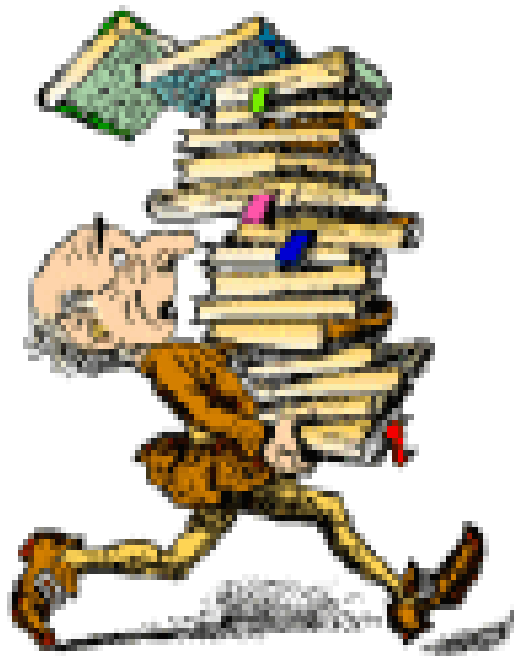


# STUDY MATERIAL FOR CLASS XII

SESSION 2010-2011

## BIOLOGY



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**KENDRIYA VIDYALAYA SANGATHAN**

**STUDY MATERIAL OF BIOLOGY**

**CLASS:-XII**

**Moderated at ZIET, Chandigarh**

## PREFACE

In the ACs' conference held in July, 2010 at KVS (HQ), New Delhi, issue of Study Material for Board classes was discussed at length and finally decided to provide it to students. Various Regional Offices were asked to prepare the study material in different subjects while the task of its correction and moderation was assigned to various ZIETs of KVS.

KVS, ZIET, Chandigarh received study material in the subjects of Physics, Chemistry, and Biology & Maths for XII, Maths and Science & Tech. for X class, from various Regional Offices. The study material was got reviewed and suitably modified by organising workshops of experienced and competent subject teachers with the co-operation and guidance of AC, KVS, RO, CHD. Corrected study material was sent to all regional offices for providing it to students and also uploaded on the Website [WWW.zietchandigarh.org](http://WWW.zietchandigarh.org).

Subject teachers, both at the preparation and moderation levels have done a remarkable job by preparing a comprehensive study material of multiple utility. It has been carefully designed and prepared so as to promote better learning and encourage creativity in students through their increased self efforts for solving assignments of different difficulty level. But the teachers and the students must bear in mind that the purpose of the study material is in no way to replace the text-book, but to make it a complete set by supplementing it with this study material so that it may provide requisite and adequate material for use in different ways.

The study material can be effectively used in the following ways:

- ❖ **Practice material** to supplement questions given in the textbook.
- ❖ **Material for Study Camps:** The purpose of conducting study camps is to inculcate study habits amongst students under active supervision of the teachers. These camps can be organised within the normal school hours and days. Day wise target will be ascertained and given to the students and reviewed by the concerned subject teacher. If the target is not achieved by any student, it will be added to the next day's target.
- ❖ **Master Cards:** The teachers can help students prepare master cards by taking the important questions/topics/points/concepts /reactions/terms etc from this study material for the quick revision for the examination.
- ❖ **Crash Revision Courses:** The material can also be used for preparing handouts for conducting Crash Revision Courses under the supervised guidance of the teachers just before or in the gaps between papers during examination.

Effectiveness of the study material will ultimately depend upon its regular and judicious use for the above listed purposes both by teachers and students. While attempting the source material, it would be quite useful to mark every time a question done successfully with a tick out (✓) and a question not done successfully with a dot (•). It can be later used as a source of feedback for error analysis and for effective subsequent revisions/remedial work etc. I am sure that this well prepared study material if used sincerely and judiciously will surely bring cheers to all sections of students.

I, also, take this opportunity to extend my most sincere gratitude to our Hon'ble, Commissioner KVS (HQ), New Delhi, and other higher authorities of KVS for providing this opportunity for making some useful contribution to the study material.

I also extend my thanks to all the Assistant Commissioners of various Regions for their in-valuable contribution in preparation of the Study Material in various subjects.

Above all, sincere and dedicated efforts of the subject teachers in preparation of this study material deserve full appreciation. Teacher's observations, suggestions and critical analysis for further improvement of the study material mailed to 'kvszietchd' @[gmail.com](mailto:kvszietchd@gmail.com), will be highly appreciated.

With best wishes to all users of this STUDY MATERIAL.

(HAR GOPAL)

Director

KVS ZIET Chd.

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**Details of the concept to be mastered by every child of class XII with concepts and exercises  
of NCERT Book.**

**Symbols used**

\* Important Questions      \*\* Very Important Questions

\*\*\* Very-very Important Questions

CHAPTER	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
Reproduction In Organisms	Types of reproduction A) Asexual reproduction B) Sexual reproduction, phases and events in sexual reproduction	*  **	NCERT text book xii fig . 1.2(a) (b) fig. 1.3, 1.4 page 5-8  NCERT book p – 15 - 19 ex q 2,6,9,13,15,18	fail to differentiate asexual reproductive structures- zoospores, conidium, gemules etc.  differentiation in monoecious & dioecious
Sexual Reproduction In Flowering Plants	1. Pre fertilization: structures and events (i) stamens microsporangium & pollen grain microsporogenesis (ii) pistil megasporangium ( ovule) embryosac- megasporogenesis 2) pollination (i) autogamy , xenogamy, geitonogamy (ii) agents of pollination (iii) out breeding devices (iv) pollen pistil interaction 3. Double fertilization 4. Post fertilization : structures & events – endosperm , embryo, seed 5. Apomixis - polyembryony	***  **  **  **  ***  *  **	NCERT book fig 2.2. 2.3 , 2.5 p – 21 – 23  NCERT book fig 2.7(d) 2.8 p – 24 – 27  NCERT book p – 27 – 28  NCERT book p – 31 – 33  NCERT book p – 34 fig 2.12. (c,d,e)	no. of cells in mature pollen grains  no. of cells & nuclei in embryo sac , role of synergids  self incompatibility  triple fusion  free nuclear & cellular endosperm, embryo of monocot

			fig – 2.13, 2.14, 2.15 p – 35 NCERT p – 38 NCERT	fail to differentiate apomixes , parthenocarpy
Human Reproduction	1 male reproductive system (i) diagram & description (ii) parts of male reproductive system (structure) (iii) functions of parts of system (iv) accessory ducts (v) accessory glands	*  *  * * * * * * *	NCERT P – 43 , FIG 3.1 (B) NCERT P – 43-44  NCERT P – 43-44	Exact Location & Function Of Leydig Cells & Sertoli Cells
	2. Female reproductive system (i) diagram & description (ii) parts of female reproductive system (structure) (iii) functions of parts of system (iv) accessory ducts (v) uterus & its layers (vi) mammary glands	* *  *  * * * * * *	NCERT P – 44- 46 , FIG 3.3 (B) -DO-  NCERT P – 44-46 NCERT P – 44 NCERT P – 46 NCERT P – 47	
	3 gametogenesis (i) spermatogenesis & diagram  (ii) stages of spermatogenesis with names of cells & no of chromosomes (iii) structure of sperm	** *          ***	NCERT P – 47 FIG – 3.2 & 3.5 , 3.8 (a) P – 49  Page no 47	Exact Stage Where Meiosis I & II Occurs During Gametogenesis As Well As The Ploidy Of Cells At Each Stage Of Gametogenesis

	(diagram) (iv) functions of each part of sperm & organelles (v) composition of semen	*** *** **	Fig 3.6, page no 48 page no 48 page no 48	
	4 oogenesis i) structure and description ii) development of follicles iii) stages with names of cells and no. of chromosomes with events iv) significance of polar bodies	*** ** *** ***	Fig 3.7 ,Fig 3.8(b) Page no 48-49 Page no48-49 Page no48-49	Difficulty in relating different stages of oogenesis with different life stages.
	5 menstrual cycle (i) menarche and menopause (ii) phases of menstrual cycle with diagram (iii) role of hormones in cycle	* ** ***	Page no – 49, 51 Fig 3.9	Co-relation of levels of pituitary hormones and events during menstrual cycle
	6 fertilization and implantation (i) structure of ovum (ii) cleavage- formation of morula and blastula (iii) implantation- meaning, stage and site (iv) sex determination in humans (v) three germ layers	* * * * * * * * * *	Fig – 3.1, Page no – 51 Fig – 3.11 Page no – 52 Page 53 Page 52 Page 54	Labelling of mature graafian follicle
	7 pregnancy and embryonic development (i) placenta as endocrine gland (ii) embryo and extra-embryonic layers	* * * * *	Page 53 Fig – 3.12 Page 53	
	8 parturition (i) meaning (ii) foetal ejection reflex (iii) Role of hormones	* *	Page no – 54	Hormones involved at the time of parturition
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	**	Page-280		
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	***			
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## Chapter – 1 - REPRODUCTION IN ORGANISMS

CHAPTER	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
Reproduction In Organisms	Types of reproduction C) Asexual reproduction D) Sexual reproduction, phases and events in sexual reproduction	*  * *	NCERT text book xii fig . 1.2(a) (b) fig. 1.3, 1.4 page 5-8  NCERT book p – 15 - 19 ex q 2,6,9,13,15,18	fail to differentiate asexual reproductive structures- zoospores, conidium, gemules etc.  differentiation in monoecious & dioecious

