

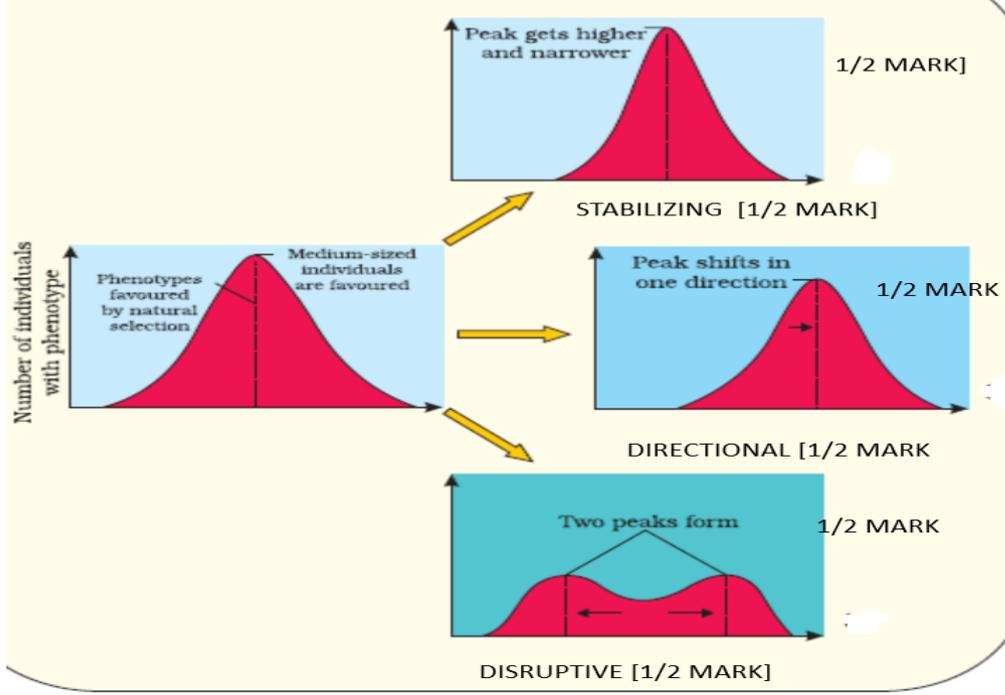
SOLUTIONS
Senior Secondary School Examination, 2025
BIOLOGY (Subject Code-044)
[Paper Code: 57/2/3]

Maximum Marks:70

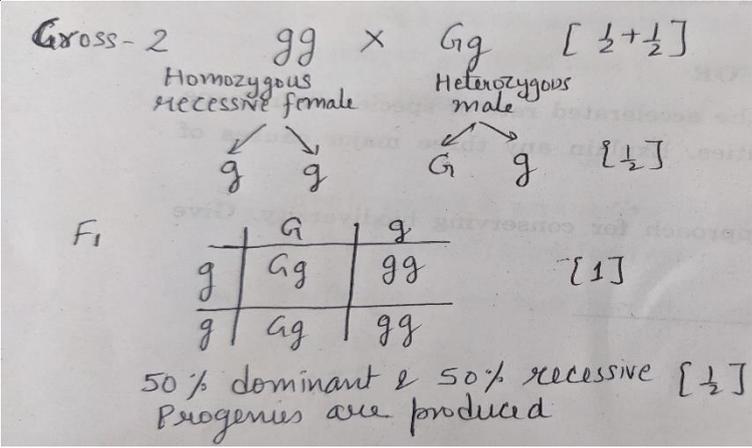
Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
SECTION—A			
1	(D) / Autogamy but not Geitonogamy	1	1
2	(D) / I-Spermatogonia, II- Sec spermatocyte, III-Spermatids, IV-Spermatozoa	1	1
3	(B) / (iii), (i), (ii), (iv)	1	1
4	(B) / Francis Crick	1	1
5	(D) / 7,8	1	1
6	(B) / (ii) and (iii)	1	1
7	(D) / (a)-(i), (b)-(iii), (c)-(ii)	1	1
8	(C) / Father- I^{B_i} , Mother- $I^{A_i B}$, Child- I^{A_i}	1	1
9	(B) / Decrease in antibodies // (D) / increase in antigens	1	1
10	(B) / 0 : 1 : 3	1	1
11	(D) / Plasmid DNA acts as vector to transfer the piece of DNA attached to it.	1	1
12	(A) / <i>Aspergillus niger</i>	1	1
13	(A) / Both (A) and (R) are true, and (R) is the correct explanation of (A).	1	1
14	(C) / (A) is true, but (R) is false.	1	1
15	(A) / Both (A) and (R) are true, and (R) is the correct explanation of (A).	1	1
16	(C) / (A) is true, but (R) is false	1	1
SECTION B			
17	<p>(A)</p> <ul style="list-style-type: none"> - <i>Vallisneria</i>- Female flower reaches surface of water and male flower or pollen grain are released on the surface of water. - <i>Zostera</i>- Female flower remain submerged in water and pollen grain are released inside water. <p style="text-align: center;">OR</p> <p>(B)</p> <p>Pollen release and stigma receptivity are not synchronised , anther and stigma are placed at different positions , Self incompatibility , production of unisexual flowers</p>	<p>1</p> <p>1</p> <p>$\frac{1}{2} \times 4$</p>	<p>2</p>

