



महाराष्ट्र राज्य पाठ्यपुस्तक निर्मिती व अभ्यासक्रम संशोधन मंडळ

‘बालभारती’, सेनापती बापट मार्ग, पुणे-४११००४.

फोन : ०२०-२५६५९४६५/६६/६७/६८

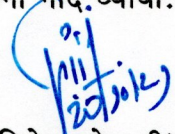
फॅक्स क्र : ०२०-२५६५६०४६

* शुद्धिपत्रक *

विषय : इयत्ता १२ वी ‘जीवशास्त्र’ विषयाच्या पाठ्यपुस्तकामधील आशयासंदर्भात असलेल्या दुरुस्त्यांबाबत.....

इयत्ता अकरावी, बारावी (उच्च माध्यमिक स्तर) पुनर्रचित अभ्यासक्रमानुसार शालेय वर्ष २०२०-२१ पासून इयत्ता बारावीची नवीन पाठ्यपुस्तके तयार करून निर्धारित करण्यात आलेली आहेत. इयत्ता बारावीसाठी तयार करण्यात आलेल्या ‘जीवशास्त्र’ विषयाच्या पाठ्यपुस्तकामधील आशयासंदर्भातील दुरुस्त्यांचे शुद्धिपत्रक पाठ्यपुस्तक मंडळाच्या www.ebalbharati.in या संकेतस्थळावर उपलब्ध करून देण्यात आलेले आहे.

सदर पाठ्यपुस्तकामधील आशय दुरुस्त्यांच्या शुद्धिपत्रकाची अध्ययन/अध्यापनाच्या अनुषंगाने इयत्ता अकरावीच्या शिक्षक/विद्यार्थी/अनुषंगिक घटक यांनी नोंद घ्यावी.


(विवेक गोसावी)

क्रमांक : ह/शास्त्र/ ५७१३

दिनांक : २०.१०.२०२१

संचालक,
पाठ्यपुस्तक मंडळ, पुणे ४

Corrigendum : Standard XII Biology Textbook Edition 2021

Chapter 1: Reproduction in Lower and Higher Plants

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
1	R	Budding: Spore formation below the diagram 1.2	line 3 line 3	Yeast..... addition in Algae, <i>Chlorella Chlamydomonas</i>	Yeast and <i>Protozoa</i> . in unicellular Algae, <i>Chlorella</i> , <i>Chlamydomonas</i> and Diatoms;
1	R	Spore formation below the diagram 1.2	line 3	in <i>Penicillium</i> and Gemmules formation in	and Gemma formation in
1	R	Spore formation below the diagram 1.2	line 5	Sponges	<i>Marchantia</i> .
3	L	Below the box	line 4	addition - Stamen consist and anther	Stamen consist and anther having two anther lobes (theca).
3	L	Structure of anther Para		Structure of anther:	A mature anther has generally two anther lobes and each anther lobe has two microsporangia or pollen sacs . Thus it is dithecous and tetrasporangiate . However in family Malvaceae, anther is monothecous, bisporangiate. An immature stage of anther is represented by group of parenchymatous tissue surrounded by single layered epidermis. The heterogeneity (differentiation) arises when some hypodermal cells get transformed into archesporial cells .

6	R	c. Xenogamy ... :	2	..... one flower is deposited .....	..... one flower are deposited
7	L	Fig. 1.8	title	Fig. 1.8 : Pollination by wind (Maize)	Fig. 1.8 : Pollination by wind (Maize plant)
7	L	Fig. 1.8	labelling	Seed (Kernel)	grain (Kernel)
12		Fig.1.16	Title	Fig. 1.16 : Development of Monocot Embryo	Fig. 1.16 : Development of Monocot (grass) Embryo
13	R	Fig. 1.18	Title	Fig. 1.18 : Maize seed (Monocot)	Fig. 1.18 : V.S. of Maize grain (Monocot)
14	L	Try this box	3	..clay. Mould the mixture into small balls and	..clay. Mould the mixture with water into small balls and
14	L	Below try this box	1	Dormancy is a state of metabolic arrest that	Dormancy is a temporary state of metabolic arrest that.....

Chapter 3 : Inheritance and Variation

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
49	L	3.1 Chr..... para 2	line 1	• Gregor Mendel, son of the peasant farmer,	• Gregor Mendel, son of a peasant (farmer),
56	R	para 1	line 2	Walter Sutton along with Theodor Boveri (1903) studied the parallel behaviour of Mendel's factors (genes) and behaviour of chromosomes, at the time of meiosis. Addition in this para.	Walter Sutton along with Theodor Boveri (1903) studied the behaviour of Mendel's factors (genes) and behaviour of chromosomes, at the time of meiosis. They concluded that the behaviour of genes and chromosomes is parallel. Since there are many characters (genes) while the number of chromosomes is limited, they concluded that each chromosome carries a large number of genes.
57	R	Function	line 1	Chromosomes are carriers of heredity.	Chromosomes mainly act as carriers of hereditary material.

58	R	Sex Chromo... para 2	line 7	Euchromatin has large amount of DNA material, hence genetically active.	Euchromatin has DNA in extended state hence it is metabolically more active than the heterochromatin.
59	L	linkage	line 2	It is a known fact that several genes are present on the chromosome. As chromosomes are carriers of heredity, these genes have tendency to be inherited together. Such genes are called linked genes . This tendency of two or more genes present on the same chromosomes that are inherited together is known as linkage . This entire part be modified..	It is a known fact that several genes are closely located on each chromosome and are located very close to each other such genes have tendency to be inherited together and thus, called linked genes . This tendency of two or more genes present on the same chromosomes being inherited together, is known as linkage .
59	R	Crossing over	line 8	The consist	The consists of
59	R	Crossing Over :	line 12-13	The phenomenon of crossing over is universal and it is necessary for the natural selection, because it increases the chances of variation.	The phenomenon of crossing over is by and large universal (except in male <i>Drosophila</i>). It is necessary for the natural selection because it increases the chances of variation.
60	L	Box para 1		Thomas Hunt Morgan was an American biologist. He used fruit fly (<i>Drosophila melanogaster</i>) in genetic reserch crossing over.	Thomas Hunt Morgan was an American biologist. He used the fruit fly (<i>Drosophila melanogaster</i>) in genetic research crossing over.
60	L	Box para 2		Morgan's work played key role in the field of genetics. He was awarded a Nobel prize in 1933, in Medicine.	Morgan's work played a key role in the field of genetics. He was awarded the Nobel prize in 1933, for Medicine.
63	L	Fig. 3.11	labelling	Carrier daughter X Normal Male	Carrier female X Normal Male
64	L	Fig. 3.13	labelling	Carrier daughter X Normal Male	Carrier female X Normal Male
65	R	Something... box para 2	line 2	about 10 cm long body. She has a proboscis....	about 10 cm long body and the proboscis...