### Definitions:

- **CLONE** :- Offspring from single parent, Morphology and genetically similar individuals.
- **CYST** :- Hard covering around the organism protecting from anti environment.
- **DIOECIOUS** :- It is the condition in which either male or female reproductive organs are found in the same body of an organism.
- **EMBRYOGENESIS** :- It is the process of development of embryo from the zygote..
- **FERTILIZATION** :- The union of two opposite types of gametes, spermatozoa and ova to produce single diploid zygote.
- **FISSION** :- Division of nucleus with cytoplasm.
- **FRAGMENTATION** :- Division of breaking into distinct pieces each of which can produce an offspring.
- **GEMMULE** :- The parent individual releases a specialized mass of cells enclosed in a common opaque envelope called the gemmule.
- **HERMAPHRODITE** :- Organisms which have both male and female reproductive organs in the same individual.
- **HOMOGAMETES** :- When the two gametes of male and female are so similar in appearance that it is not possible to categorize them into male and female gametes.
- **JUVENILE PHASE** :- Juvenile Phase represents the period of an organism from birth upto reaching reproductive maturity.
- **LIFE SPAN** :- The period from birth to the natural death of an organism.
- **MEIOCYTE** :- The cell which undergoes meiosis is called a meiocyte .
- **MONOECIOUS** :- It is the condition in which male and female reproductive organs are found in the same body of an organism.
- **PARTHENOGENESIS** :- The female gamete undergoes development to form new organisms without fertilization.
- **REPRODUCTION** :- Biological process in which an organism gives rise to young ones of its own kind.
- **SYNGAMY** :- Syngamy refers to the fusion of two (male and female) gametes.
- **VEGETATIVE PROPAGATION** :- It is the process of formation or regeneration of new plants from a portion of a vegetative part of the plant .

## Differences

External fertilization	Internal fertilization
<ol style="list-style-type: none"> <li>1. This is fusion of gametes (syngamy) outside the body</li> <li>2. The progeny formed are extremely vulnerable to predators. eg. bony fishes and amphibians</li> </ol>	<ol style="list-style-type: none"> <li>1. It is the fusion of gametes inside the body of mother.</li> <li>2. They are well protected hence the chances of more survival of young ones. eg. reptiles</li> </ol>

Menstrual cycle	Oestrous cycle
<ol style="list-style-type: none"> <li>1. It is the cyclic change that takes place in reproductive organs of primate females</li> <li>2. Menstruation takes place at the end of cycle in the absence of fertilization.</li> <li>3. Copulation takes place in any season.</li> <li>4. Eg. humans</li> </ol>	<ol style="list-style-type: none"> <li>1. It operates in the non primate females</li> <li>2. No menstruation take place at the end of cycle</li> <li>3. Copulation takes place in heat period.</li> <li>4. Eg. cow, deer</li> </ol>

Seasonal breeders	Continuous breeder
<ol style="list-style-type: none"> <li>1. There are some animals/ mammals which possess the changes in reproductive organs only during favourable conditions.</li> <li>2. They reproduce only in a particular season of year eg. Dogs and rats</li> </ol>	<ol style="list-style-type: none"> <li>1. These are the mammals which possess changes in their reproductive organs throughout their reproductive phase.</li> <li>2. They reproduce during any time of the year. Eg. Humans</li> </ol>

Oviparous	Viviparous animals
<ol style="list-style-type: none"> <li>1. The animals which lay fertilized or unfertilized eggs.</li> <li>2. The development takes place outside the body eg. Reptiles and birds.</li> </ol>	<ol style="list-style-type: none"> <li>1. These animals give birth to young ones.</li> <li>2. The development takes place inside the body eg. Mammals.</li> </ol>

## ASSIGNMENTS

### LEVEL-1

1. What is meicyte?
2. Name the structure which gets transformed into seeds at maturity.
3. Show diagrammatically only reproduction in yeast.
4. Name two animals having external fertilization. Why are more gametes produced by such animals?

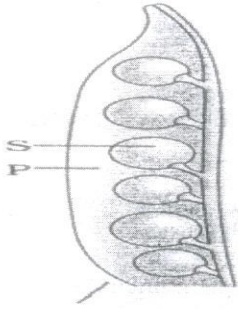
## LEVEL 2

1. Why are the date palms referred to as dioecious?
2. Name any one animal in which self-fertilization occurs.
3. Differentiate between: External Fertilization / Internal fertilization, Zoospore / zygote, Gametogenesis / Embryogenesis.
4. What is special in flowering bamboo?
5. Write the mode of asexual reproduction in the following organisms:  
*Penicillium, Spongilla, Paramecium, Yeast, Chlamydomonas, Amoeba.*
6. Why are the date palms referred to as dioecious ?
7. What do the following parts in a flower form after fertilization?
  - a. Zygote,
  - b. ovule,
  - c. ovary-wall,
  - d. Petal

## LEVEL 3

1. What are the three major phases in the life cycle of organism? Define each phase
2. Discuss the similarities in pattern of sexual reproduction.
3. Name the kind of reproduction in bees by which drones are produced?
4. If the diploid number of chromosomes in an angiosperm plant is 28, what number would you expect in the endosperm and embryo of that plant?
5. Give the scientific terms for the following
  - a. Morphologically and genetically similar individual derived through asexual reproduction.
  - b. Cyclical changes shown by seasonal breeders.
6. What is the site of origin of new plantlets in the followings ?
  - a) Potato tuber,
  - b) rhizome of ginger,
  - c) leaves of bryophyllum,
  - d) stem cutting of sugar cane

7. Label S & P shown in the Figure and state one function each.



8. Arrange the following events in proper sequence:-

- (i) (a) Embryogenesis (b) fertilization (c) Gametogenesis (d) Zygote formation
- (ii) Mention two processes taking place in embryogenesis?
- (iii) What will happen if meiosis does not take place during gametogenesis?

#### SELF EVALUATION ASSIGNMENT

1. Single celled organisms are considered immortal. Justify the statement taking the example of amoeba.
2. Which ability of plants like banana and Bryophyllum is exploited by gardeners & farmers for their commercial propagation.
3. All papaya and date palm plants produce flowers yet only few papaya and date palm are seen to produce fruits. Suggest the possible reason for the rest not producing then.
4. In nature for both plants and animals hormones are responsible for transition between the three phases of their life span. Which three phases are being referred to here. What regulates the reproduction process and the associated behavioral expression in them?
5. Name the process of development of embryo from zygote. What are the two changes which the zygote undergoes during this process.
6. i) Name a group of plants that has haploid body  
ii) What are the specialized cells which undergo meiosis in the diploid organisms.
7. (i) In bisexual flowers why is transfer of pollen grains easier than in the unisexual flowers?  
(ii) Name the specialized event in unisexual flowers which helps in transfer of pollen.  
(iii) How are the non-motile male gametes carried to the female gamete in seed plants?
8. Why do dogs and cats have oestrus cycle but human beings have menstrual cycle, though all are mammals? Why are some mammals called seasonal breeders?
9. Arrange the following events in proper sequence:-
  - (i) (a) Embryogenesis (b) fertilization (c) Gametogenesis (d) Zygote formation
  - (ii) Mention two processes taking place in embryogenesis?
  - (iii) What will happen if meiosis does not take place during gametogenesis?

**Chapter – 2**  
**SEXUAL REPRODUCTION IN FLOWERING PLANTS**

Sexual Reproduction In Flowering Plants	3. Pre fertilization: structures and events	* * *		
	(i) stamens microsporangium & pollengrain microsporogenesis	* *	NCERT book fig 2.2. 2.3 , 2.5 p – 21 – 23	no. of cells in mature pollengrains
	(ii) pistil megasporangium ( ovule) embryosac- megasporogenesis	* *	NCERT book fig 2.7(d) 2.8	no. of cells & nuclei in embryo sac , role of synergids
	2) pollination (i) autogamy , xenogamy, geitnogamy	* *	p – 24 – 27	self incompatibility
	(ii) agents of pollination (iii) out breeding devices	* * *	NCERT book p – 27 – 28	
	(iv) pollen pistil interaction	*		
	3. Double fertilization			
	4. Post fertilization : structures & events – endosperm , embryo, seed	* *	NCERT book p – 31 – 33	triple fusion
	5. Apomixis - polyembryony		NCERT book p – 34 fig 2.12. (c,d,e) fig – 2.13, 2.14, 2.15 p – 35 NCERT p – 38 NCERT	free nuclear & cellular endosperm, embryo of monocot  fail to differentiate apomixes , parthenocarpy

**Definitions**

- **DOUBLE FERTILIZATION** :- Fusion of one male gamete with egg and the other gamete with secondary nucleus (forming 3n endosperm nucleus)
- **FISSION** :- Fraction of nucleus with cytoplasm.
- **GOOTEE** :- bark of healthy and woody branch for grafting.
- **HELOBIAL** :- The mitosis is followed by cytokinesis forming two unequal cells. Subsequent divisions are free nuclear making the endosperm cellular after cytokinesis.
- **INCOMPATIBILITY** :- The inability of certain gametes, even from genetically similar plant species to fuse with each other. This is also called intraspecific incompatibility, self sterility.

