature spermatids are not released from Sertoli cells?
(iii) Name and explain one assisted reproductive technology (ART process) in which the sperm/semen is used to assist fertilization.
(iv) Name and explain the assisted reproductive technology that should be used to complete the development of embryos I and II shown in the figure given below (Embryo I with fewer blastomeres and Embryo II with more blastomeres).
[For visually impaired students] (iv) An infertile couple decided to use ART to conceive. After IVF they decided for Embryo transfer of the following 2 embryos. Embryo 1 consisted of 8 blastomeres and Embryo 2 consisted of 16 blastomeres. Name and explain the techniques they should deploy to complete further development of the given embryos.
OR
B. (i) Explain the significance of each of the following features present in plants given below: a) In rose-bay plant the stamens ripen before the stigma. b) In certain species of primrose, the flowers have short stamen and long style. c) The bisexual flower of mustard exhibits rejection of self-pollen grain. (ii) Explain how autogamy is prevented in castor and papaya plant respectively.



10. Select/match contraceptive to need or mode

Asked 2× · Board 2023, Sample 2026 · 1/3 marks

Suggest a suitable contraceptive device for the following cases with justification.
(i) Mohini does not want to take the risk of conception and sexually transmitted infections (STIs).
(ii) Lalita has two children and does not want any more children.
(iii) Geeta wants a contraceptive that she can take till she wants to avoid conception and can resume back to her fertile life without the intervention of the doctor. Also, it should have a lower failure rate.

11. Oral contraceptive pills / Saheli

Asked 2× · Board 2024, Board 2025 · 1/3 marks

Two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the appropriate option: (A) Both (A) and (R) are true and (R) is the correct explanation of (A). (B) Both (A) and (R) are true, but (R) is not the correct explanation of (A). (C) (A) is true, but (R) is false. (D) (A) is false, but (R) is true.
Assertion (A) : Saheli is the World's first non-steroidal oral contraceptive pill.
Reason (R) : It has been developed by National Institute of Immunology, New Delhi.

12. ART techniques (abbreviations/steps)

Asked 2× · Board 2023, Board 2024 · 2/3 marks

Write the basic steps followed in the Assisted Reproductive Technologies (ART) programme to help childless couples. Why is it also known as test tube baby programme ?

Principles of Inheritance and Variation

13. Heterogamety type (XO/ZW)

Asked 2× · Board 2023, Board 2026 · 1/2 marks

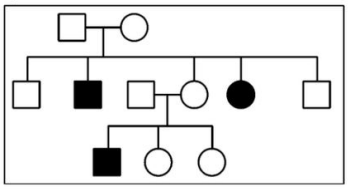
Analyse the following two cases of sex determination in different organisms: Case I: Males have (XO) sex chromosomes and females have two copies of same sex chromosome (XX). Case II: Females have two different sex chromosomes (ZW) and males have two copies of same sex chromosome (ZZ). Identify the type of heterogamety in each case, giving one example of each.

14. Pedigree chart analysis

Asked 2× · Board 2023, Board 2026 · 3 marks

(a) What is pedigree analysis? Mention its importance in human genetics. (2 pts.) (b) Analyse the following pedigree and write the (i) Pattern of inheritance. (ii) Give one example of disease showing such an inheritance pattern.

(ii) इस प्रकार के वंशावली प्रतिरूप (पैटर्न) में दर्शाए गए एक रोग का उदाहरण (नाम) भी लिखिए। ½



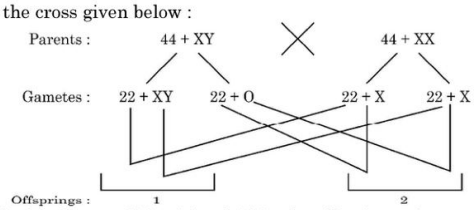
15. Chromosomal aneuploidy disorders

Asked 2× · Board 2024, Board 2025 · 1/2 marks

Study the cross given below : [Diagram: Parents 44+XY crossed with 44+XX; Gametes 22+XY, 22+O, 22+X, 22+X; Offsprings labelled '1' and '2'.] Identify the abnormalities '1' and '2' in the offsprings of a cross done between a couple and distinguish between them.

productivity in an ecosystem.