18	<p>(a) Autosomal recessive trait Normal carrier parents / Heterozygous individuals , transfer defective gene to both male and female progeny producing affected individuals or homozygous recessive individuals //</p> <p>(b) Sickle cell anaemia / cystic fibrosis/ Phenylketonuria/Thalassemia / or any other example (any one)</p>	$\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$	2
19	<p>(A) -In case of snakebite, quick response is required as natural production of antibodies will take more time therefore preformed antibodies against the snake venom are injected. -In tetanus, preformed antibodies are directly injected because quick immune response is required against deadly microbes. (or any other relevant example) OR (B) The symptoms do not appear immediately as parasite initially multiply within the liver cells, and then attack RBCs, resulting in their rupture and, release toxic substance haemozoin.</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} \times 4$	2
20	<p>(a) Bacterium <i>Thermus aquaticus</i> (b) It remains active in high temperature during denaturation process of PCR</p>	1 1	2
21	<p>The plots with more species showed less year to year variation in total biomass , Plots with increased diversity contributed to high productivity</p>	1+1	2
SECTION – C			
22.	<p>(a) Copper releasing IUDs release copper ions that suppress sperm motility, suppress the fertilising capacity of sperms, increase phagocytosis of sperms (any two) (b)The oral pills inhibit ovulation and implantation / It alter the quality of cervical mucus to prevent or retard the entry of sperms.</p>	1+1 1	3

23	<p>(a) 3200 male gametophyte</p> <p>(b)</p> <ul style="list-style-type: none"> - Intine made up of cellulose, and pectin. - Exine made up of sporopollenin. 	1	
		$\frac{1}{2} + \frac{1}{2}$	3

24	 <p>(Correct diagram with labelling or correct explanation with diagram to be considered)</p>	$\frac{1}{2} \times 6$	3
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25	<p>Cross-1 $GG \times Gg$ [$\frac{1}{2} + \frac{1}{2}$]</p> <p>Homozygous dominant female Heterozygous male</p> <p>gamete $G \quad G$ $G \quad g$ [$\frac{1}{2}$]</p> <table border="1" data-bbox="303 1523 638 1680"> <tr> <td>F_1</td> <td>G</td> <td>g</td> </tr> <tr> <td>G</td> <td>GG</td> <td>Gg</td> </tr> <tr> <td>g</td> <td>Gg</td> <td>gg</td> </tr> </table> <p>All dominant progenies are [$\frac{1}{2}$]</p> <p style="text-align: center;">//</p>	F_1	G	g	G	GG	Gg	g	Gg	gg	$\frac{1}{2} + \frac{1}{2}$	
F_1	G	g										
G	GG	Gg										
g	Gg	gg										
		$\frac{1}{2}$	1									
		$\frac{1}{2}$										