- **NUCELLUS**:- The nucleus undergoes repeated divisions & nuclei so produced get arranged in the periphery leaving a large central vacuole-cytokinesis begins from the periphery towards the centre making it cellular at maturity. e.g. maize, wheat, sunflower.
- **PARTHENOCARPY** :- Development of fruit in an unfertilized flower resulting in a seedless fruit. e.g. grapes, banana, tomato.
- **REPRODUCTION** :- The process of producing offsprings and a means of self perpetuation.

### DIFFERENCES

Geitonogamy	Autogamy
<ol style="list-style-type: none"> <li>1. It refers to transfer of pollen grains from anther to stigma of a different flower on the same plant</li> <li>2. It requires a pollinating agent</li> </ol>	<ol style="list-style-type: none"> <li>1. It refers to transfer of pollen grains from anther to stigma of same flower on the same plant.</li> <li>2. It does not requires a pollinating agent</li> </ol>

Perisperm	Pericarp
<ol style="list-style-type: none"> <li>1. It is the remnant of the nucellus left in the seed</li> <li>2. It provides nutrition to the seed / developing embryo</li> </ol>	<ol style="list-style-type: none"> <li>1. It is the wall of fruit formed by the ovary wall.</li> <li>2. It provide protection and help in dispersal of seed</li> </ol>

Microsporogenesis	Megaspороgenesis
<ol style="list-style-type: none"> <li>1. It is the process of formation of microspore from microspore mother cell in anthers.</li> <li>2. A no. of microspore pollen mother cell undergoes this process inside a microsporangium c) All the microspores formed from MMC are functional.</li> </ol>	<ol style="list-style-type: none"> <li>1. It is the process of formation of megaspore from megaspore mother cell in an ovule.</li> <li>2. Only one of megaspore mother cell undergoes this process inside a mega sporangium.</li> <li>3. Only one of the megaspores formed from MMC is functional</li> </ol>

Geitonogamy	Xenogamy
<ol style="list-style-type: none"> <li>1. It refers to transfer of pollen grains from anther to stigma of a different flower on the same plant.</li> <li>2. It does not result in genetic variation</li> </ol>	<ol style="list-style-type: none"> <li>1. It refers to transfer of pollen grains from anther of one plant to stigma of another flower on the different plant</li> <li>2. It result in genetic variation</li> </ol>

True fruit	False fruit
<ol style="list-style-type: none"> <li>1. They develop only from the ovary after fertilization.</li> <li>2. eg. Mango tomato</li> </ol>	<ol style="list-style-type: none"> <li>1. Those fruits which develop from the parts of a flower other than ovary.</li> <li>2. Apple , strawberry</li> </ol>

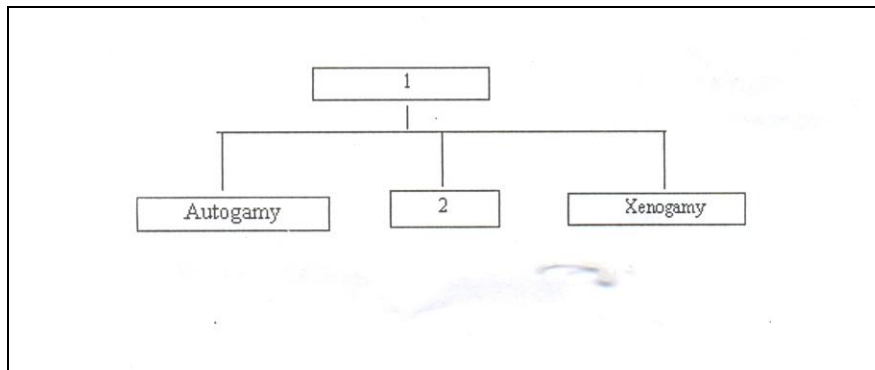
**ASSIGNMENTS:**

**LEVEL I**

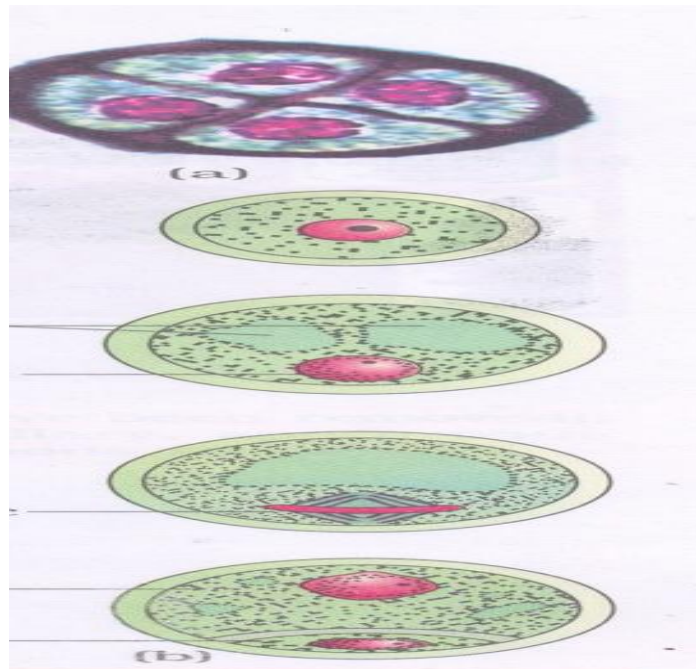
1. Name the protective substance present on the pollen envelope to tide over adverse conditions.
2. Your friend would like to cross-pollinate the bisexual flower. How can you guide him to be successful in his experiment?
3. What is self-incompatibility? Mention two strategies evolved to prevent self pollination in flowers.

**LEVEL 2**

1. Why are pollen grains produced in enormous quantities in anemophilous flowers?
2. T.S. of anther shows four layers in the wall-epidermis, endothelium, tapetum and middle layer. Arrange them from outermost to innermost.
3. Complete the flow chart



- 4(i) What is the process shown in the diagram given below      (ii) Name the structure at (a) of the figure



5. Both wind and water pollinated flowers are not very colourful and don't produce nectar. What would be the reason for this?
6. (i) What are the pollen/nectar robbers?  
(ii) Why do flowers pollinated by flies and beetles secrete foul odor?
7. What is pollen pistil interaction? Why is it called a dynamic process?
8. Why do you think that the zygote is dormant for some time in a fertilized ovule?

### LEVEL 3

1. Non-albuminous seeds do not have endosperm, then from where do they take the food during germination?
2. State the difference between the endosperm of gymnosperms and angiosperms.
3. If the number of chromosomes in the leaf cell of a flowering plant is 28, what number would you expect in the embryo and endosperm of the plant?
4. Mention the scientific term used for modified form of reproduction in which the seeds are formed without fusion of gametes.
5. What will be the fate of ovule if the synergids are absent in the embryo sac?
6. (i) "The microspore is haploid while microspore mother cell is diploid" comment?  
(ii) How many male gametes and female gametes are produced by –
  - a) 5 Microspore mother cells
  - b) 5 megaspore mother cells
7. Cleistogamy in spite of producing assured seed-set even in the absence of pollinators is considered disadvantages to the plant. Why?
8. What is the ploidy of the following?  
(i) cells of nucellus, (ii) microspore mother cell, (iii) functional megaspore and (iv) female gametophyte?
9. How do the flowers of maize and cannabis pollinated? What are the features found in these flowers for such type of pollination?
10. How would you justify the absence of sporopollenin in exine of pollen grains at some places?
11. Why does self pollination not lead to seed formation in self incompatible species?
12. (i) Generally nucellus does not persist in mature seeds. Cite two examples which show persistence of nucellus in the seed

### **SELF EVALUATION**

1. Name the two wall layers of pollen grain and state the chemical nature.
  - How many germ pores are there in pollengrain of monocots and dicots? What is the function of germ pore?



	(ii) stages of spermatogenesis with names of cells & no of chromosomes (iii) structure of sperm (diagram) (iv) functions of each part of sperm & organelles (v) composition of semen	***  *** ***  **	P – 49  Page no 47  Fig 3.6, page no 48 page no 48  page no 48	As Well As The Ploidy Of Cells At Each Stage Of Gametogenesis
	4 oogenesis i) structure and description ii) development of follicles iii) stages with names of cells and no. of chromosomes with events iv) significance of polar bodies	*** ** ***  ***	Fig 3.7 ,Fig 3.8(b) Page no 48-49  Page no48-49  Page no48-49	Difficulty in relating different stages of oogenesis with different life stages.
	5 menstrual cycle (i) menarche and menopause (ii) phases of menstrual cycle with diagram (iii) role of hormones in cycle	* **  ***	Page no – 49, 51 Fig 3.9	Co-relation of levels of pituitary hormones and events during menstrual cycle
	6 fertilization and implantation (i) structure of ovum (ii) cleavage- formation of morula and blastula (iii) implantation- meaning, stage and site (iv) sex determination in humans (v) three germ layers	* * *  * * *  * * * *	Fig – 3.1, Page no – 51 Fig – 3.11 Page no – 52  Page 53  Page 52 Page 54	Labelling of mature graafian follicle
	7 pregnancy and embryonic development (i) placenta as endocrine	* * *	Page 53	

	gland (ii) embryo and extra-embryonic layers	* *	Fig – 3.12 Page 53	
	8 parturition (i) meaning (ii) foetal ejection reflex (iii) Role of hormones	* *	Page no – 54	Hormones involved at the time of parturition
	9 lactation Meaning, colostrum and its importance	*	Page no – 54	

### DEFINITIONS:

- **CLOSTRUM**:- the first milk that comes out of the mammary gland of the mother immediately after child birth is called colostrums.
- **FOLLICULAR ATRESIA**:- It is the process of degeneration of number of primary follicle in ovary of human female from birth to puberty.
- **GAMETOGENESIS** :- It refers to the process of formation of gametes for sexual reproduction.
- **GRAFFIAN Follicle**:- The mature follicle in the ovary is known as graffian follicle.
- **IMPLANTATION**:- The process in which embryo become embedded / attached to the wall of uterus is called implantation.
- **LECTATION**:- Due to the effect of hPL and progesterone after pregnancy there is starting of secretion of milk is called lactation.
- **L-H SURGE**:- it refers to maximum level of L-H during middle of menstrual cycle.
- **MENARCHE**:- The beginning of menstruation at puberty in primate females is called as menarche.
- **OOGENESIS**:- it is the formation of ova in the ovary by meiosis is known as oogenesis.
- **PRIMARY SEX ORGANS**:- The organs producing male and female gametes are known as primary sex organs.
- **SECONDARY Sex Organs**:- The sex organs which perform important functions in the reproduction but do not form gametes are called secondary sex organs.
- **SEMEN**:- The mixture of seminal plasma and spermatozoa is called semen.
- **SPERMATION**:- It is the process of transformation of spermatids into spermatozoa is known as spermiation.