67	R	Turner's Syndrome :		It is sex chromosomal disorder caused due to non-disjunction of chromosome during gamete formation. Individual born with Turner's syndrome has 44 autosomes with XO.	It is a sex chromosomal disorder caused due to non-disjunction of X- chromosome during the formation of egg. Individual born with Turner's syndrome has 44 autosomes and XO.
67	R	Klinefelter's syndrome (XXY males) :	line 1	It is chromosomal disorder caused due to	It is a chromosomal disorder caused due to
67	R	Klinefelter's syndrome (XXY males) :	line 5 - 6	result of non-disjunction of X-chromosome during meiosis. Individual is male and has over all masculine development. Voice pitch is harsh and have under developed testis. They are tall with long arms, feminine development (development of breast i.e. Gynaecomastia) and no spermatogenesis, therefore, individuals are sterile.	result of non-disjunction of X-chromosomes during meiosis in the formation of ovum. Such an individual is a male and has overall masculine development with harsh voice pitch, under developed testes and are tall with long arms showing feminine features like development of breast i.e. Gynaecomastia and no spermatogenesis, therefore, individuals are sterile.
68	L	MCQ 1	Caption	1. Phenotypic ratio of incomplete dominance in <i>Mirabilis jalapa</i> .	1. F ₂ Phenotypic ratio of incomplete dominance in <i>Mirabilis jalapa</i> is ---
68	L	MCQ 4	Caption	4. When phenotypic and genotypic ratios are the same, then it is an example of	4. When F ₂ phenotypic and genotypic ratios are the same, then it is an example of
68	R	MCQ 8	Choice d	d. Super female = 44 + XXX	d. Normal female = 44 + XXX

Chapter 4 : Molecular Basis of Inheritance

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
70	R	para 1	line 1 from top	On the other hand DNA thought ...	On the other hand the DNA thought ...

70	R	4.2 The genetic	line 3 to 7	..... on chromosome and that are mainly composed of DNA and protein. Initially, that protein are molecules and .....	..... on chromosomes and that are composed mainly of DNA and protein. Initially, that proteins are and varied molecules and store
70	L	para 2	line 3 and 4	..... Let us study three important opinion.	..... Three following important opinion.
73	L	Packag... Euka...	line 1 and 2	Eukaryotes show well organized nucleus containing nuclear membrane, nucleolus and thread-like material in the form of chromosomes.	Eukaryotes show a well organized nucleus with nuclear membrane, nucleolus and chromosomes.
73	R	Para 1	line 4 , 5, 6	The nucleosome core is made up of two molecules of each of four types of histone proteins viz. H ₂ A, H ₂ B, H ₃ and H ₄ . H ₁ protein binds the DNA thread where it enters (arrives) and leaves the nucleosome.	The nucleosome core is an octamer made up of two molecules of each of four types of histone proteins viz. H ₂ A, H ₂ B, H ₃ and H ₄ . Histone protein H ₁ binds the DNA thread where it enters (arrives) and leaves the nucleosome.

73	R	Para 2		one nucleosome Non-histone chromosomal proteins (NHC)	One nucleosome (Fig 4.5) approximately contains 200 base pair (bp) long DNA helix, of which about 146 bp long segment is wound around each octamer and the remaining bp contribute as linker DNA (Fig. 4.5) connecting two successive nucleosomes. Nucleosomes are stained body made of repeating units of chromatin. When observed under electron microscope these appear as ' beads-on-string ' but actually represent ' string-on-beads ' (Fig 4.6). DNA helix of 200 bps wraps around the octamer by $1\frac{3}{4}$ turns. Six such nucleosomes get coiled repeatedly and then form solenoid that looks like a coiled telephone wire (Fig 4.7). The chromatin is around 10 nm thick fibre packed to form a solenoid structure of 30 nm diameter (300\AA). Further supercoiling of solenoid tends to form a looped structure that further coils and condenses at metaphase stage to form the chromosomes . The packaging of chromatin at higher levels, need additional set of proteins that are called Non-Histone Chromosomal proteins (NHC).
75	L	Autocatalytic... Para 2	line 3	The process by which DNA duplicates itself is called replication. Through replication, it forms two copies that are identical to it. Addition to line 3	The process by which DNA duplicates itself is called replication. Through replication, it forms two copies that are identical to each other and also to the parent DNA.
76	R	Meselson's expt.	step 1	1. Meselson and Stahl in 1958 performed an experiment to prove semiconservative nature (mode) of replication.	1. Meselson and Stahl in 1958 performed an experiment to verify the semiconservative nature (mode) of replication.
76	R	Meselson's expt.	step 2	They cultured band is recorded	To be deleted