19. Study the cross given below :



Identify the abnormalities '1' and '2' in the offsprings of a cross done between

16. Assertion-Reason: linkage vs independent assortment

Asked 2× · Board 2024, Board 2025 · 1 marks

Two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the appropriate option: (A) Both (A) and (R) are true and (R) is the correct explanation of (A). (B) Both (A) and (R) are true, but (R) is not the correct explanation of (A). (C) (A) is true, but (R) is false. (D) (A) is false, but (R) is true.
Assertion (A) : When the two genes in a dihybrid cross are situated on the same chromosome, the proportion of parental gene combinations is much higher than non-parental type.
Reason (R) : Higher parental gene combinations can be attributed to crossing over between two genes.

17. Colour-blindness inheritance cross

Asked 2× · Board 2024, Board 2025 · 1/3 marks

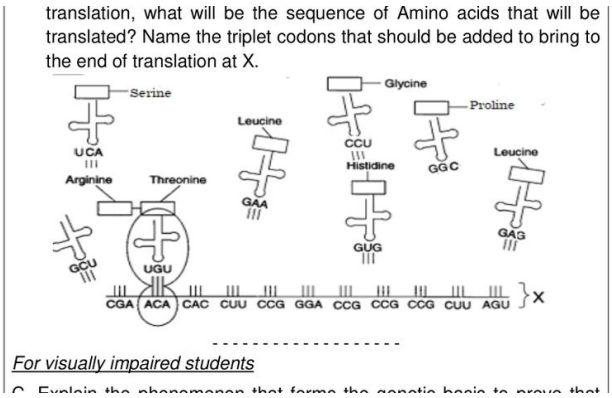
A man whose father was colour-blind marries a woman who had a colour-blind mother and normal father. What percentage of male children of this couple will be colour-blind ?
(A) 25%
(B) 0%
(C) 50%
(D) 75%

Molecular Basis of Inheritance

18. Construct transcription unit + processing

Asked 2× · Board 2026, Sample 2026 · 5 marks

A. Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below: 3'- ATGCATGCATAC -5' (template strand, read 3' to 5').
B. How is transcription a more complex process in eukaryotic cells? Explain the additional processes that a precursor mRNA has to undergo in these organisms.
OR
A. Explain the process of aminoacylation of tRNA. Mention its role in translation.
B. How do ribosomes in the cells act as factories for protein synthesis?
C. Given below is a strand of mRNA undergoing the process of translation, what will be the sequence of Amino acids that will be translated? Name the triplet codons that should be added to bring to the end of translation at X. (mRNA read on ribosome: CGA ACA CAC CUU CCG GGA CCG CCG CCG CUU AGU ... X; charged tRNAs shown: Serine-UCA, Arginine-GCU, Threonine-UGU, Leucine-GAA, Histidine-CCU, Glycine-GGC, Proline-GUG/GGC, Leucine-GAG)
[For visually impaired students: A. Why are both the strands not copied during transcription? B. How is transcription a more complex process in eukaryotic cells? Explain the additional processes that a precursor mRNA has to undergo in these organisms. OR C. Explain the phenomenon that forms the genetic basis to prove that codon is a triplet and it is read in a contiguous manner.]



19. Experiment proving stability of genetic material

Asked 2× · Board 2024, Sample 2026 · 1/5 marks

The experimental proof on the thermal stability of genetic material was first provided by experiments of
A. Hershey and Chase
B. Meselson and Stahl
C. Frederick Griffith
D. Jacob an Monod

20. Given DNA strand, write the mRNA

Asked 2× · Board 2025, Sample 2025 · 1 marks

The sequence of nitrogenous bases in a segment of a coding strand of DNA is 5' - AATGCTAGGCAC - 3'. Choose the option that shows the correct sequence of nitrogenous bases in the mRNA transcribed by the DNA.
(A) 5' - UUACGAACCGAG - 3'
(B) 5' - AAUGCUAGGCAC - 3'
(C) 5' - UUACGUACCGUG - 3'
(D) 5' - AACGUAGGCAGC - 3'

21. lac operon regulation

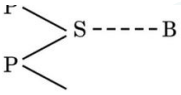
Asked 2× · Board 2023, Sample 2025 · 1/4 marks

In E.coli, the lac operon gets switched on when lactose is
A. present in the medium and it binds to the repressor.
B. not present in the medium and the repressor binds to the operator.
C. not present in the medium and RNA polymerase binds to the operator.
D. Active lactose present in the medium binds to RNA polymerase.