### DIFFERENCES

Endometrium	Myometrium
1. It is innermost glandular layer that lines the uterine cavity. 2. Implantation occurs in this layer 3. It undergo cyclic changes during the menstrual cycle	1. It is the middle thick layer of smooth muscles of the uterine wall. 2. It is responsible for the uterine movement. 3. It does not undergo any cyclic changes during the menstrual cycle.

Spermatogenesis	Spermiogenesis.
1. It is the process of formation of mature spermatozoa in the testis 2. It involves meiotic and mitotic division 3. It is controlled by hormone LH and androgen.	1. It is a process of transformation of spermatids into spermatozoa. 2. It does not involve any division. 3. It is controlled by hormone LH only.

Blastula	Morulla
1. It is a hollow sphere of 32 or more cells formed by the rearrangement of blastomeres.	1. It is a solid sphere of 8- 16 cells blastomeres formed by cleavage of zygote.

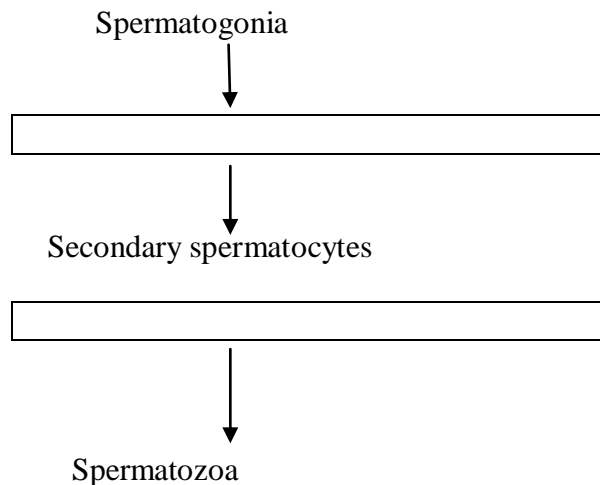
2. Zona pellucida disintegrates with the enlargement of blastocoel.	2. Zona pellucida is intact.
<b>Menarche</b>	<b>Menopause</b>
1. It refers to beginning of menstruation at puberty in primates/ human females. 2. It marks the beginning of reproductive phase	1. It refers to stoppage of menstruation at the age of 45-50 in primates/ human females. 2. It marks the end of reproductive phase

**ASSIGNMENTS:**

**LEVEL 1**

1. Why does failure of testes to descend into the scrotum produce sterility?
2. Name the important mammary gland secretions that help developing resistance in the new born baby?
3. What are sertoli cells?
4. At what stage is the mammalian embryo implanted in the uterus?
5. What is spermiogenesis?
6. Name the ducts received by urethra in a human male?
7. At what stage is meiosis I suspended in primary oocyte?
8. When is meiosis II completed in the oogenesis of human female?
9. Define foetal ejection reflex?
10. Zygote undergoes mitosis to form 16 celled stage of embryo. What is it known as?

11. Fill in the boxes

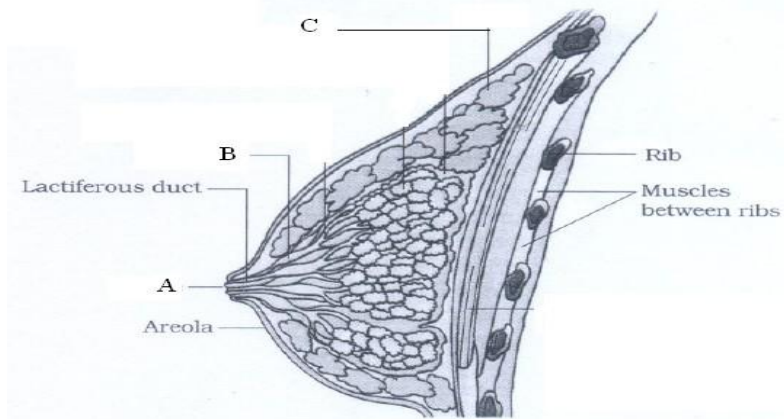


12. How do hormones secreted from anterior pituitary gland control and regulate the male reproductive system?
13. Why does fertilization takes place in fallopian tube and not in uterus?
14. Draw and label the main parts of the human spermatozoa. Why is the middle piece considered as power house of the human sperm?

**LEVEL -2**

15. What is acrosome? What is its significance?
16. Failure of fertilization leads to menstruation. Explain.
17. What is the role of pituitary hormone in the regulation of menstrual cycle?
18. Mention the main changes taking place during implantation.

19. Name the hormonal secreted by placenta that play significant role in maintaining pregnancy?
20. State any two differences between Spermatogenesis and oogenesis.
21. During fertilization hundreds of sperm cells are in the vicinity of an egg cell. But only one sperm enters the ovum. How is this achieved?
22. What are the main events / changes taking place after implantation that lead to formation of Placenta?
23. Name the part of female reproductive system where the embryo is implanted. Mention the type of tissue by which it is made up of and give their functions?
24. Label a, b, c in the following diagram.

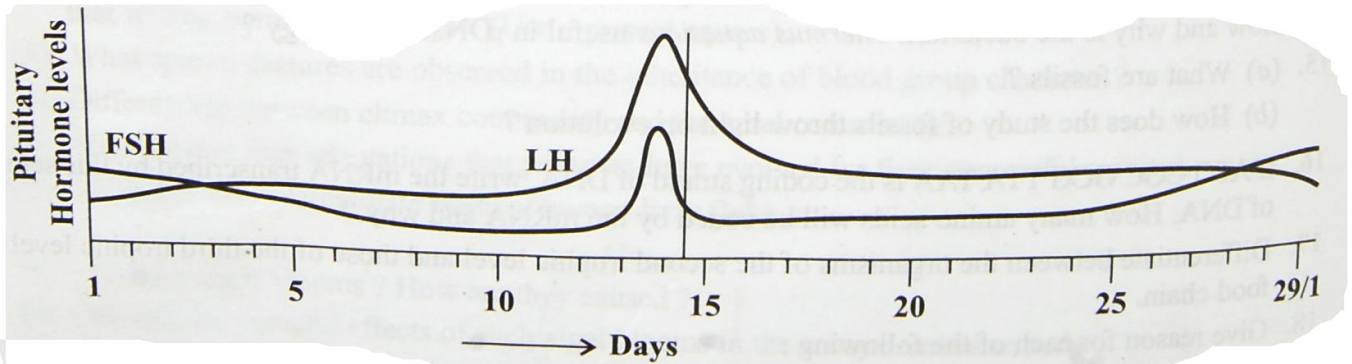


25. What is pregnancy hormone? Why it is so called? Name two sources of this hormone in a human female?

### LEVEL-3

26. Give reasons:-
- zona pellucida layer block the entry of additional sperms?
  - sperm cannot reach ovum without seminal plasma?
  - all copulations do not lead to fertilization and pregnancy?
27. Furnish the technical term for the following:-
- the middle thick layer/wall of uterus
  - semen without sperm
  - mechanism responsible for parturition
28. Women are often blamed for giving birth to girl child in our society. What is your View?
29. What are following known as:-
- cushion of fatty tissue covered by skin and pubic hair in female external genitalia.
  - the finger like projections which collect ovum after ovulation
  - the finger like projections appearing in the trophoblast after implantation?
30. What is the fate of inner cell mass in the blastocyst? Mention their significance.
31. (i) What is the number of chromosomes in the following cells of human male?
- spermatogonial cells
  - spermatids
  - primary spermatocyte
  - sertoli cells.
- (ii) How many sperms are present in an ejaculate of human male? What proportion of them should have normal size and shape and what proportion should have vigorous motility for normal fertility?
32. (A) Differentiate between menarche and menopause

- (B) (a) Read the graph given below. Correct the ovarian events that take place in the human female according to the pituitary hormones during the following days:
- (i) 10-14 days
  - (ii) 14-15 days
  - (iii) 16-23 days
  - (iv) 25-29 days (if the ovum is not fertilised)



- (C) What are the uterine events that follow beyond 29<sup>th</sup> day if the ovum is not fertilised?