76	R	Meselson's expt.	step 3	3. <i>E. coli</i> cells were then transferred to ^{15}N medium (heavy isotopic nitrogen) and allowed to replicate for several generations. At equilibrium point density gradient band was obtained, by using 6M CsCl_2 . The position of this band is recorded.	2. <i>E. coli</i> cells growing in ^{14}N were transferred to ^{15}N medium (heavy isotopic nitrogen) and allowed to replicate for several generations. At equilibrium point density gradient band was obtained, by using 6M CsCl_2 (Cesium chloride). The position of this band was recorded.
77	L	Meselson's expt.	step 4	4. The heavy DNA (^{15}N) molecule can be distinguished from normal DNA by centrifugation in a 6M Cesium chloride (CsCl_2) density gradient. The density gradient value of 6M CsCl_2 and ^{15}N DNA is almost same. Therefore, at the equilibrium point ^{15}N DNA will form a band. In this both the strands of DNA are labelled with ^{15}N .	3. The heavy DNA (^{15}N) molecule can be distinguished from normal DNA (^{14}N) by centrifugation in a 6M CsCl_2 density gradient. The density gradient value of 6M CsCl_2 and of ^{15}N DNA is almost same. Therefore, at the equilibrium point ^{15}N DNA will form a band. In this both the strands of DNA are labelled with ^{15}N .
77	L	Meselson's expt.	step 5	5. Such <i>E. coli</i> cells were they transferred to another medium containing ^{14}N i.e. normal (light) nitrogen. After first generation, the density gradient band for $^{14}\text{N}^{15}\text{N}$ was obtained and its position was recorded. After second generation, two density gradient bands were obtained - one at $^{14}\text{N}^{15}\text{N}$ position and other at ^{14}N position.	4. Such <i>E. coli</i> cells were then transferred to another medium containing ^{14}N i.e. normal (light) nitrogen. After first generation, the density gradient band for $^{14}\text{N} - ^{15}\text{N}$ (hybrid) was obtained and its position was recorded. After second generation, two density gradient bands were obtained - one at $^{14}\text{N} - ^{15}\text{N}$ position and other at ^{14}N position.
77	L	Meselson's expt.	step 6	6. The position of bands after two generations clearly proved that DNA replication is Semiconservative.	5. The position of bands after two generations clearly proved that the DNA replication is Semiconservative. (Fig. 4.9)
77	R	last box		..... RNA to be made bold	..... RNA to be made bold
82	R	Mutations..... Code:	line 4	place. It results in the change of genotype (i.e. character).	place. It results in the change of genotype expressed in the terms of phenotype (i.e. character).
85	L	can you tell boxs	Bullet 5	5. What is translocation?	5. What is translation?

90	L	4. Southern blotting	line 1	4. Southern blotting: The separated DNA fragments are transferred to a nylon membrane or a nitrocellulose filter paper by placing it over the gel and soaking them with filter paper overnight.	4. Southern blotting: It is a technique used for detecting a specific DNA sequence, developed by E. Southern . The separated DNA fragments are transferred to a nylon membrane or a nitrocellulose filter paper by placing it over the gel and soaking them with filter paper overnight.
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Chapter 5 : Origin and Evolution of life

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
94	L	5.1 Origin of life para 1	line 1	The living matter shows attributes or	The 'living beings' shows attributes or
94	L	5.1 b Cosmozoic...	line 1	This theory advocates that life did not arise	This theory advocates that life did not originate
94	L	5.1 b Cosmozoic...		Addition in the para	....Antarctica. However this theory could not explain the origin of life of other planets hence it is not accepted.
94	L	5.1 c Spontaneous...		According to this theory, life originated from non-living material spontaneously. This theory was disproved by Louis Pasteur.	According to this theory, life originated spontaneously from the interaction of non-living (inanimate) material i.e. abiogenetically. e.g. maggots from decaying meat. This theory was however disproved by Louis Pasteur.
94	R	observe and... 2. Louis Pasteur's....		correction in the labelling.	Broth boiled, Curved neck removed, Broth remained free of microorganisms, Microorganisms grew in broth
95	R	para 1	last line	of free oxygen and enzymes.	of free oxygen and enzymes (non enzymatic reducing atmosphere).
97	L	RNA World... para 3	line 3	suggests that early life must have been based	suggests that early (first) life must have been based

98	L	Darwinism	line 5, 6	“On the origin of species by Natural Selection”	“On the origin of species by means of Natural Selection”
98	R	Darwinism ... postulates 2 Struggle	line 4, 5, 6	2. Struggle for existence - Tendency of over production leads to the struggle for existence between the members of population for limited supply of food or to overcome adverse environmental conditions or for a space or to escape from enemies etc.	2. Struggle for existence - Tendency of over production leads to the struggle for existence between the members of population. The struggle is for limited supply of food, to overcome adverse environmental conditions, for space and mate, and or to escape from enemies etc.
98	R	Darwinism ... postulates 4 Natural...	line 1, 2, 3	4. Natural selection - Organic variations can serve as evidence that for the some organisms have better adapted to survive	4. Natural selection - Organic variations can serve as evidence for some organisms that are better adapted to survive....
99	L	5. Origin of new species	line 3 and 7	generation to generation, successive cycle and finally giving rise to a new species.	generation to generation, the successive in the life cycle and finally gives rise to a new species.
99	L	Evidences....		Evidences Darwinism include - (i) Evolution of long-necked Giraffe to pluck and eat more leaves from tall trees and woody climbers. This adaptation became fixed in the life for survival. The Giraffe borne tall could survive in famine heat areas. This adaptation was transmitted to their offspring. This is how, present long-necked Giraffe came to existence. (ii) Black colour peppered moths evolved gradually as new species. (iii) DDT resistance in mosquitoes-intensive DDT spraying destroyed all types of mosquitoes. However some mosquitoes developed resistance to DDT and survived the on slaughter of DDT spray. Such resistant mosquitoes survived and reproduce giving rise to more resistant offspring.	Evidences for Darwinism - (i) Evolution of long-necked Giraffe to pluck and eat more leaves from tall trees and woody climbers. This adaptation became fixed in the life for survival. The Giraffe with long neck could survive better in grass land and woodland areas as compared to those having short necks. This adaptation was transmitted to their offspring. This is how, present long-necked Giraffe came to existence. (ii) Black colour peppered moths evolved gradually as new species. (iii) DDT resistance in mosquitoes : intensive DDT spraying destroyed many types of mosquitoes. However some mosquitoes developed resistance to DDT and survived the onslaught of DDT spray. Such resistant mosquitoes survive and reproduce giving rise to more resistant offspring.