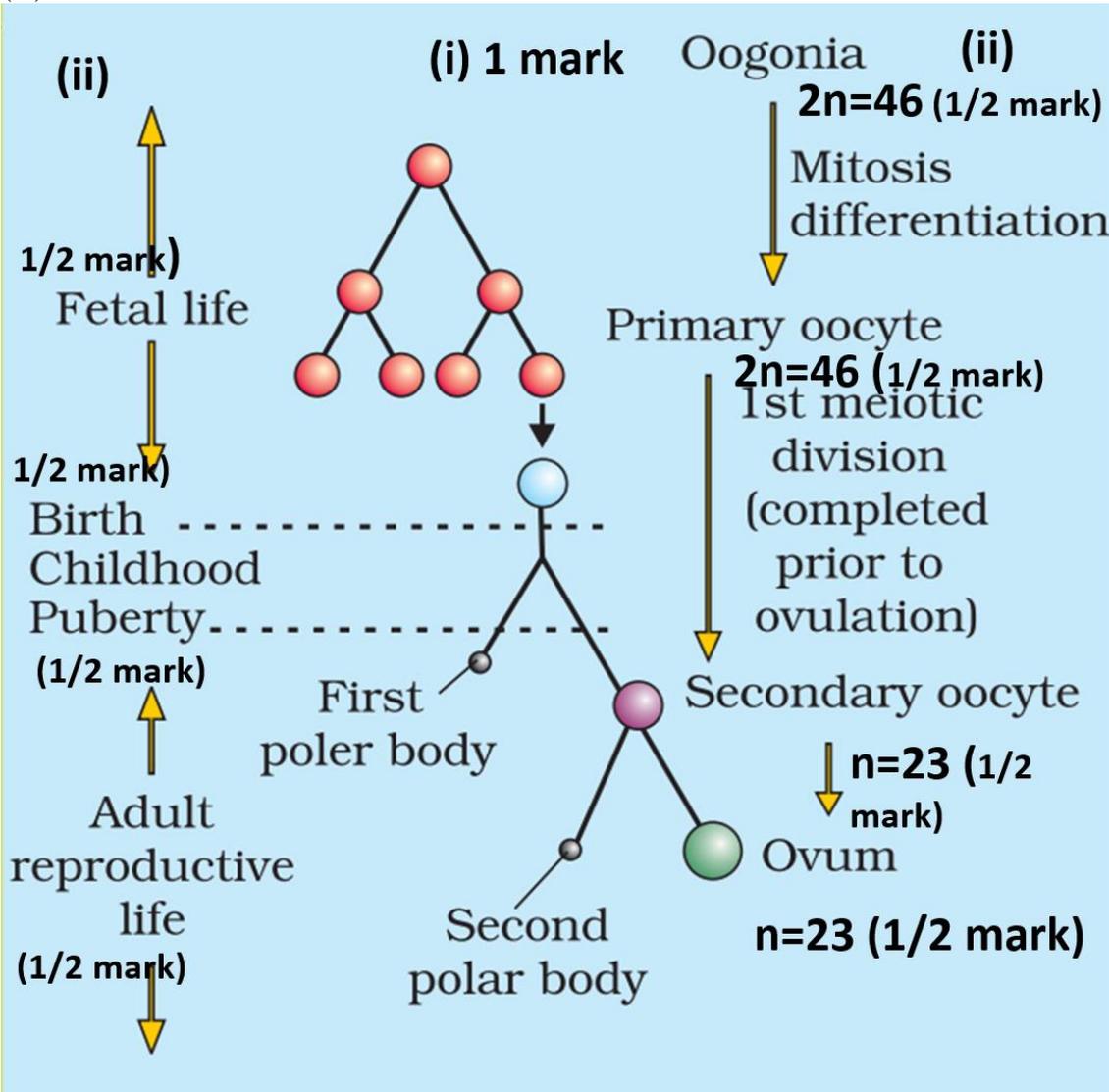
	 <p> Cross-2 $gg \times Gg$ [$\frac{1}{2} + \frac{1}{2}$] Homozygous recessive female Heterozygous male g G g [$\frac{1}{2}$] g Gg gg [1] g Gg gg 50% dominant & 50% recessive [$\frac{1}{2}$] Progeny are produced </p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$	3
26	<p>(a) Sportspersons abuse certain drugs to increase their muscle strength and bulk and aggressiveness for better performance in sports.</p> <p>(b) Cocaine/coca alkaloids , cannabinoids , any other correct example (any two)</p> <p>(c) <i>Erythroxylum</i> , <i>Cannabis</i> ,any other correct example (any two)</p>	1 $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3
27	<p>(a) Cry IAb</p> <p>(b) When the inactive protoxin is ingested by the insect, it is converted to its active form by the alkaline pH in the gut which solubilises the crystals, the active form of the toxin binds to the surface of the midgut epithelial cells, creates pores that cause cell swelling and lysis and eventually cause death of the insect.</p>	1 $\frac{1}{2} \times 4$	3
28	<p>(a) -'x' is Insects - 'y' is Molluscs</p> <p>(b) -'x' is most species rich taxonomic group -more than 70% of the total animals.</p> <p>(c) (i) Ecological diversity (ii) Genetic diversity</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3
SECTION-D			
29	<p>(a) B-lymphocytes ,and T-lymphocytes.</p> <p>(b) Because the antibodies are found in the blood hence antibody-mediated immunity is also called humoral immune response.</p>	$\frac{1}{2} + \frac{1}{2}$ 1	