### SELF EVALUATION

1. Name the important mammary gland secretions that help developing resistance in the new born baby?
2. Define foetal ejection reflex?
3. Failure of fertilization leads to menstruation. Explain.
4. Draw and label the main parts of the human spermatozoa. Why is the middle piece considered as power house of the human sperm?
5. Give reasons:-
  - i). zona pellucida layer block the entry of additional sperms?
  - ii). sperm cannot reach ovum without seminal plasma?
  - iii). all copulations do not lead to fertilization and pregnancy?
6. Women are often blamed for giving birth to girl child in our society. What is your View?
7. What is the fate of inner cell mass in the blastocyst? Mention their significance.

### Chapter-4 :REPRODUCTIVE HEALTH

Reproductive Health	1. Reproductive health	**	Page 57-58	Amniocentesis Specific site for transplantation of embryo in GIFT and ZIFT
	(i) Problems & Strategies	***	Page 59-61	
	2. Methods of birth control	**	Page 64	
	3. Infertility – Corrective treatments	***	Page 63	
	4. Sexually transmitted			

	diseases			
	5 methods of birth control (i) natural methods (ii) barrier methods (iii) IUDS (iv) oral contraceptives (v) injections and implants (vi) surgical methods	**	Page 66	

**DEFINITIONS:**

- **IN- VITRO FERTILIZATION** :- In- Vitro fertilization refers to the fusion of gametes in the laboratory conditions.
- **INFERTILITY**:- The inability of couple/ person to produce new young one in spite of unprotective sexual act.
- **INTRA-UTERINE DEVICES(IUDS)**:- These are the devices inserted in uterus to achieve contraception.
- **LACTATIONAL AMENORRHEA**:- It refers to the absence of menstruation during the period of intense lactation following parturition.
- **MEDICAL TERMINATION OF PREGNANCY( MTP)**:- voluntary termination of pregnancy before full term is called MTP or induced abortion.
- **POPULATION EXPLOSION**:- An enormous increase in the size of the population in the short span of time is called population explosion.
- **REPRODUCTIVE HEALTH** :- It is total well being in physical, emotional, behavioural and social aspect of reproduction.
- **SEXUALLY TRANSMITTED DISEASES(STDs)**:- Diseases or infections that are transmitted through sexual act are called STDs or reproductive tract infections (RTIs).
- **TUBECTOMY**:- Sterilization process in female by cutting of fallopian tubes is called tubectomy.
- **VASECTOMY**:- Sterilization procedure in male by cutting and tying of vas deference is called vasectomy.

**DIFFERENCES**

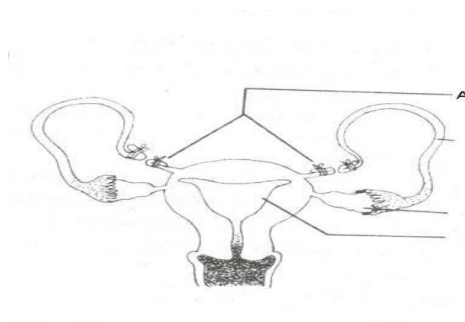
Tubectomy	Vasectomy
1. Method of sterilisation in females 2. Fallopian tubes of both sides are cut and tied. 3. It prevents ova to reach the place of fertilization	1. Method of sterilization in males 2. Vas deference is cut and tied. 3. It prevents sperms to reach the place of fertilization.

GIFT	ICSI
1. called as gamete intra fallopian transfer (b). transfer of ovum from a donor female to provide suitable environment . 2. sperm is not directly injected to ovum 3. no artificial insemination is done	1. intra cytoplasmic sperm transfer this is a special technique to prepare embryo in lab . 2. The sperm is directly injected to ovum . 3. artificial insemination is done for infertile couple

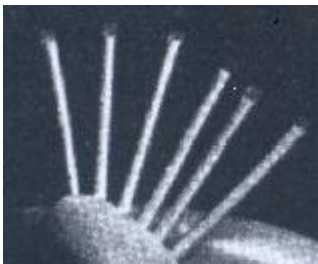
ASSIGNMENTS:

LEVEL 1

1. A large number of couples are said to be infertile. These couple could be assisted to have children through certain special techniques. Name one such technique.
2. Condoms are the barrier that prevents the ovum and sperms from coming closer. Suggest one more benefit of condoms
3. Differentiate between ZIFT and GIFT.
4. Give reasons why family planning techniques are not adopted by all in our country?
5. What are action plans/programmes initiated In India at the national level to attain total reproductive health?
6. Label the diagram and mark A in it.



- 3 Name a STD caused by protozoan.
- 4 How do Intra-Uterine devices (IUDs) prevent conception? List any two ways?
- 5 Identify the given diagram. What is it used for?



- 6 (i) Name the principle on which natural methods of Birth control work?  
(ii) What is periodic abstinence?
7. Is sex education necessary in school if so, why? Give any four reasons.
- 8 Enumerate the complications that untreated STDs can lead to?

9 Mention the different ways in which people are made aware of the significance of reproductive and a reproductively healthy society?

LEVEL 3

1 At what stage zygote can be introduced in the fallopian tube in Zygote Intra Fallopian Transfer (Z.I.F.T.)

2 A doctor has observed the chromosomal disorder in developing foetus and advised the couple to undergo abortion. Suggest the technique by which doctor observed the chromosomal disorder.

3. A Women's husband is infertile. So the lady has decided to have baby by taking sperms from sperm bank. Which technique will you suggest for her pregnancy?

4. Following table gives certain terms associated with ARTS

Fill the spaces a, b, c and d.

Sr. no.	Column 1	Column 2
1	IVF and ET	a
2	b	Introduction of zygote or embryo with 8 blastomeres in fallopian tube
3	c	Introduction of Ova of a donor into fallopian tube
4.	IUT	d

5. 'Saheli' is an example of oral contraceptive-

(i)Name the non-steroidal principle in it.

(ii)How does it provide contraception.

6. During lactation chances of conception are almost zero.

(i) Give the reason.

(ii) Give the term used to describe the phenomenon?

**SELF EVALUATION**

1. What precautions a lady can take to prevent unwanted pregnancy?

(i) Name the barrier.

(ii) Mention the composition of it.

2. Mention any four possible ill-effects of contraceptives?

3. Give reasons why family planning techniques are not adopted by all in our country?

4. Mention any two probable reasons for rapid rise of population in India from the time of independence to date.

5. What is the lactational amenorrhea method of birth control.

6. A mother of one year old daughter wants to space her second child. Her doctor suggested copperT. Explain its contraceptive action.

7. Describe sexually transmitted diseases giving any two examples.



- **ANEUPLOIDY** :- The phenomenon of gain or loss of one or more chromosome.
- **AUTOSOMES** :- All the chromosomes of an individual that are not involved in the determination of sex.
- **BACK CROSS**:- When F1 progeny /heterozygous is crossed with either of the parent.
- **CO DOMINANCE** :- When two alleles of a gene are equally dominant & express themselves in the presence of other.
- **DIHYBRID** :- The individual that is heterozygous for the alleles controlling two characters.
- **DIHYBRID CROSS** :- A cross made between individuals of a species considering the inheritance of contrasting pair of two traits.
- **DOMINANT ALLELE** :- Allele that express itself in a hybrid/heterozygous condition.
- **EMASCULATION** :- Removal of anthers from the bisexual flower before maturation of pollen grains.
- **GENETICS** :-The branch of science that deals with inheritance & variations.
- **GENOTYPE** :-The genetic constitution of an organism.
- **HEREDITY** ; -The process of transmission of characters from one generation to another generation/parent to offspring.
- **HETEROZYGOUS** :- Organism having dissimilar pair of allele for a character.
- **HOMOZYGOUS** :- Organism having similar pair of allele for a character.
- **INCOMPLETE DOMINANCE** :- When neither of two alleles of a gene is completely dominant over the other giving an intermediate character.
- **LINKAGE**:- The phenomenon where two or more linked genes are always inherited together/tendency of a gene (located on same chromosome) to move together into gametes.
- **LINKED GENES**-All the genes present on a chromosome.
- **MONOHYBRID** :- The individual that is heterozygous for the alleles controlling one character.
- **MONOHYBRID CROSS** :- Cross made between two individuals of a species considering the inheritance of the contrasting pair of a single character.
- **MONOSOMY** :- The condition where a particular chromosome is present in a single copy in a diploid cell.
- **MULTIPLE ALLELISM** :- When a gene exists in more than two allelic forms.
- **MUTATION** :- Sudden inheritable change in genetic material.
- **NON-DISJUNCTION** :- Phenomenon in which the members of homologous chromosome pair do not separate during meiosis.
- **OFFSPRING** ; -Products of sexual reproduction.
- **PEDIGREE ANALYSIS** :- It is an analysis of the distribution and movement of traits in a series of generations of a family.
- **PHENOTYPE** :- Observable or external characteristics of an organism.
- **PLEIOTROPY**:- When a gene has the ability to have more than one phenotypic effect.
- **RECESSIVE ALLELE** :- Allele that is not expressed in a hybrid/heterozygous condition.
- **RECOMBINANTS**-DNA formed by combining DNA from two different organisms.
- **RECOMBINATION** :- Exchange of gene segments between non-sisters chromatids of homologous chromosome pair.
- **SEX CHROMOSOME** :- Chromosomes that are involved in the determination of sex.
- **TEST CROSS** :- When F1 progeny is crossed with homozygous recessive parent.

- **TRISOMY** :- The condition where a particular chromosome is present in 3 copies in diploid cell.
- **VARIATION** :-Dissimilarities among the individuals of a species.