22. Bonds within a nucleotide

Asked 2× · Board 2024, Board 2026 · 1/2 marks

The type of bond represented by the dotted line '– – – – –' in a schematic polynucleotide chain [diagram of a polynucleotide backbone showing P (phosphate) linked to S (sugar), with each S connected to B (base) by a dotted line] is : (A) Hydrogen bond (B) Peptide bond (C) N-glycosidic linkage (D) Phosphodiester bond



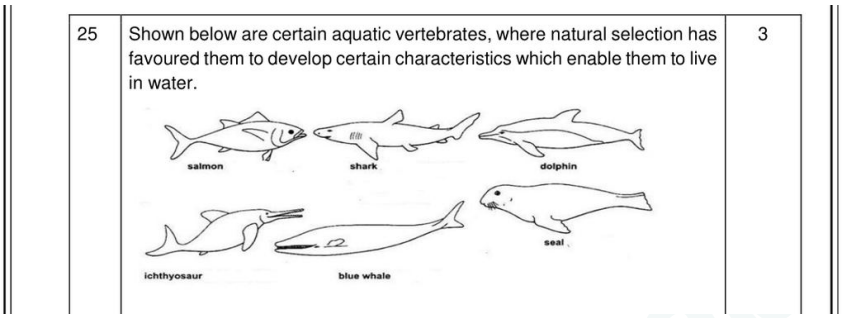
(A) Hydrogen bond (B) Peptide bond
(C) N-glycosidic linkage (D) Phosphodiester bond

Evolution

23. Convergent vs divergent evolution

Asked 2× · Board 2025, Sample 2026 · 3 marks

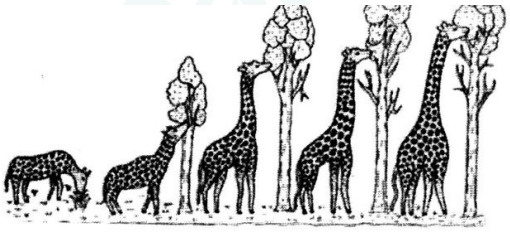
Shown below are certain aquatic vertebrates (salmon, shark, dolphin, ichthyosaur, blue whale, seal), where natural selection has favoured them to develop certain characteristics which enable them to live in water.
A. Name and explain the phenomenon exhibited by the above animals.
B. Which one of the above is the most primitive one? What is its significance?
[For Visually impaired students: A. What are the basic conceptual similarities and differences between Lamarckian and Darwinian theory of evolution? B. Give an example that supports any one of the above two theories.]



24. Lamarck's use and disuse (giraffe)

Asked 2× · Board 2024, Board 2026 · 1/2 marks

Observe the picture given below [illustration of giraffes with progressively longer necks feeding on trees]. Name the naturalist and write the explanation given by him that evolution of life forms had occurred on the basis of this example.



25. Sequence and ancestors of human evolution

Asked 2× · Board 2023, Board 2025 · 1/3 marks

Evolution of modern man involves the following man-like primates. Choose the correct series of human evolution.
(A) Dryopithecus -> Homo erectus -> Australopithecines -> Homo sapiens
(B) Australopithecines -> Homo erectus -> Neanderthal -> Homo sapiens
(C) Australopithecines -> Ramapithecus -> Dryopithecus -> Homo sapiens
(D) Homo erectus -> Australopithecines -> Homo sapiens -> Neanderthal

Human Health and Disease

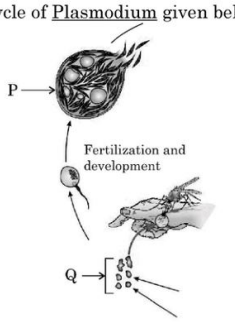
26. Malaria / Plasmodium life cycle, hosts and transmission

Asked 5× · Board 2022, Board 2025, Board 2026, Sample 2025, Sample 2026 · 1/2/3/4/5 marks

Study a part of life cycle of Plasmodium given below : [Diagram of Plasmodium life cycle showing label P, an oocyst/fertilization and development stage, an Anopheles mosquito, and label Q.] Answer the following questions : (a) Name the infective stage of Plasmodium that is stored in the female Anopheles mosquito. (b) Where does fertilization and development of parasite take place ? (c) Identify labels P and Q in the given diagram. (d) Asexual and sexual phase of the life cycle of the Plasmodium takes place in two different hosts. Write their names.