99	L	Drawbacks...	a	and not part of evolution... Addition	and not part of evolution i.e. he was unable to distinguish between the environmental and hereditary variations.
99	R		e	e. According to natural selection new species are formed by gradual accumulation of useful variations. If it is so, then their should be intermediate forms. But in most cases intermediate form were not recognised. Moreover, Darwinism also could not explain existence of neutral flowers and the sterility of hybrids.	e. According to natural selection new species are formed by gradual accumulation of useful variations. If it is so, then there should be intermediate forms. But in most cases intermediate forms were not recognized. Moreover, Darwinism also could not explain existence or occurrence of neutral flowers and the sterility of hybrids.
99	R	5.5 Mutation Theory	last 2 line	these sudden changes are inheritable, and proposed the Mutation theory .	these sudden changes are heritable, and proposed the Mutation theory .
100	L	Objections to Mutation...	bullet 2 line 1	Rate of mutation is very slow as compared	Rate of mutation is very low as compared
100	L	Always remember box	bullet 1 line 3	large, sudden, random and direction less.	large, sudden, random and directionless.
100	L	5.6 Modern....	bullet 2 line 3	Fisher, Sewall Wright, Medel, T. H. Morgan	Fisher, Sewall Wright, Mendel , T. H. Morgan
100	L	5.6 Modern....	bullet 3	<ul style="list-style-type: none"> Stebbins in his book discussed five key factors such as gene mutations, mutations in the chromosome structure and number, genetic recombinations natural selection and reproductive isolation, contributed in the evolution of new species. 	<ul style="list-style-type: none"> Stebbins in his book discussed five key factors viz. gene mutations, mutations in the chromosome structure and number, genetic recombinations, natural selection and reproductive isolation. These contributed in the evolution of new species.
101	L	iv. genetic drift..	line 4-7	called genetic drift. For example, when the size of a population is severely reduced due to natural disasters like earthquakes, floods, fires, etc. cause elimination of particular	called genetic drift. For example, the size of a population is severely reduced due to natural disasters like earthquakes, floods, fires, etc. thus causing elimination of particular ...

101	R	b. Natural selection para 1		According to Darwin, natural selection is the main driving force leading to evolution. This holds that genetic variations rise within the population. The 'fittest' will be at the selective advantage and will be more likely to produce offsprings than the rest, as the 'fit' continues to enjoy greater survival and reproductivity, new species will eventually evolve.	According to Darwin, natural selection is the main driving force behind the evolution. This holds that genetic variations arise within the population. The 'fittest' will be at the selective advantage and will be more likely to produce more offsprings than the rest. The 'fit' continues to enjoy greater survival and reproductivity. New species will eventually evolve.
102	L	para 1		Selection against harmful mutations leads to a mutation balance in which allele frequency of harmful recessives remain constant generation after generation.	Selection against harmful mutations leads to a mutation balance, in which allele frequency of harmful recessives remains constant generation after generation.
102	R	c. Isolation : para 2		Number of isolating mechanisms are operated in nature and therefore divergence and speciation may occur. The isolating mechanisms are of two types namely, geographical isolation and reproductive isolation.	Number of isolating mechanisms operate in nature and may promote the divergence, and the speciation. The isolating mechanisms are of two types namely, geographical isolation and reproductive isolation.
102	R	I. Geographical Isolation : para 2	line 3	they acquired new traits by mutations. The	they acquire new traits by mutations. The
103	R	Mutations -	line 1-3 from top	Mutations are already described earlier in this chapter. Gene mutations produce new alleles which are added to gene pool.	Mutations are already described earlier in this chapter. Gene mutations will alter the genetic make up and thus the gene pool.
103	R	Genetic drift - para 2		A bottle neck effect is seen when much of a population is killed due to a natural disaster and only a few remaining individuals are left to begin a new population.	The Bottle neck phenomenon is a type of genetic drift seen when much of a population is killed due to a natural disaster (e.g. Tsunami, Floods, Tornado, Disease epidemic etc.) and only a few individuals are left to begin a new population.
103	R	Natural selection	line 3	variations are selected by nature and leave	variations are selected by nature and thus they leave the...

104	L	a. Stabilizing selection :	bullet 1 line 2	acquired a mean character value.	acquire a mean character value.
104	L	a. Stabilizing selection :	bullet 2 line 5	compare to those who are over-weight or	compared to those who are over-weight or
104	L	a. Stabilizing selection :	bullet 4 line 2-3	tend to maintain phenotypic stability within population, therefore, it is described as	tends to maintain phenotypic stability within the population, therefore, it is described as
104	L	b. Directional selection :	bullet 1 line 1	In this type, more individuals acquired value	In this type, more individuals acquire a value
104	L	b. Directional selection :	bullet 3 line 3, 4	trend within a population and shifting a	trend within a population and shifting of the peak ...
104	L	b. Directional selection :	bullet 4 line 1	e.g. Industrial melanism, DDT resistant	Examples - Industrial melanism, DDT resistant
104	R	c. Disruptive Natural selection	bullet 2 line 1,2	Nature select extreme phenotypes and eliminate intermediate. Hence two peaks	Nature selects extreme phenotypes and eliminates the intermediate. Hence two peaks
104	R	c. Disruptive Natural selection	line 5 to 6	Large beak sized birds feeds on large seeds	Large beak sized birds feed on large seeds
105	L	5.8 Hardy-Weinberg's...	line 13	locus is always one. i.e. $P + Q = 1$. The genotypic	locus is always one. i.e. $p + q = 1$. The genotypic
105	L	5.8 Hardy-Weinberg's...	line 16	is $P^2 + 2pq + q^2 = 1$ i.e. $AA=P^2$, $aa=q^2$ and for	is $p^2 + 2pq + q^2 = 1$ i.e. $AA=p^2$, $aa=q^2$ and for
105	L	5.8 Hardy-Weinberg's...	line 18	Hence $P^2 + 2pq + q^2 = 1$ This is a binomial	Hence $p^2 + 2pq + q^2 = 1$. This is a binomial
105	L	5.8 Hardy-Weinberg's...	above the table	This can be explained by punnet square as follow.	This can be explained by Punnett square as follows :
105	L	Table		Hybrid Aa, Hybrid A a	Hybrid Aa/pq, Hybrid A a/pq
105	L	below the table	line 1-2	Like allele frequency, the genotypic frequencies together are also equal to 1.	Like the allele frequency, the genotypic frequencies together are also equal to 1. i.e. $AA + 2Aa + aa = 1$