### Differences

<b>GENOTYPE</b>	<b>PHENOTYPE</b>
1. Genotype remains the same throughout the life of an individual. 2. Genotype cannot be studied directly .it can be known through the study of ancestor, mating and offspring. 3. In a given environment or time, individual with similar genotype will produce similar character.	1. Phenotype may change with time and environment, e.g. infant. 2. Phenotype can be known through direct observation. 3. Individuals with similar phenotypes may not belong to same genotype.

<b>DOMINANT</b>	<b>RECESSIVE</b>
1. The condition in which the dominant allele is able to express itself even in the presence of its recessive allele is known as dominance. 2. In dominance, the dominant allele or factor can form complete polypeptide or enzyme for expressing its effects, e.g. red colour of flower in pea.	1. The condition in which recessive allele or factor is unable to express its effect in the presence of the dominant allele is known as recessive. 2. In recessive, the recessive allele forms an incomplete defective polypeptide or enzyme so that expressing consists of absence of the effect of dominant allele for e.g. white flower colour in pea.
<b>INCOMPLETE DOMINANCE</b>	<b>CODOMINANCE</b>
1. Effect of one of two alleles is more conspicuous. 2. It produces a fine mixture of the expression of two alleles. 3. The effect in hybrid is intermediate of the expression of the two allele.	1. Effect of both the allele is equally conspicuous. 2. There is no mixing of the effect of the two allele. 3. Both the allele produce their effect independently

## Assignment Questions

### LEVEL 1

1. Name the law that explains the expression of only one of the parental characters in the F1 generation of a monohybrid cross?
- 2.. What is a linkage map?
- 3.. How is the child affected if it has grown from the zygote formed by an XX–egg fertilised by a Y-carrying sperm? What do you call this abnormality?
4. Not all characters show true dominance. What are the two other possible type of dominance? Give an example of each?
5. What proportional of individuals produced in the progeny of a cross between two individuals with genotype TtSs will be TtSs and ttss respectively
- 6.. A cross between two plants heterozygous for a single locus was made. The progeny contained the following:
  - i) Round seeds, large starch grains: 1

- ii) Round seeds, intermediate starch grains: 2
- iii) Wrinkled seeds, small starch grains: 1

What phenomenon is exhibited by the above result? Show the genotype of the parents and offspring using a punnet square.

7. (i) In an experiment 3:3:1:1 phenotypic ratio was obtained on crossing a pea plant with axial, violet flowers with another pea plant having axial, white flowers. Judge the accuracy of this result using a punnet square.

(ii) Two plants (Snapdragon) with red flowers and white flowers are crossed and produced all pink flowers in F<sub>1</sub> generation

- a) What phenomenon is responsible for it.
- b) Write the genotype of F<sub>1</sub>.
- c) Write the phenotype of F<sub>2</sub> generation.
- d) What would be the phenotype and genotype ratio of the F<sub>2</sub> generation?

## LEVEL 2

1. How many types of glycoproteins (oligosaccharides) that determine the ABO blood group are found on the surface of RBCs in humans?

2. Pick out the possible combinations of blood groups of parents of a boy who has a blood group O?

- (i) Mother O group, Father AB group
- (ii) Mother O group, Father heterozygous A group
- (iii) Both Mother and Father A group (heterozygous)
- (iv) Both Mother and Father AB group

3.. What was the most significant conclusion that Mendel drew from his experiment?

4.. A haemophilic man marries a normal homozygous woman. What is the probability that their daughter will be haemophilic? (a) 100%, (b) 75%, (c) 50%, (d) 0%.

5. A homozygous green seeded plant is crossed with yellow seeded plant. The progeny obtained was half yellow seeded and half green seeded.

i) Write the genotype of yellow seeded progeny.

ii) Write the technical name of cross.

6. A man with blood group O and his wife with blood group AB claim a child with blood group AB as their son. Justify whether it is possible or not with a punnet square.

7. (i) The egg of the animal contains 10 chromosomes of which one is X-chromosome. How many autosomes would be there in the karyotype of this animal?

(ii) What is meant by aneuploidy?

8. Write the sex chromosome complement of each of the following;

- (i) Male fowl (ii) Human female (iii) Male grasshopper (iv) Female grasshopper

9. When two genes (involved) in a dihybrid cross are situated on the same chromosome, the proportion of parental gene combination was much higher than the non-parental combination. What is it due to?

Who discovered the phenomenon?

10. (i) Which of the two, sperms or ovum, determines the sex of the offspring in fowl? Why?

(ii) What is the type of sex determination known as?

11. In *Lathyrus*, blue flower colour and long pollen are dominant over red flower colour and round pollen. In a cross between two plants, one with blue flowers and long pollen, both heterozygous and the other with red flowers and round pollen, the progeny contained the following:

Blue flowers, long pollen : 42%

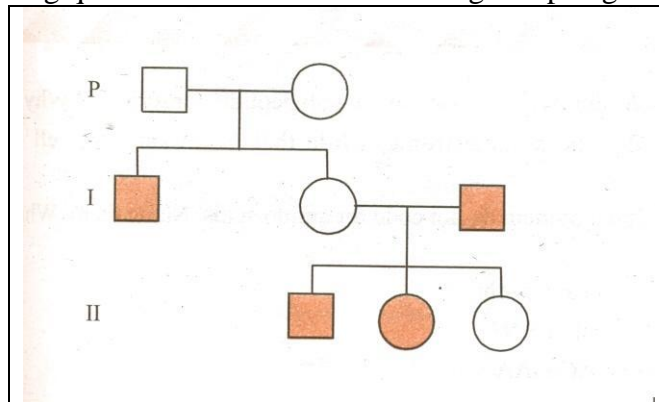
Blue flowers, round pollen : 08%  
 Red flowers, long pollen : 08%  
 Red flowers, round pollen : 42%

Explain the phenomenon responsible for such result?

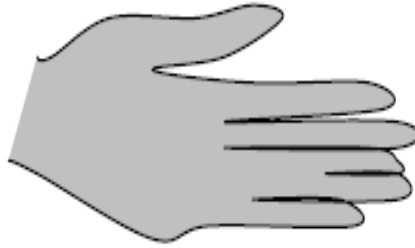
12. Justify the situation that in human beings, sex of the child is determined by father, and not by mother?

### LEVEL 3

1. What percentage of gametes produced by an individual with genotype AaBb will be ab?
2. Why does deletion or insertion of a segment of DNA result in alteration of chromosomes (also called chromosomal aberration)?
3. If the frequency of parental form is higher than 25% in a dihybrid test cross, what does that indicate about the two genes involved?
4. Dominance is not an autonomous feature of a gene or the product it codes for; it depends on the gene product and the production of a particular phenotype from the gene product. Justify with one example.
5. A colour blind man marries a woman with normal vision whose father was colour blind. Work out a cross to show the genotype of the new couple and their prospective sons?
6. Answer the following questions with reference to the given pedigree.



- i) Is the trait autosomal dominant, autosomal recessive or sex-linked? Why? Justify your answer.
  - ii) Give the genotypes of the parents.
  - iii) Give the genotype of the daughter in the first generation and the son and the daughters in the second generations.
7. A male child was born with 47 chromosomes. Write any three possible combinations of chromosomal abnormalities and write one important symptom of each?
  8. Given below is a diagrammatic sketch of the hand of a person.



- Name or mention the genetic feature.
- Make a pedigree of the character to mention its inheritance? What do the circles and squares in the chart represent respectively?
- Is it a sex linked character? Give reason in support of your answer.

### Questions for Self Evaluation

- 1) The following table shows the genotypes for ABO blood grouping and their phenotypes . Fill in the gaps left in the table..

S.NO	Genotype	Blood Group
1	$I^A I^A$	A
2	<input type="text"/>	A
3	$I^B I^B$	B
4	<input type="text"/>	B
5	$I^A I^B$	<input type="text"/>
6	<input type="text"/>	O

- A homozygous green seeded plant is crossed with yellow seeded plant. The progeny obtained was half yellow seeded and half green seeded .
  - Write the genotype of yellow seeded progeny.
  - Write the technical name of the cross.
- Match the following with respective worker :

<p><b>a. Transforming Principle</b>  <b>b. DNA is genetic material</b>  <b>c. Semi conservative mode of DNA replication</b>  <b>d. Proof of semi conservative replication</b></p>	<p><b>i) Messelson &amp; Stahl</b>  <b>ii) Watson &amp; Crick</b>  <b>iii) Fredrick Griffth</b>  <b>iv) Hershey &amp; Chase</b></p>
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- Assume that no new mutations have arisen in the family.  
 Answer each question with either 'Yes' or 'No'
  - Could this be inherited as recessive trait?
  - Could this be inherited as dominant trait?