(b) Name the restriction endonuclease that recognizes this sequence.
(c) How are sticky ends produced ? Mention their role.

23. Study a part of life cycle of Plasmodium given below :



57/1/1 ~ 13 | P a g e P.T.O.

27. Active vs passive immunity and vaccination

Asked 3× · Board 2023, Board 2024, Sample 2026 · 2/4/5 marks

[Case context] The graph below shows the Antibody concentration in young calves. Study the graph and answer the questions that follow: (Graph: Passive immunity (Colostrum) peaks early then falls; Active immunity (Immune system) rises after a high risk period between 1 d and 14 d.)

A. What do you think is the difference between passive and active immunity in this case? (1)

B. What kind of immunity will be observed when a vaccine is administered to the calf and why? (2)

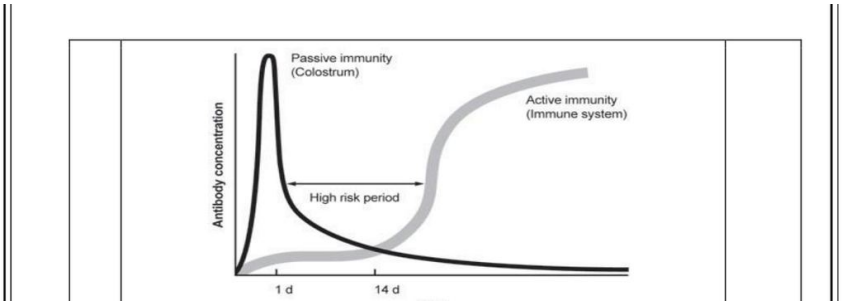
Attempt either subpart C or D.

C. What kind of trend does passive immunity show and why? (1)

OR

D. Why does active immunity start after 14 days as per the above graph?

[For visually impaired students: The antibody concentration in a young calf was studied. It was found that the antibodies derived from colostrum (passive immunity) decreased from day 1 to 14, while the antibodies derived from immune cells (active immunity) increased between day 1 to day 14 and remained steady thereafter. A. What do you think is the difference between passive and active immunity in this case? (1) B. What kind of immunity will be observed when a vaccine is administered to the calf and why? (2) Attempt either subpart C or D. C. What kind of trend does passive immunity show and why? (1) OR D. Why does active immunity start after 14 days as per the above graph?]



28. Humoral vs cell-mediated immune response

Asked 2× · Board 2025, Board 2026 · 1/2 marks

(a) Define Humoral immune response. (b) Name any two types of antibodies found to give humoral immune response in humans.

29. Opioids - morphine and heroin

Asked 2× · Board 2025, Board 2026 · 2/3 marks

(a) Mention the scientific name of the source plant and the part from which opioids are extracted. (b) How are morphine and heroin related? Mention the effect each one of them has on human body.

30. Cancer - tumour types, oncogenes, detection

Asked 2× · Board 2023, Board 2024 · 3/5 marks

(a) (i) Name and explain the property present in normal cells but is lost in cancer cells. (ii) All normal human cells have genes that may become cancerous under certain conditions. Name them and explain how. (iii) State the role of the following techniques in detection and diagnosis of cancer : (1) Biopsy and Histopathology (2) Magnetic Resonance Imaging. OR (b) Large quantities of sewage are generated every day in cities as well as in towns and are treated in Sewage Treatment Plants (STPs) to make them less polluting. Given below is the flow diagram of stages of STP [flow diagram: Primary effluent passed into large aeration tanks → Effluent passed into settling tanks to form 'sediment']. (i) (1) Why is primary effluent passed into large aeration tanks ? (2) What is the 'sediment' formed, referred to as ? Mention its significance. (3) Explain the final step in the settling tank before the treated effluent is released into water bodies. (ii) Name any two organisms commonly used as biofertilisers, belonging to different kingdoms. Write how each one acts as a biofertiliser.

31. Disease - pathogen - symptom / affected organ identification

Asked 2× · Board 2022, Board 2024 · 2/3 marks

Identify A, B, C, D, E and F in the table given below : Name of Human Disease | Causative Organism | Symptoms. Pneumonia | Streptococcus | 'A'; Typhoid | 'B' | High fever, weakness, headache, stomach pain; Common Cold | Rhino virus | 'C'; Ringworm | 'D' | Dry scaly lesions on body parts, redness, itching; Ascariasis | Ascaris | 'E'; 'F' | Entamoeba histolytica | Constipation, cramps, stools with mucous and blood clots.