106	L	Can you tell box	Q.3	3. What is Homologous organs ?	3. What are Homologous organs ?
106	R	Connecting link		Connecting link (missing link) : These are fossil forms transitional or intermediate between two groups of organisms. It shows some characters to both the groups. Thus it indicate the evolutionary line Seymouria (between amphibians and reptiles). e.g. Archaeopteryx (between reptiles and birds).	Connecting link (s) [(missing links)] : These are fossil forms transitional or intermediate between two groups of organisms. They show some characters akin to both the groups. Thus indicate the evolutionary line, e.g. <i>Seymouria</i> (between amphibians and reptiles) and <i>Archaeopteryx</i> (between reptiles and birds).
108	L	a. Homologous organs :	pt.3	Addition in the para	3. In plants, thorns of <i>Bougainvillea</i> and tendrils of <i>Cucurbita</i> represent homology. Thorns of Bael and tendrils of passion flower are homologous.
108	L	b. Analogous organs :		Addition as point 4	4. Terminal leaflets of pea and apical bud in <i>Vitis</i> are modified into tendrils.
108	R	c. Vestigeal organs :	last line above the e.g.	with those organisms were these organs are fully developed.	with those organisms where these organs are fully developed.
109	L	5.11 a. Allopatric speciation	line 1-7	i. Allopatric speciation : Formation of a new species due to separation of a segment of population from the original population by distanced or a geographical barrier cutting across the species range. e.g. creeping glaciers, development of mountains. Migration of individual also causes allopatric speciation. The mode of evolution here is called adaptive radiation	i. Allopatric speciation : It is the formation of a new species due to separation of a segment of the population from its original population by distance or by a geographical barrier cutting across the species range. e.g. creeping glaciers and development of mountains. Migration of individuals also causes allopatric speciation. The mode of evolution here is called adaptive radiation...
109	R	ii. Sympatric speciation:	line 1-2	Formation of species within single population without	It is the formation of new species within single population without...

109	R	Hybridisation :		Hybridisation :Two different species on crossing may give rise to a new species. e.g. Mule is a hybrid produced by interbreeding between a male donkey and a female horse. Hinny is offspring of male horse and female donkey.	Hybridisation :Two different species on crossing may give rise to a hybrid that on doubling of its chromosomes forms a new species. e.g. <i>Triticum aestivum</i> (hexaploid) and <i>Gossypium herbaceum</i> (tetraploid).
109	R	5.12 Geological time scale : para 1	line 3	tells us that life forms were not the same millions	tells us that life forms were not the same like today's, millions.....
110		Table 5.15	column 4 and 5	Recent (Holocene), Angiosperms	Recent (Holocene), Angiosperms dicots, monocots, spread of agriculture.
110		Table 5.15	column 4 and 5	Pliocene - Hard woody plants conifers, grasslands bryophytes, monocots	Pliocene Hard woody plants conifers, bryophytes, monocots, grasslands dominated
110		Table 5.15	column 4 and 5	Miocene- Abundance of deciduous trees origin of grasses	Abundance of deciduous trees, origin of grasses.
110		Table 5.15	column 4 and 5	Palaeocene-Modernisation of flowering plants	Palaeocene- Advancement of flowering plants and grasses
110		Table 5.15	column 2 and 5	Cretaceous- Decline of ferns - sphenopsids (horsetails) and Gymnosperms Ginkos, Gnetales. 1st appearance of flowering plants.	Cretaceous- Decline of ferns - sphenopsids (horsetails) and Bennettiales Gymnosperms Ginkgos, Gnetales. 1st appearance of Angiospermic plants which begin to dominate land.
110		Table 5.15	column 2 and 5	Jurassic -Origin of angiosperms Dominance of lycopods, ferns, conifers, cycads.	Jurassic -Origin of angiosperms, Dominance of herbaceous lycopods, ferns, conifers, cycads.

110		Table 5.15	column 2 and 5	Triassic- Dominance of gymnosperms extinction of seed ferns	Triassic- Dominance of Bennetiales gymnosperms, extinction of seed ferns
111		Table 5.15	column 2 and 5	permian- Origin of conifers Decline of lycopods Abundance of ferns, cycads and conifers	permian- Origin of conifers, Decline of arborescent lycopods, Abundance of ferns, cycads and advanced conifers
111		Table 5.15	column 2 and 5	Carboniferous- Development of diverse pteridophytes, mosses and gymnosperms. age of ferns and coal forests, different fungal groups	Carboniferous- Development of diverse arborescent lycopods, mosses, seed ferns and primitive conifers. Age of ferns and coal forests, different fungal groups.
118	L	Very short ans.	Q.3	3. If the variation occur in population by chance alone and not by natural selection and bring change in frequencies of an allele. What is it called?	3. If the variation occur in population by chance alone but not through natural selection and it brings change in frequency of an allele. What is it called?
118	L	Q. 4 Match the following	column 2 c	3. Charles Darwin - c. Theory of acquired characters	3. Charles Darwin - c. Theory of inheritance of acquired characters
118	R	Q.5 Long Ans.	3	3. By talking industrial melanism as one example. Explain the concept of natural selection.	3. By taking industrial melanism as one example, explain the concept of natural selection.
118	R	Q.5 Long Ans.	6	6. What is Genetic variations? Explain the different factors responsible for genetic variations.	6. What are Genetic variations? Explain the different factors responsible for genetic variations.

Chapter 6 : Plant Water Relation

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
121	R	below iii. isotonic		Osmosis is of two types viz, Exo-osmosis and Endo-osmosis.	Osmosis is of two types viz, Exosmosis and Endosmosis.
121	R			Exo-osmosis : It is the migration of solvent	Exosmosis : It is the diffusion of solvent
121	R			Endo-osmosis : It is the migration of the	Endosmosis : It is the diffusion of the
123	L	6.7 para 2	last 3rd line	cells of endodermis and finally into the cell of	cells of endodermis (in monocot roots) and finally into the cell of...
126	R	iii.	line 1	iii. If plant is smeared with vaseline in order to	iii. If plant leaves are smeared with vaseline in order to
127	L	6.11 Transport of food	line 1-2	All the plant parts require continous supply of food for nutrition and developement. In	All the plant parts require continous supply of food (photosynthate) for nutrition and developement. In
128	L	Lateral translocation :	line 1	Lateral translocation : It occurs in the root and	Lateral translocation : It occurs horizontally/laterally across the root and....
130	L	para 2	line 4	its lateral wall is thin and elastic. Guard cells	its lateral (outer) wall is thin and elastic. Guard cells
133	R	Q.4	Sub Q. 5.	5. What is hydroponics? How is it useful in identifying the role of nutrients?	to be deleted altogether.
133	L	Q. 3	11.	How are minerals absorbed by the plants?	to be transferred to Q.4 on page 152

Chapter 7 : Plant Growth and Mineral Nutrition

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
134	L	7.1 Plant growth para 1	last line	product of successive metabolism.	product of successful metabolism.