**Chapter-6**  
**Molecular Basis of Inheritance**

Chapter No.	Chapter Name	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
6	Molecular basis of inheritance	1. DNA (i) structure and salient features (ii) packaging of DNA helix	**  **	Page no. 96-98  Fig 6.4 page 99	Polarity of two stands  Histone and non histone chromosomal protein
		2. Search for genetic material (i) transforming principle (ii) Hershey and chase experiment (iii) properties of genetic material	*** ***  **	Page 100-101 Fig 6.5 Page 102  Page 103	Differentiation between transformation and transaction
		3. Replication – experimental proof	*** ***	Fig 6.7, 6.8 page 105-107  Fig 6.9, page 107-108	Leading and lagging strand direction
		4. Transcription (i) transcription unit (ii) Type of RNA and process of transcription	**  **	109-111  page 112	Polycistronic, monoistronic, capping, taling
		5. Genetic code (ii) Mutations and Genetic Code	***  ****	Page 113  Fig. 6.12 Page-	Frame Shift and Point mutation

	(iii) TRNA-The adapter Molecule 6. Translation 7. Regulation of Gene Expression (i) Levels of Regulation (ii) The lac operon 8. Human Genome Project  9. DNA Finger printing	* **** ***  ****	114 Fig. 6.13 Page 115  Page 115 Fig. 6.14,Page 116,117 Page118-120  Fi. 6.16 Page 121-122	Charging of tRNA  Expresses Sequence Tags Sequence Annotation BAC/YAC  Satellite DNA,VNTR
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### Definitions

- **ANTICODON** :- The sequence of nitrogenous bases on RNA that is complementary to the codon for particular amino acid.
- **BACTERIOPHAGE** :- A virus that infects a bacterium.
- **CODON** :- It is a sequence of three nitrogenous bases on m-RNA that code for a particular amino acid.
- **CONSTITUTIVE GENES** :- Constitutive genes are those genes which are constantly expressed & whose products are continuously needed for cellular activity.
- **DNA POLYMORPHORISM** :- Refers to the variations at genetic level where an inheritable mutation is observed in a population in a frequency greater than 0.01.
- **EXON** :- The regions of a gene which become part of m-RNA & code for the different regions of proteins.
- **FRAME SHIFT MUTATION** :- A type of mutation where addition or deletion of one or two bases changes the reading frame from the site of mutation, resulting in a protein with a different set of amino acids.
- **GENE** :- Segment of DNA that code for RNA/functional unit of heredity.
- **INTRONS** :- The regions of a gene which do not form part of m-RNA and are removed.
- **NUCLEOSOME** :- Structure formed when negatively charged DNA is wrapped around the positively charged histone octamer.
- **OPERON** :- All the genes controlling a metabolic process constitute an operon.
- **ORIGIN OF REPLICATION** :- It is the definite region of DNA where replication originates starts.
- **REPLICATION FORK** :- The Y- shaped structure formed when the double standard DNA is unwound up to a point during its replication.
- **SATELLITE DNA** :- The repetitive DNA sequences which do not code for any protein, but form a large portion of human genome; and show high degree of polymorphorism.
- **SILENT MUTATION** :- Mutation which do not cause any change in protein.
- **SPLICING** :- The process in eukaryotic genes by which the introns are removed are the exons are joined together to form m-RNA.
- **TRANSCRIPTION** :- It is the process of formation of RNA from DNA.

- **TRANSFORMATION** :- It is the phenomenon by which the DNA isolated from one type of cell, when introduced into another type is able to bestow some of the properties of the former to later.
- **TRANSLATION** :- It is the process of polymerization of amino acids to form a polypeptide dictated by mRNA.

### Differences

<b>DNA</b>	<b>RNA</b>
<ol style="list-style-type: none"> <li>1. It usually occurs inside nucleus and some cell organelles.</li> <li>2. DNA is a genetic material.</li> <li>3. It is a double stranded with the exception of some viruses (rabies, AIDS etc.)</li> <li>4. DNA contains over a million nucleotides.</li> <li>2. It contains deoxyribose sugar.</li> <li>3. Nitrogen bases thymine occurs in DNA along with three others- adenine, cytosine and three guanine.</li> </ol>	<ol style="list-style-type: none"> <li>1. Very little RNA occurs inside nucleus. Most it is found in the cytoplasm.</li> <li>2. RNA is not a genetic material except in certain viruses, e.g., Reovirus.</li> <li>3. It is a single stranded with the exception of some viruses(e.g., double stranded in Reovirus)</li> <li>4. Depending upon the type, RNA contains 70-12000 nucleotides.</li> <li>5. It contains ribose sugar.</li> <li>6. Thymine is replaced by uracil in RNA. The other are similar – adenine, cytosine and guanine.</li> </ol>

<b>PROCARYOTIC TRANSCRIPTION</b>	<b>EUKARYOTIC TRANSCRIPTION</b>
<ol style="list-style-type: none"> <li>1. It occurs in contact with cytoplasm.</li> <li>2. Products of transcription become effective in situ.</li> <li>3. There is only one RNA polymerase.</li> <li>4. RNA polymerase does not have separate transcription factors.</li> <li>5. mRNA is generally polycistronic.</li> <li>6. Splicing is generally not required.</li> </ol>	<ol style="list-style-type: none"> <li>1. It occurs inside the cytoplasm.</li> <li>2. Products of transcription come out of the nucleus for functioning in cytoplasm.</li> <li>3. There are three types of RNA polymerase.</li> <li>4. Transcription factors are involved in recognition of promoter site.</li> <li>5. mRNA is generally monocistronic.</li> <li>6. In most of the cases splicing required for removing intervening sequences.</li> </ol>

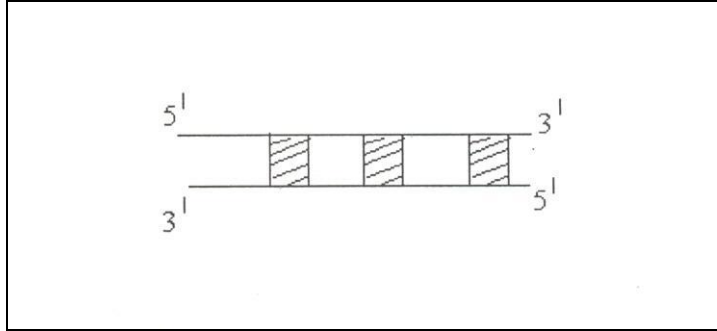
<b>LEADING STRAND</b>	<b>LAGGING STRAND</b>
<ol style="list-style-type: none"> <li>1. It is a replicated strand of DNA which grows continuously without any gap.</li> <li>2. It does not require DNA ligase for its growth.</li> <li>3. The direction of growth of the leading strand is 5'→3'</li> <li>4. Only a single RNA primer is required.</li> <li>5. Its template opens in 3'→5' direction.</li> <li>6. Formation of leading strand begins immediately at the beginning of replication.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lagging strand is a replicated strand of DNA which is formed in short segment called discontinuous.</li> <li>2. DNA ligase is required for joining Okazaki fragments.</li> <li>3. The direction of growth of the lagging strand is 3'→5' though in each Okazaki fragment it is 5'→3'.</li> <li>4. Starting of each Okazaki fragment requires a new RNA.</li> <li>5. Its template opens in 5'→3' direction</li> <li>6. Formation of lagging strand begins a bit later than that of leading strand.</li> </ol>

<b>TEMPLATE STRAND</b>	<b>CODING STRAND</b>
<ol style="list-style-type: none"> <li>1. The DNA strand that has the polarity 3'→5' acts as template during transcription is called as template strand.</li> <li>2. It is also called as master strand or (-) or sense strand.</li> <li>3. This takes part in transcription.</li> </ol>	<ol style="list-style-type: none"> <li>1. The strand which has polarity of 5'→3' is called as codon strand.</li> <li>2. It is called (+) because genetic code present in this strand is similar to genetic code (based on mRNA) except that of uracil is replaced by thymine.</li> <li>3. This does not take part in transcription.</li> </ol>

## Assignment Questions

### LEVEL 1

1. The two strands of DNA have antiparallel polarity. What does it mean?
2. DNA fingerprinting is a technique to find out variations at DNA level among individuals of population. What is the principle on which it works?
3. What term is given to the flow of information from RNA to DNA in certain viruses?
4. A criminal case is 10 years old was registered for investigation. What samples they might have tested?
5. Pick out the untranslated regions from the given mRNA.  
5' ACG UCG AUG GCG CCC UUU UAG GAG GAA 3'  
Where are they normally located?
6. Illustrate below is a DNA segment which constitutes a gene.



- i) Will the whole gene be transcribed in RNA primarily?
  - ii) Name the shaded & unshaded part to the gene,
  - iii) Explain how is gene expressed.
  - iv) How is the gene different from prokaryotic gene in its expression?
7. Which of the two –the coding strands or the template strands– will the RNA transcribed by the DNA, resembles? Why? How will they yet differ from each other?

### LEVEL 2

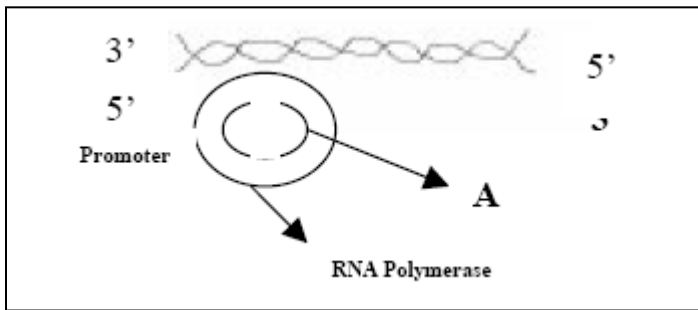
1. There are proteins which are positively charged and there are also negatively charged proteins. What makes the protein get its charge
  2. What is ESTs?
  3. A particular human gene has the largest number of bases. Identify it.
  4. Why is mRNA of eukaryotic cells said to monocistronic, while that of prokaryotic cell is polycistronic?
  5. A point mutation leads to adverse change in the function of hemoglobin (B-globin chain). Identify the disease that may occur due to this mutation. Mention the change of amino acids in the polypeptide due to mutation
  6. Two persons filed a case against a lady claiming to be the father of her only daughter. How to find the real biological father
  7. If a nucleosome contains 200bps, how many nucleosome are there in a mammalian cell? What changes occur to beads of strings of DNA during metaphase?
  20. Given below schematic representation of two interacting bacterial cells.
  8. Write the mRNA transcribed from the DNA segment with the base sequence TAC TAG TCG ACT. How many amino acids will there be in the oligopeptide translated by the mRNA? Why?
  9. Lac operon is negatively regulated. What is meant by this? Why is lactose called the inducer of lac operon in *E.coli*?
  10. (i) Describe the two major approaches to sequencing of genomes?  
 (ii) Expand SNPs. What are they?  
 (iii) Explain VNTR as the basis of DNA fingerprinting?
- would be the phenotype and genotype ratio of the F<sub>2</sub> generation.