Microbes in Human Welfare

32. Secondary sewage treatment - aeration, flocs, BOD, sludge

Asked 5× · Board 2022, Board 2023, Board 2026, Sample 2025, Sample 2026 · 1/2/3 marks

Assertion (A): Flocs are masses of bacteria associated with fungal filaments in secondary treatment of sewage. Reason (R): Flocs help in digestion of solid waste by anaerobic respiration. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation for Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation for Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.

33. Sources of biofertilisers

Asked 3× · Board 2022, Board 2026, Sample 2025 · 3/5 marks

(i) What are bio-fertilizers? (ii) Name the different types of microorganisms used as bio-fertilizers in organic farming and explain how each contributes to soil fertility. (iii) Write two advantages of using bio-fertilizers over chemical fertilizers.

34. Organic farming / Integrated Pest Management

Asked 2× · Board 2022, Sample 2026 · 1/3 marks

Integrated Pest Management involves
I. Using pesticides/insecticides judiciously
II. Using biocontrol agents
III. Engaging in organic farming
A. Only I
B. Only II
C. Both I and II
D. Only III

35. Biogas production

Asked 2× · Board 2022, Sample 2025 · 1/2 marks

Assertion (A): A floating cover placed over the slurry in a biogas plant keeps on rising.
Reason (R): This cover keeps on rising due to the gas produced in the tank by the microbial activity.
A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true.

Biotechnology - Principles and Processes

36. EcoRI recognition palindrome & sticky ends

Asked 3× · Board 2025, Board 2026, Sample 2025 · 1/2/3 marks

Study the sequence of bases in a DNA molecule that is shown below and answer the questions. 5' – GAATTC – 3' / 3' – CTTAAG – 5'. (a) What are such sequences called? Name the enzyme used that recognises such nucleotide sequences. (b) How do these enzymes function?

37. Natural pathogens as rDNA tools (Agrobacterium / retrovirus, T-DNA)

Asked 3× · Board 2022, Board 2024, Sample 2026 · 1/3/5 marks

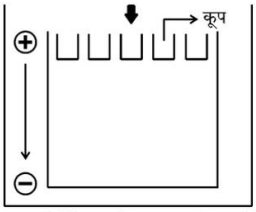
Some plant and animal pathogens serve as one of the tools of recombinant DNA (rDNA) technology.
A. Name one animal and one plant pathogen and discuss the pathogenic nature of both. State how they serve as a tool in rDNA technology.
B. What are the enzymes needed for rDNA technology?
C. A farmer owns a cotton farm land which is getting infested with coleopteran pests. He is not willing to use the microbes to protect his farm. i. Name an alternate method to introduce the gene of interest the pathogen would have otherwise delivered and discuss how the alternate method would deliver the gene. ii. State how this gene would control the pest.
OR
BamH1 is a restriction enzyme which recognizes the sequence 5' - GGATCC - 3'. The restriction activity of this enzyme is between G and G.
A. Construct the palindrome for the above sequence.
B. Draw a labeled diagram to show the formation of recombinant DNA (rDNA) using BamH1.
C. PBR322 is a plasmid that has a restriction site for this enzyme at the tetracycline resistant gene. If BamH1 were to be used, how will it impact the response of the transformant with rDNA to antibiotics- ampicillin and tetracycline. Justify.

38. Gel electrophoresis - separation by size / staining

Asked 2× · Board 2026, Sample 2025 · 1/3 marks

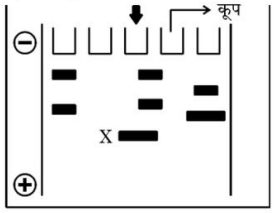
Observe the given picture carefully. A mixture of DNA with fragments ranging from 100 base pairs to 1800 base pairs were separated by electrophoresis on agarose gel with the following arrangement: (a) What result will be obtained in staining with ethidium bromide? Explain with reasons. (b) The above setup was modified as shown below and a band with 100 base pairs was obtained at X. What changes were made to the previous design to get a band at 'X'. Why did the band appear at 'X'?