134	R	7.2 A phase...	line 4	cytoplasm. Meristematic cell undergoes	cytoplasm. Meristematic (particularly cambial) cell undergoes
135		box	pt. 4	4. Increase in volume of a fruit - e.g. In watermelon flower, ovary after fertilization increases in	4. Increase in volume of a fruit - e.g. In watermelon flower, the ovary after fertilization increases in
137	L	7.5 Growth curve :	last para last line	of growth, a sigmoid curve is obtained.	of growth, a 's' shaped i.e. sigmoid curve is obtained.
140	L	Box	line 2 - 3	..... ester form, 2, 4-D and 2,4,5-T (dioxin) is known .....	..... ester form viz. 2, 4-D and 2, 4, 5-T (dioxin), is known
140	L	b. Gibberellins : para 2	line 13	GA ₃ is most common and biologically active	GA ₃ (= Gibberellic acid) is the most common and biologically active
140	R		line 4 from top	Addition	increase in length and converting genotypic dwarf to phenotypic tall plant. It also promotes bolting i.e.....
140	R	c. Cytokinin :	line 1-2	It is another growth hormone that promotes cell division. Letham coined the term cytokinin.	It is another growth hormone that promotes cytokinesis during cell division. Letham coined the term cytokinin.
142	L	Photoperio.... para 1	last 3 line	flowering. The influence of light is known as Photoperiodism and that of temperature, is Vernalization .	flowering. The influence of duration of light is known as Photoperiodism and that of low temperature, is Vernalization .
143	L	b. Long Day Plants (LDP)	line 1	Plants that flower during summer are	Plants that flower usually during summer are
143	L	Fig. 7.9	labelling	a. Requires a relatively long of uninterrupted darkness.	a - SDP Requires a relatively long uninterrupted darkness.
143	L	Fig. 7.9	labelling	b. Requires a relatively small duration of darkness/ no darkness at all.	b - LDP Requires a relatively short duration of darkness/ no darkness at all.
143	R	Phytochrome : para 2	line 1	The leaves produce light-receiving	The leaves posses light-receiving....

143	R	Phytochrome :	below the diagram	During day time, P_{fr} accumulates in the plants. It inhibits flowering in SDP but initiates flowering in LDP. During dark period P_{fr} changes into P_r , it stimulates/ promotes flowering in SDP and inhibits flowering in LDP.	During day time, P_{fr} accumulates in the plants because of conversion of P_r into P_{fr} . It inhibits flowering in SDP but initiates flowering in LDP. During dark period, P_{fr} changes into P_r which stimulates/ promotes flowering in SDP but inhibits flowering in LDP.
144	R	Advantages...	bullet 1	• Crops can be produced earlier.	• Crop plants by shortening of the juvenile phase attain early flowering.
144	R	7.12 Mineral	line 1-2	Plant absorbs water, gases, mineral, nutrients, etc. from surroundings. Green plants	Plant absorbs water, gases, minerals and nutrients from surroundings. Green plants
145	L	para 1	line 5	the catalytic role e.g. Zn, Cu, Al, Si, etc. as	the catalytic role e.g. Zn, Cu, Al, Si, Mn, B, Mo, Cl etc. as
145	L	para 1	2 nd last line	S, etc. C, H, O are non mineral major elements.	S, Ca and Fe. C, H, O are non mineral major elements.
147	L	upper Do you know box	bullet 3 line 1-2	• Catalytic functions : Many elements like Fe, Cu, Zn, Mg, Mn, Cl, etc. act as ...	• Catalytic functions : Many elements like Fe, Cu, Zn, Mg, Mn, Cl, MO, B act as ...
147	L	Toxicity....		Addition in the para	The phenomenon where toxic effect of one mineral is counter balanced by the other ion, is called antagonism .
147	R	b. Donnan equilibrium :	line 3	ions, after their entry into the cell, become	ions (i.e. anions), after their entry into the cell, become
148	L	7.13 Nitrogen cycle:	2 nd last line	Plants need nitrogen in a reactive form usually	Plants badly need nitrogen in a reactive form usually
148	R	Box	21	Industrial nitrogen fixation.	Industrial nitrogen fixation:
149	L	Biological Nitrogen fixation : para 2	line 2	process and nitrogen fixers use 16 molecules of	process (endothermic reaction) and nitrogen fixers use 16 molecules of ...

149	L	Nitrification : para 1	line 1	Most of the soil bacteria participate in... Addition before the 1st line	Nitrification is exothermic reaction. Most of the soil bacteria participate in...
150		Do you know box	bullet 1	1. Soil nitrogen is replenished by excretion of animals, (as ammonia, urea and uric acid) ammonification and nitrification.	1. Soil nitrogen is replenished through the nitrogenous waste of animals, (as ammonia, urea and uric acid) via. ammonification and nitrification.
152	R	Q.4	Sub Q. 5	Addition	How are minerals absorbed by the plants?

Chapter 8 : Respiration and Circulation

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
153	R		line 2 from top	Addition	spaces are continuous. Exchange of gases takes place between the air and the tissue. Oxygen diffuses into.....
158	R	Graph 8.7	labelling	Oxygen ppO_2 (mm Hg)	Oxygen tension ppO_2 of blood (mm Hg)
158	R	Carbon monoxide poisoning	line 7 - 8	monoxide preventing oxygen from binding with hemoglobin. Thus less hemoglobin.....	monoxide thus preventing oxygen from binding with it as a result less hemoglobin.....
162	R	internet my ...	line 1	Which is type of circulation present in amphibians and reptiles ?	Which type of circulation is present in amphibians and reptiles ?