	<p>(c)</p> <p>(i) Our immune system is able to distinguish between 'self' and 'non-self' cells/molecules.</p> <p>(ii) Cell-mediated immune response , T-lymphocytes are involved.</p> <p style="text-align: center;">OR</p> <p>(d)</p> <table border="1" data-bbox="164 454 1295 779"> <thead> <tr> <th data-bbox="164 454 730 517">Active immunity</th> <th data-bbox="730 454 1295 517">Passive immunity</th> </tr> </thead> <tbody> <tr> <td data-bbox="164 517 730 674">When antibodies are produced by B-cells within the body.</td> <td data-bbox="730 517 1295 674">Preformed antibodies are injected into the body for defence</td> </tr> <tr> <td data-bbox="164 674 730 779">It is produces comparatively slow response</td> <td data-bbox="730 674 1295 779">It provides quick response</td> </tr> </tbody> </table>	Active immunity	Passive immunity	When antibodies are produced by B-cells within the body.	Preformed antibodies are injected into the body for defence	It is produces comparatively slow response	It provides quick response	<p>1</p> <p>½ +½</p> <p>1</p> <p>1</p>	<p>4</p>
Active immunity	Passive immunity								
When antibodies are produced by B-cells within the body.	Preformed antibodies are injected into the body for defence								
It is produces comparatively slow response	It provides quick response								
30	<p>(a) DNA -dependent RNA polymerase</p> <p>(b) B-coding strand, A-Template strand</p> <p>(c)</p> <ul style="list-style-type: none"> - C is promoter, it is the sequence of DNA where the enzyme DNA dependent RNA polymerase binds for initiation of transcription. - D is the terminator, it is the sequence of DNA where the process of transcription terminated. <p style="text-align: center;">OR</p> <p>(d)</p> <ul style="list-style-type: none"> - C is located towards 5' end (upstream) of coding strand - D is located towards 3' end (downstream) of coding strand 	<p>1</p> <p>½+½</p> <p>½+½</p> <p>½+½</p> <p>1</p> <p>1</p>	<p>4</p>						

SECTION E

31

(A)



1

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

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

(1 mark to be awarded for the correct schematic representation of oogenesis, $\frac{1}{2}$ mark each for the correct number of chromosomes at each stage and $\frac{1}{2}$ mark each to the life phases of the individual with the correct stages of the process.)

OR

(B)

(i)

Autogamy – The transfer of pollen grains from the anthers to the stigma of the same flower.