28. नीचे दिए गए चित्र का सावधानीपूर्वक प्रेक्षण कीजिए। डीएनए अणु के 100 क्षारक युग्मों से 1800 क्षारक युग्मों वाले टुकड़ों (खंडों) के परास वाले मिश्रण का एगरोज़ जैल वैद्युत संचलन (इलेक्ट्रोफोरेसिस) तकनीक द्वारा पृथक्करण किया गया जिसका संयोजन चित्र में दिखाया गया है :



(a) इथीडियम ब्रोमाइड द्वारा अभिरंजित करने पर क्या परिणाम प्रेक्षित होंगे ? कारण सहित व्याख्या कीजिए। 1

(b) उपरोक्त संयोजन को निम्न रूप से दर्शाए अनुसार पुनःसंयोजित किया गया तथा 'X' पर 100 क्षारक युग्मों वाली पट्टी प्राप्त हुई।



'X' पर पट्टी प्राप्त करने के लिए पहले वाले उपकरण संयोजन में क्या परिवर्तन किए गए ? पट्टी

39. PCR amplification of DNA

Asked 2× · Board 2025, Sample 2025 · 1/3 marks

Amplification of gene of interest by using DNA polymerase may go upto
(A) 0.1 million times
(B) 1 million times
(C) 1 billion times
(D) 1 trillion times

40. Isolation of genetic material / gene of interest

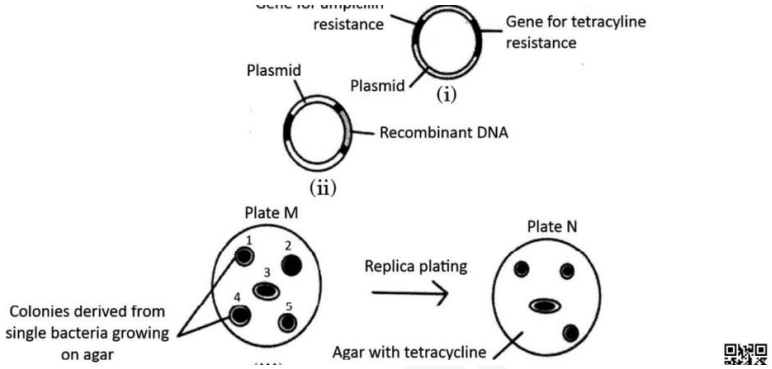
Asked 2× · Board 2022, Sample 2026 · 1/5 marks

In order to isolate genetic material of a bacterium, the cell must be treated with
A. Lysozyme, ribonuclease, protease, chilled ethanol
B. Cellulase, ribonuclease, protease, chilled ethanol
C. Chitinase, ribonuclease, chilled ethanol, water
D. Ribonuclease, protease, chilled ethanol, water

41. Insertional inactivation / blue-white colony selection

Asked 2× · Board 2024, Sample 2025 · 2/4 marks

[case context] Study the diagram given below that shows the steps involved in the procedure of selecting transformed bacteria and answer the questions that follow [diagram: (i) plasmid with gene for ampicillin resistance and gene for tetracycline resistance; (ii) recombinant DNA formed in plasmid; (iii) Plate M – colonies (1–5) derived from single bacteria growing on agar; replica plating to (iv) Plate N – agar with tetracycline and ampicillin]. (a) Identify the colony that has got transformed. Justify your answer. (b) What are the sites in a plasmid called where ampicillin and tetracycline resistance genes are inserted ? State their role in genetic engineering. (c) Name two enzymes playing an important role in genetic engineering. OR (c) State the role of β-galactosidase in insertional inactivation.



42. Plasmids and cloning vectors

Asked 2× · Board 2022, Board 2026 · 1/3 marks

Which of the following statements about plasmids is incorrect? (A) Plasmids have the ability to replicate within the bacterial cell. (B) Their replication is controlled by chromosomal DNA. (C) They are autonomously replicating circular extra-chromosomal DNA. (D) They often carry antibiotic resistant genes.

Biotechnology and its Applications

43. First transgenic cow Rosie / transgenic animals

Asked 3× · Board 2024, Board 2026, Sample 2026 · 1/3 marks

Assertion (A): The milk produced by transgenic cow 'Rosie' was nutritionally more balanced product for human babies than natural cow milk. Reason (R): It was human protein enriched milk containing human alpha lactalbumin. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation for Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation for Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.

44. RNA interference against nematode

Asked 2× · Board 2025, Sample 2025 · 1/5 marks

RNA interference (RNAi) helps in making tobacco-plant resistant to a nematode (Meloidegyne incognitia). Choose the correct option that shows how RNAi is achieved :
(A) Preventing the process of translation of mRNA of the nematode.
(B) Preventing the process of replication of DNA of the nematode.
(C) Preventing the process of transcription of DNA of the plant.
(D) Preventing the process of replication of DNA of the plant.