Chapter 9 : Control and Coordination

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
183	L	Fig 9.2	labelling	Flatworms e.g. Planaria	Flatworms e.g. <i>Planaria</i>
202	L	Eye	line 6	..... upper and lower eyelids eyelashes ....	..... upper and lower eyelids, eyelashes
212	R	below the box	line 7	transmitters adrenaline and nor-adrenaline	transmitters - adrenaline and nor-adrenaline

215	R	Pancreas	line 3 line 5	and endocrine gland. ... four kinds of hormone....	and an endocrine gland. ... four types of hormone....
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Chapter 10 : Human Health and Diseases

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
239	R	Middle period	line 6 second last line	conditions; capability for establishing peer group defining	conditions; capability for establishing peer group that helps in defining

Chapter 11 : Enhancement of Food Production

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
246	R	Lower do you know box	last 2 line	Molecular plant breeding, Tissue culture, rDNA technology, SCP, etc.	Molecular plant breeding, and rDNA technology.
247	R	2. Evaluation...	line 4	The selected parents must be healthy, vigorous	The two plants selected as parents must be healthy, vigorous
248	R	para 2		Many high yielding, hybrid varieties of rice, wheat, sugarcane, millets, developed through hybridization, have helped farmer community to attain record agricultural production in India since 1961. This is called green revolution .	The cultivation of many high yielding, hybrid varieties of rice, wheat, sugarcane, millets, developed through hybridization, and the use of fertilizers pesticides and proper irrigation have helped farmer community to attain record agricultural production in India since 1961. This is called green revolution .
251	R	Advantages ...	bullet 4 line 1	4. Genetically similar plants (clones) are	4. Genetically identical plants (clones) are

252	R	11.5 Bio....	line 1-3	It is a method in which crops are bred (produced) for having higher levels of vitamins, minerals and fats (i.e. better nutritive value). Addition of sentence	It is a method in which crops are bred (produced) for having higher levels of vitamins, minerals and fats (i.e. better nutritive value). It can also be achieved by supplementing nutrients from outside, besides through breeding.
258	R	11.7 Microbes..	para 2 line 3-4	algae, fungi, bacteria, viruses, protozoans, nematodes, etc. and their products that exhibit beneficial activities which are used for welfare	algae, fungi, bacteria, viruses, protozoans, nematodes etc. Their products having beneficial activities are used for welfare
259	R	iv. Cheese:		The milk is coagulated with lactic acid - addition to be done prior to the above sentence	It is the partially degraded concentrate of milk fat and caesin. The milk is coagulated with lactic acid
260	L	a. Production..	line 1-2	Beverage is a liquid used or prepared for	Beverage is a non-alcoholic or alcoholic liquid produced or prepared and used for drinking e.g. ...
260	R	c. Production..	line 1-2	Vitamins are some organic nitrogenous compounds which are capable of performing many life-sustaining functions inside our body.	Vitamins are some complex organic nitrogenous compounds required in small amount and are capable of performing many life-sustaining functions of our body.
265	R	Table 11.14	headings of columns	Pathogen Host	Pathogen (biocontrol agent) Host(target pest)

Chapter 12 : Biotechnology

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
273.	L	para 2	line 4	way, using in vitro process.	way, using 'in vitro' process.
280	R	para 2	line 1-4	The genes are inserted by the side of β -galactosidase gene of the plasmid. The recombinant plasmids were then separately transformed into <i>E. coli</i> host.	The genes for chain A and B are inserted next to β -galactosidase gene separately in separate plasmid vectors. The recombinant plasmids are then separately introduced into <i>E. coli</i> host cell.

280	R	Vaccine production: para 3	line 1	Vaccines have eliminated small pox,	Vaccines have eliminated (eradicated) small pox, ...
281	L	Oral Vaccine: para 2	line 5-6	important example is the production of flu vaccine by <i>Bacillus</i> which melts in the mouth.	important example is the production of flu vaccine by <i>Bacillus subtilis</i> which melts in the mouth.
281	L	b. Agriculture para 1		para 1 modified	Application of Biotechnology in Agriculture involves the use of genetically modified crops through the gene manipulation. The GM crop that are pest resistant, stress tolerants etc. are used in improving the productivity.
281	R	Gene therapy box	line 1 and 4	Gene therapy is the treatment of disease ...or abnormality is responsible for the disease.	Gene therapy is the treatment of disease (disorder)... ...or abnormality is responsible for the disease (disorder).
281	R	Gene therapy Para 2	line 1	Most, if not all, diseases have a genetic	Most, if not all, disorders have a genetic..
281	R	Gene therapy Para 2	line 3	partially responsible for the disease. For	partially responsible for the disorder. For
281	R	Gene therapy	Bullet 2	• Deliver genes that speed the destruction of cancer cells;	• Deliver genes that speed up the destruction of cancer cells;
283	R	Highlighted box		Golden rice - a transgenic food crop used to reduce vitamin A deficiency disease.	Golden rice - a transgenic food crop used to reduce vitamin A deficiency disease (night blindness).
283	R	b. bioforti... para 2	line 1	Especially terrible is the blindness that	Especially terrible is the night blindness that
283	R	b. bioforti... para 2	line 5	world cannot afford. To solve this problem,	world do not easily afford. To solve this problem,
283	R	b. bioforti... para 2	line 9	The golden colour is due to vitamin A. They	The golden colour is due to beta carotene a precursor of vitamin A. They....

284	R	para 1	line 11-12	called Flavr savr tomatoes) can remain on the vine until mature and be transported in a firm solid state.	called 'Flavr savr' tomatoes) can remain on the vine until mature (long shelf life) and be transported in a firm solid state.
285	L		bullet d.	d. Genetically engineered opium poppy to produce more powerful painkillers.	d. Products of Genetically engineered opium (poppy) used to produce more powerful (i.e. strong) painkillers - i.e. analgesics and sedatives.
285	L	e. Transgenic..	line 5	in developing countries. Potatoes, tomatoes,	in developing countries. GM Potatoes, tomatoes,
285	L	e. Transgenic..	last line	vaccine delivery. Addition in the ...	vaccine delivery. Fruits of GM banana can be used as oral edible vaccine against Hepatitis - B.
288	L	a. Herbicide....	line 1	Effects on the environment are a particular	Effects on the environment are of a particular
288	L	a. Herbicide....	line 8	crops in less than ideal conditions. However,	crops in lesser ideal conditions. However,
288	R	c. New Proteins	last line	...unknown.	...unknown. eg. whey protein.
288	R	d. Food Additives ... para 1	line 5	and disease resistance to those countries ...	and disease resistance to the people of those countries ...
288	R	d. Food Additives ... para 2	line 2-3	of antibiotic and vaccine-resistant strains of diseases.	of antibiotic and vaccine-resistant strains of pathogens.
291	R	Q.3 short....	1.	1. Explain the properties of a good or ideal cloning vector for rDNA technology.	1. Explain the properties of a good and ideal cloning vector in rDNA technology.
291	R	Q.3 short....	2.	2. A PCR machine can rise temperature...	2. In a PCR machine the temperature can be raised upto...