1

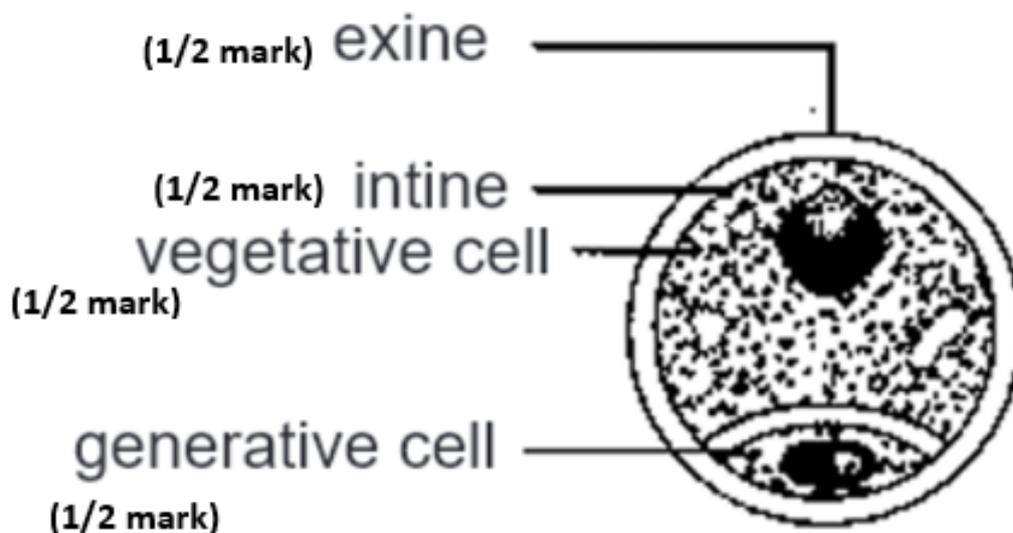
Geitonogamy – The transfer of pollen grains from the anthers of flower to the stigma of another flower of the same plant.

1

Xenogamy – The transfer of pollen grains from the anthers of a flower to the stigma of another flower on a different plant of the same species

1

(ii)



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

5

32

(A)

(i) A bacterial cell is made competent by treating it with a specific concentration of a divalent cation such as calcium, which increases the efficiency with which DNA enters the cell through pores in its cell wall.

1+1

(ii)

-**Denaturation** , DNA is heated to a high temperature resulting in the separation of two strands of DNA

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

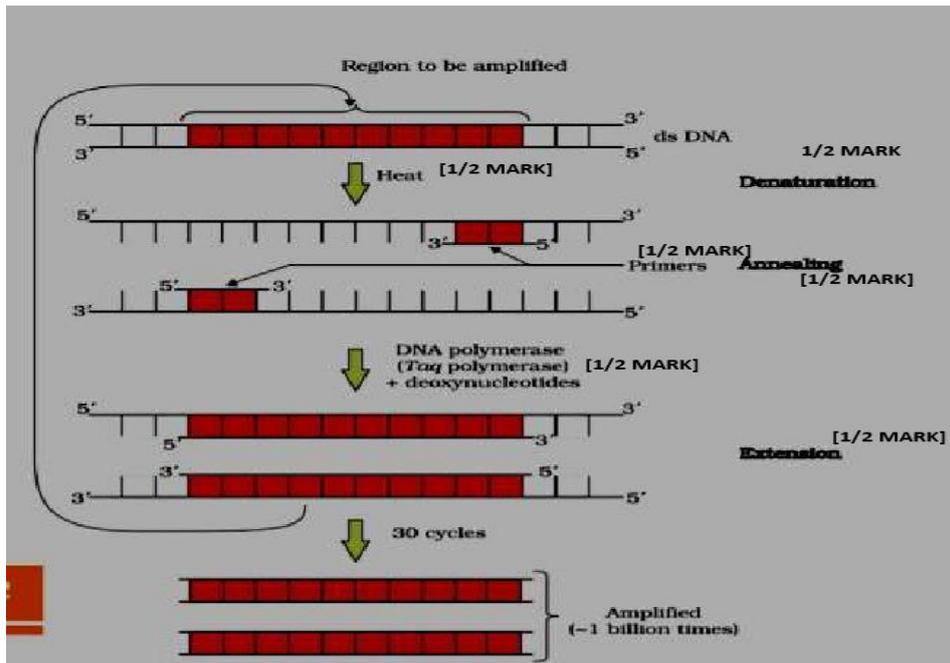
-**Annealing** , two primers are annealed to each of the single-stranded template DNA.