45. GEAC - full form and role

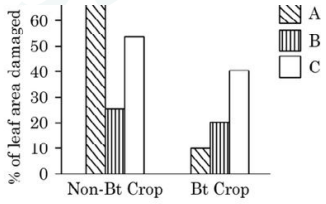
Asked 2× · Board 2024, Board 2025 · 1 marks

GEAC stands for
(A) Genome Engineering Action Committee
(B) Ground Environment Action Committee
(C) Genetic and Environment Approval Committee
(D) Genetic Engineering Approval Committee

46. Bt crops and cry genes

Asked 2× · Board 2022, Board 2026 · 3/5 marks

[Case study with bar graph: Y-axis '% of leaf area damaged / mm^2' by three corn-borer species (key A, B, C) on 'Non-Bt Crop' vs 'Bt Crop'.] To save the crop plant from the attack of various insect pests the biotechnologists have developed many pest resistant plants. One such example is Bt corn plant. In this plant 'cry' genes were introduced which produces cry-proteins in the plant that has toxic effect on the pest (corn borer). Thus saves the corn plant from the attack of the corn borer. An experimental field study was conducted by the scientists to see the efficacy of the Bt corn plant against the attack of corn borers. Three different species of corn borers namely 'A', 'B', 'C' were collected and were independently fed on non Bt corn plants and Bt corn plants separately for the same period. The extent of the damage caused to the leaf area of the plant was observed and noted down. With the help of the observations and data collected the following bar graph was plotted. Study the graph and answer the questions that follow. (i) Identify the species of the corn borer that was most successfully controlled by Bt corn plant. Give appropriate reason for your inference. (ii) Identify the species of the corn borers which shows least impact of toxin produced by Bt genes. (iii) What would be your advise as a Scientist, to the farmers for growing this particular Bt corn variety in the area which is infested by species-'B' of corn borers? (iv) Name one Bt gene that encodes protein in corn plants to control corn borers.



47. ADA deficiency and gene therapy

Asked 2× · Board 2023, Board 2025 · 1/2 marks

Student to attempt either option-(A) or (B) :
(A) A patient with ADA deficiency requires periodic infusion of genetically engineered lymphocytes. Explain why such periodic infusion is required and also suggest a permanent cure for such ADA deficiency.
OR
(B) Describe in brief any two techniques that can be utilised to transfer recombinant DNA into the host cell directly without using any vector.

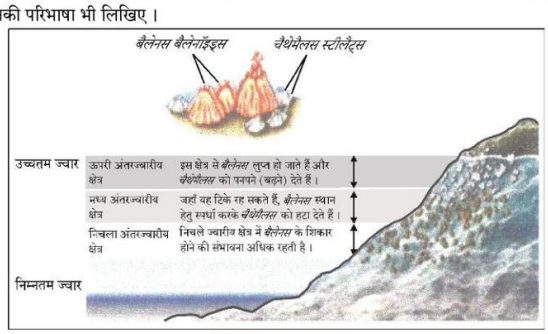
Organisms and Populations

48. Competition, competitive exclusion and co-existence

Asked 3× · Board 2026, Sample 2025, Sample 2026 · 3/4/5 marks

[Case: The diagram below shows the distribution of two barnacle species, Chthamalus and Balanus on a rocky sea shore. When Balanus is experimentally removed, Chthamalus expands its range in lower intertidal zone.] (a) Identify and define the ecological phenomenon demonstrated by this observation. OR (a) State the principle that explains the elimination of one species. (b) Two different species can compete for the same resource. Give another example of it. (c) How do species avoid competition in nature? Explain with an example.