Chapter 13 : Organisms and Populations

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
294	R	Table 13.2	3 rd diff.. in both columns	Effect of temperature, rainfall and other abiotic factors. Flow of energy from one organism to other through ecosystem.	has effect of temperature, rainfall and other abiotic factors on its population. shows impact of organisms upon the habitat .

294	R	Table 13.2	5 th diff..	Niche is an activity performed by organisms.	Niche is an activity or role performed by organisms.
302	L	Para 1	2 nd last line	benefited in mutualism and both are harmed in competition .	benefited in mutualism and one or both may be harmed in the competition .
307	L	MCQ 3	catption	3. Association between sea anemone and Hermit crab in gastropod shell is that of	3. Association between sea anemone and clown fish is that of

Chapter 14 : Ecosystems and Energy flow

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
308	L	Para 1	line 16	ecosystems while lakes, wetlands, rivers and...	ecosystems while lakes, wetlands, rivers, seas, oceans and....
308	L	Para 2	line 2	analyse the structure of the ecosystem, in order ...	analyse the structure and functions of the ecosystem, in order ...
308	L	Para 2	line 3	to appreciate the input (productivity), transfer ...	to appreciate the input (net productivity), transfer...
308	L	Para 2	line 5	and the output (degradation and energy loss).	and the output (as degradation and energy loss).
312	R	Fig. 4.6	Title	Fig. 14.6 : Energy loss with increasing trophic level	Fig. 14.6 : Energy flow showing loss at increasing trophic level
312	L	below box	line 7	saprotrophs . Decomposers secrete enzymes	saprotrophs (saprobes) . Decomposers secrete enzymes
313	L	14.3 Ecological para 2	line 3	an inverted cone like structure. This concept	an upright cone like structure. This concept

314	L	para 1	line 1-5	Pyramid of energy is always upright , can never be inverted, because when energy flows from a particular trophic level to the next trophic level, some energy is always lost as heat at each step.	Pyramid of energy is always upright. It can never be inverted, because when energy flows from a particular trophic level only 10% pass on as net energy to the next trophic level, and large amount of energy is always lost as heat at each step.
314	L	14.4 Nutrient..	line 5	calcium, etc. present in the soil, varies in ...	calcium, etc. present in the soil. Their concentration varies in...
316	L	14.5 Ecological	line 3	ecosystem is occupied by the pioneer species.	ecosystem is initially occupied by the pioneer species.

Chapter 15 : Biodiversity, Conservation and Environmental Issues

Page No.	Column Left (L) Right (R)	Heading/ Paragraph	Line No.	Printed Matter	Correction
321	R	para 1		a defined area... Addition	a defined area. In nut shell, biodiversity is the totality of genes species and ecosystem in a region (as per IUCN, UNEP and WRI).
322	L	a. Genetic... para 1	last 3 rd line	species. You know about 1000 varieties of	species. There are about 1000 varieties of
322	L	a. Genetic... para 2	line 1-4	Another case of genetic diversity is : a medicinal plant <i>Rauwolfia vomitoria</i> which secretes active component reserpine, is found in different Himalayan ranges. This plant	Another case of genetic diversity is a medicinal plant <i>Rauwolfia serpentina</i> which secretes (produces) active component reserpine. It is found in different Himalayan ranges. This plant....
323	R	Below fig. 15.5	line 1-5	Humboldt observed that species richness does increase with the increase in area but upto a limit. Observe the graph for species-area relationship. For many species this curve is a rectangular hyperbola.	Humboldt observed that species richness increases with the increase in area but upto a certain limit. Observe the graph for species-area relationship. For many species this relationship is in the form of a rectangular hyperbola.

325	R	15.4 Loss of para 2	last line	overexploitation and reclamation. Addition	overexploitation and reclamation (of mangroove lands).
325	R	Yellow box	line 1 - 2	Major mass extinction events occurred between Cretaceous and Coenozoic period;	Major mass extinction events occurred between pleistocene and holocene epoch; between Cretaceous and Tertiary period;
325	R	15.4 Loss of	below the box line 1-4	We are aware of five mass extinctions during various stages of history of earth (e.g. ice age). The current loss of biodiversity is considered to be the Sixth extinction which	We are aware of six mass extinctions during various stages of history of earth (e.g. ice age). The current loss of biodiversity extinction (holocene) is considered to be the seventh mass extinction which...
328	L	15.5 Conservation para 1	line 4	its optimum level and to derive sustainable	its optimum level and also to derive sustainable
329	L	para 1	line 1-4	India has three of world's biodiversity hotspots (the areas with high density of biodiversity), Western ghats, Indo-Burma and Eastern-Himalayas . It has been estimated...	India has four of world's biodiversity hotspots (the areas with high density of biodiversity) : Western ghats, Indo-Burma region, Sundaland and Eastern-Himalayas . It has been estimated....
331	L	para 1	line 3-4	Any substance that causes pollution, is called Pollutant . In order to protect and improve	Any substance - chemical or form of energy that adversely affect health of living organism including humans, is called Pollutant . In order to protect and improve
331	L	Particu....	line 1-2	Particulate air pollutants may be solid or liquids. Particles with diameter 10 µm may	Particulate air pollutants are solids and also as fine liquid droplets called aerosols. Particles with diameter 10 µm may
334	L	para 2		Addition in last line	.... construction sites, industries, public functions, festivals, family functions etc.
334	R	Domestic sewage	line 3	human consumption. Solids are relatively easy...	human consumption and also affect aquatic plant and animals. Solids are relatively easy...
335	R	Fig. 15.8		Arrows in the figure shown in downward direction	Arrows in the figure to be shown in upward direction

338	L	below the fig. para 1	line 4-5	cycle is repeated many times. Hence CO ₂ and CH ₄ are commonly called greenhouse gases .	cycle is repeated many times. Similar phenomenon prevails under green house/ glass house. Hence it is called greenhouse effect . Gases CO ₂ and CH ₄ involved in the process are called greenhouse gases .
338	L	below the fig. para 4	2 nd last line	are emitted by fire extinguishers and air conditioners.	are emitted by fire extinguishers, jet planes, air conditioners etc.
342	R	Q.3 Short...	lin 4	4. Green house effect is boon or bane? Give your opinion.	4. Is green house effect boon or bane? Give your opinion.