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

-**Extension** , enzyme Taq polymerase extends the primers using the nucleotides provided in the reaction and the genomic DNA as template.

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

//



OR

(B)

(i) Transgenic animals : Animals that have had their DNA manipulated to possess and express an extra (foreign) gene are known as transgenic animals.

1

(ii) Common reasons to produce transgenic animals are :

-Normal physiology and development , Transgenic animals can be specifically designed to allow the study of how genes are regulated and how they affect the normal functions of the body and its development.

1/2+1/2

-Study of disease , Many transgenic animals are specially made to serve as models for human diseases so that investigation of new treatments for diseases is made possible.

1/2+1/2

-Biological products , Transgenic animals that produce useful biological products can be created

1/2+1/2

-Vaccine safety , Transgenic mice are being developed for use in testing the safety of vaccines before they are used on humans.

1/2+1/2

-Chemical safety testing , Transgenic animals are made that carry genes which make them more sensitive to toxic substances than non-transgenic animals.

1/2+1/2

(Any Four)

5

(A)

(i)

-Tropical latitudes have remained relatively undisturbed for millions of years and thus had a long evolutionary time for species diversification

1

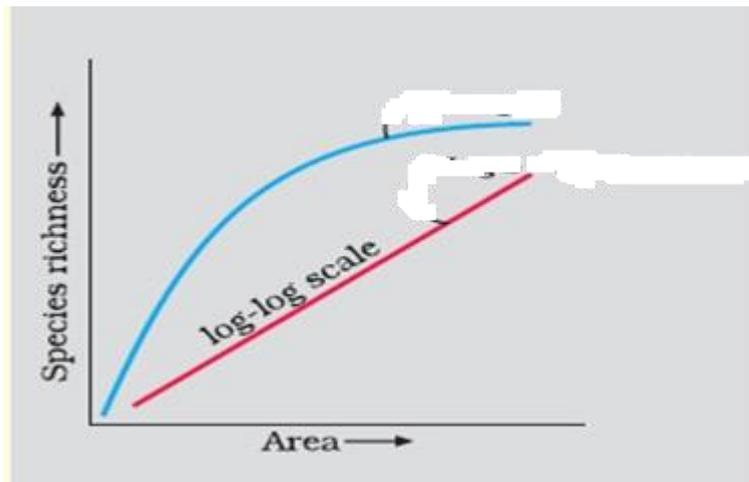
-Tropical environments are less seasonal more constant and predictable. Such constant environments promote niche specialisation and lead to a greater species diversity

1

-More solar energy is available in the tropics which contributes to higher productivity which leads to greater species diversity.

1

(ii)



1

- Alexander von Humboldt

 $\frac{1}{2}$

- Within a region species richness increased with increasing explored area but only up to a limit.

 $\frac{1}{2}$ **OR**

(B)

(i)

-**Habitat loss and fragmentation**, Deforestation leads to habitat loss and ultimately causing extinction of animals and plants / When large habitats are broken into small fragments that also leads to population decline / mammals and birds with large territories and certain animals with migratory habits are badly affected.

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

- **Overexploitation**, overexploitation of natural resources by humans leads to extinction of many species / For example overexploitation of Steller's sea cow or passenger pigeon or many marine fishes led to their extinction.

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

	<p>-Alien species invasions, When alien species are introduced unintentionally or deliberately for whatever purpose some of them turn invasive and cause decline or extinction of indigenous species/ For example <i>Parthenium</i> or <i>Lantana</i> or water hyacinth pose threat to indigenous species (or any other correct example)</p> <p>-Co-extinctions, When a species becomes extinct the plant and animal species associated with it in an obligatory way also became extinct/ For example unique assemblage of parasites and plant pollinator mutualism where extinction of one invariably leads to the extinction of the other</p> <p style="text-align: right;">(any three points)</p> <p>(ii)</p> <ul style="list-style-type: none"> - Ex-situ conservation : In this threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care. - e.g. : Zoological parks, Botanical gardens, Wildlife safari parks, seed banks, pollen bank (any two or any other relevant examples) 	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>	<p>5</p>
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