(a) इस प्रदर्शन के प्रेक्षणों (साक्ष्यों) के आधार पर इस पारिस्थितिक परिघटना की पहचान कीजिए तथा उसकी परिभाषा भी लिखिए। 1



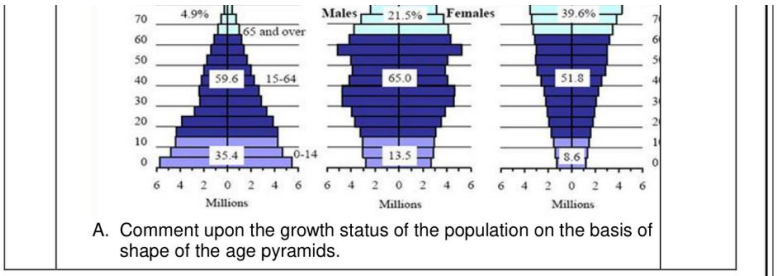
अथवा

(a) यह सिद्धान्त की व्याख्या कीजिए जो एक प्रजाति के विलोपन की व्याख्या करता है। 1

49. Age-pyramid shape and population growth status

Asked 2× · Board 2023, Sample 2026 · 1/3 marks

The population pyramids of Japan for the years 1950, 2007 and on the basis of the estimated value for 2050 have been shown below to answer the questions that follow:
A. Comment upon the growth status of the population on the basis of shape of the age pyramids.
B. What insights can you gain about their population dynamics?
[For visually impaired students: The population pyramids of Japan for the years 1950, 2007 and on the basis of the estimated value for 2050 have broad-based, inverted bell and urn shape, respectively. Answer the following questions: A. Comment upon the growth status of the population on the basis of shape of the age pyramids. B. What insights can you gain about their population dynamics?]



A. Comment upon the growth status of the population on the basis of shape of the age pyramids.

Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26.

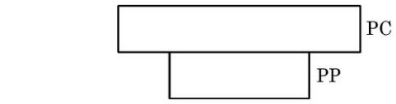
Ecosystem

50. Inverted biomass pyramid: identify and conditions

Asked 3× · Board 2024, Board 2026, Sample 2026 · 2 marks

Given below is a pyramid found in an ecosystem, where each bar represents the standing crop available in the trophic level. (i) Identify the kind of pyramid and with the help of an example explain the conditions where this kind of pyramid is possible in nature. (ii) Write any two limitations of ecological pyramids.

प्रत्येक पट्टी (शलाका) उपलब्ध पोषण स्तर पर स्थित शस्य (खड़ी फसल) को निरूपित करती है ।



(i) पिरामिड के प्रकार की पहचान कीजिए तथा एक उदाहरण की सहायता से उन परिस्थितियों की व्याख्या कीजिए जिसमें प्रकृति में इस प्रकार का पिरामिड संभव है । 1

51. Primary vs secondary productivity (GPP/NPP)

Asked 2× · Board 2024, Board 2025 · 1/2 marks

Student to attempt either option-(A) or (B) :
(A) Analyse the following ecosystems and discuss, which will be more productive in terms of primary productivity : A young forest, a natural old forest, a shallow polluted lake.
OR
(B) Differentiate between Net primary productivity and Gross primary productivity in an ecosystem.

Biodiversity and Conservation

52. Causes and effects of biodiversity loss

Asked 3× · Board 2025, Board 2026, Sample 2025 · 2/3/5 marks

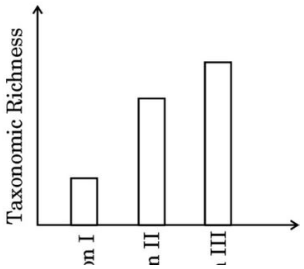
In an ecosystem there was loss of biodiversity due to some project in that area. (i) How will biodiversity be affected? (2 points) (ii) List two major causes of loss of biodiversity.

53. Latitudinal species-richness gradient interpreted from region data

Asked 3× · Board 2022, Board 2023, Board 2024 · 3/4 marks

[case context] Read the following passage and answer the questions that follow. Isn't it incredible that India's land area is only 2.4 per cent of the world's total land area whereas its share of the global species diversity is an impressive 8.1 per cent ! However, in these estimates of species, prokaryotes do not figure anywhere. Biologists are always keen on collecting data with respect to species diversity observed in different regions of the world. The data collected based on the survey conducted for species richness of groups of mammals in three different regions of the world is shown in the bar graph [bar graph of Taxonomic Richness for Region I, Region II and Region III, increasing from Region I to Region III]. (a) Why is the species richness maximum in Region III in the bar graph ? OR (a) Why is the species richness minimum in Region I in the bar graph ? (b) Plants and animals do not have uniform diversity in the world but show rather uneven distribution. Mention what this kind of diversity is referred to as. (c) Why is it that prokaryotes do not have an estimated number of their species diversity as seen in plants and animals ? Explain.

graph given below :



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