### LEVEL 3

1. The accessibility of promoter region of prokaryotic DNA is often regulated by the interaction of a protein with a certain sequence of DNA. What name is given to such a DNA sequence?
2. DNA is a polynucleotide characterized by two types of peaks. Which peak is known as satellite DNA?
3. Mention the role of DNA polymerase other than polymerizing deoxyribonucleotides during DNA synthesis.

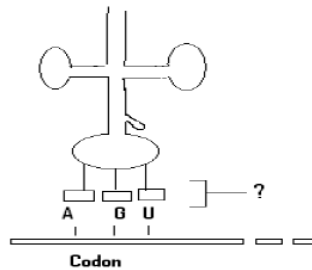


3) The diagram depicts a stage in transcription. Mention the stage and indicate A



4) Amino acid Arginine if coded by CGU; how many codons can code for this amino acid?

5) Write the anticodon of the given t-RNA



6) What is the difference between RNAs and RNase ?

### Chapter-7 Evolution

Chapter No.	Chapter Name	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
7.	Evolution	1. Origin of Life 2. Evidences of Evolution 3. Adaptive Radiation 4. Biological Evolution 5. Mechanism of Evolution 6. Hardy-Weinburg Principle 7. A Brief Account of Evolution 8. Origin and Evolution of Man	* ** **** * ** *** *	Fig 7.1 Fig. 7.3 Page 130-132 Fig. 7.5,7.6,7.7 Page 133 Page 134 Page 135 Fig. 7.8 Page 136-137 Fig. 7.9,7.10 Fig. 7.11 Page 140	Branching Desent and Natural Selection Darwinism versus de-vries- -Saltation Hardy-Weinburg Equilibrium,Founder Effect

### Definitions

- **ABIOGENESIS** :- The origin of life from non – living.
- **ADAPTIVE RADIATION** :- An evolutionary process in which a common stock / ancestor gives rise to new species that are adapted to new habitats and ways of life.
- **ALLOPATRIC SPECIATION** :- Origin of new species in geographically isolated populations.
- **ANALOGOUS ORGANS** :- Organs which are similar in appearance and perform similar functions but they are quite different in their origin and development.
- **ARTIFICIAL SELECTION** :- The process carried out by a select better breed of plants and animals, which are advantageous to human beings.
- **BIOGEOGRAPHICAL REALMS** :- Six major land masses on earth which are characterized by their own quota of life called flora and fauna.
- **BIOGEOGRAPHY** :- Study of patterns of distribution of plants and animals in different parts of the earth.
- **CONVERGENT EVOLUTION** :- Independent development of similar forms and features by unrelated organisms usually as an adaptation to a similar environment.
- **DIVERGENT EVOLUTION** :- Origin of a variety of species from a common ancestral form.
- **FOSSILS** :- The remains and / or impressions of organisms that lived in the remote part.
- **GENE POOL** :- The sum total of different kinds of genes (alleles) pooled by all the members of a population, is called gene pool.
- **HOMOLOGOUS ORGANS** :- Organs in different groups of organisms, which have similar basic structural plan but superficially, look different and perform different functions.
- **NATURAL SELECTION** :- The process occurring in nature that acts over a number of generations and slowly increases the proportion of those individuals which are well adapted to the environment due to their heritable characteristics.
- **ONTOGENY** :- The stages of embryonic development of the organism.
- **ORIGIN OF LIFE** :- The appearance of life for the first time on the earth is called origin of life.
- **OUT BREEDING** :- Mating of two unrelated individuals.
- **PALAEOBOTANY** :- The study of fossil plants.
- **PALAEONTOLOGY** :- Study of fossils.
- **PALAEOZOOLOGY** :- The study of fossil animals.
- **PHYLOGENY** :- The evolutionary history of the organism.
- **SPECIATION** :- Origin of new species.
- **SPECIES** :- A taxonomic category including closely related, morphologically similar individuals which actually or potentially interbreed.
- **SYMPATRIC SPECIATION** :- Origin of new species in the populations occupying the same geographical area.
- **VESTIGIAL ORGANS** :- Organs that have no apparent function supposed to be remnants of organs once functional in the ancestors.

### Differences

Homologous Organs	Analogous organs
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<ol style="list-style-type: none"> <li>1. They differ phenotypic ally.</li> <li>2. They have similar internal structure.</li> <li>3. They arise from similar position over the body.</li> <li>4. Stages in the development are the similar.</li> <li>5. They perform different functions.</li> <li>6. They show adaptive radiation.</li> <li>7. They occur in related organisms.</li> </ol>	<ol style="list-style-type: none"> <li>1. They show superficial resemblance.</li> <li>2. Internal structure of analogous organs is quiet different.</li> <li>3. They often arise from different positions over the body.</li> <li>4. Stages in development are different.</li> <li>5. They have similar functions.</li> <li>6. Show convergent evolution.</li> <li>7. Found in unrelated organisms.</li> </ol>
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Lamarckism	Darwinism
<ol style="list-style-type: none"> <li>1. The theory believes in the presence of an internal vital force in all organisms.</li> <li>2. It considers perfecting principle to be guiding principle for all organisms to achieve harmony with environment.</li> <li>3. Modifications and even new organs can develop due to new needs, desires and conscious reaction.</li> <li>4. Use and disuse of organs brings about their development and degeneration respectively.</li> <li>5. Change in environment produces variations.</li> <li>6. It does not consider any struggle for existence.</li> </ol>	<ol style="list-style-type: none"> <li>1. The theory does not believe in the presence of any internal vital force in all organisms.</li> <li>2. Nature selects only those individuals which are adapted to the environment in which they live.</li> <li>3. Modifications and development of new organs due to new needs, desires and conscious reaction do not form part of the theory.</li> <li>4. An organ can develop further or degenerate only due to variations appearing in that direction.</li> <li>5. Variations are already present. Changing</li> </ol>

	<p>environment selects some particular variations suitable for it.</p> <p>6. Struggle for existence is very important ingredient of this theory.</p>
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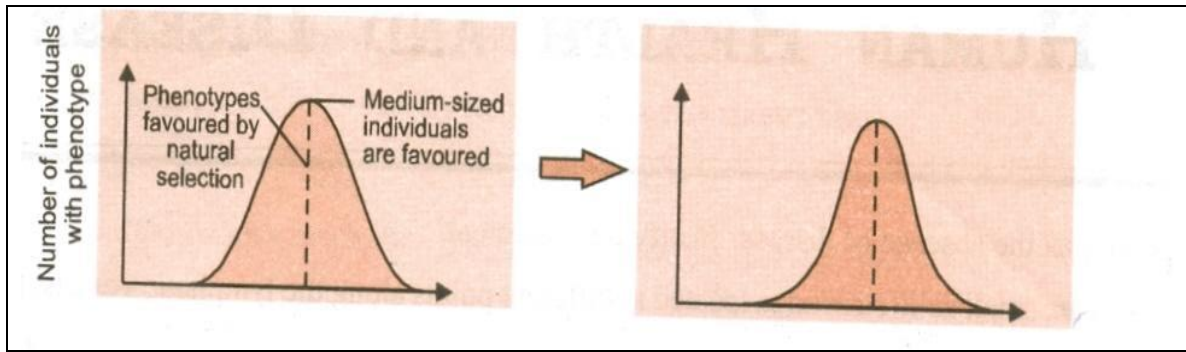
### Assignment Questions

#### LEVEL 1

1. What is 'fitness' according to Darwin?
2. What is evolution according to Hardy-Weinberg?
3. What is common among the Australian marsupials like Koala, wombat, sugar glider etc.?
4. Can we call the human evolution as an example of adaptive radiation?
5. Why did the animals resembling horse, rabbit etc. of South America disappear, but the pouched mammals of Australia survived and flourished after continental drift.
6. Each of the placental mammals living in Australia resembles a similar marsupial. What is it due to? Give two examples of each
7. Name and explain the common evolutionary phenomenon shown by Australian marsupials and Darwin's finches

#### LEVEL 2

1. How does biochemistry provide evidence for organic evolution?
2. Give an example of evolution by anthropogenic activities?
3. Mention the two key concepts of Darwinism.
4. What is saltation
5. Name the group of extinct reptiles that was the ancestor of the present day reptiles and birds? Name the period of the geological time scale in which it lived?
- 6.



What type of selection is indicated? What happens in the process?

7. Hearts and brains of different classes of vertebrates are homologous or analogous? What do they indicate about evolution?

8. Explain how the atmosphere of Earth was formed?

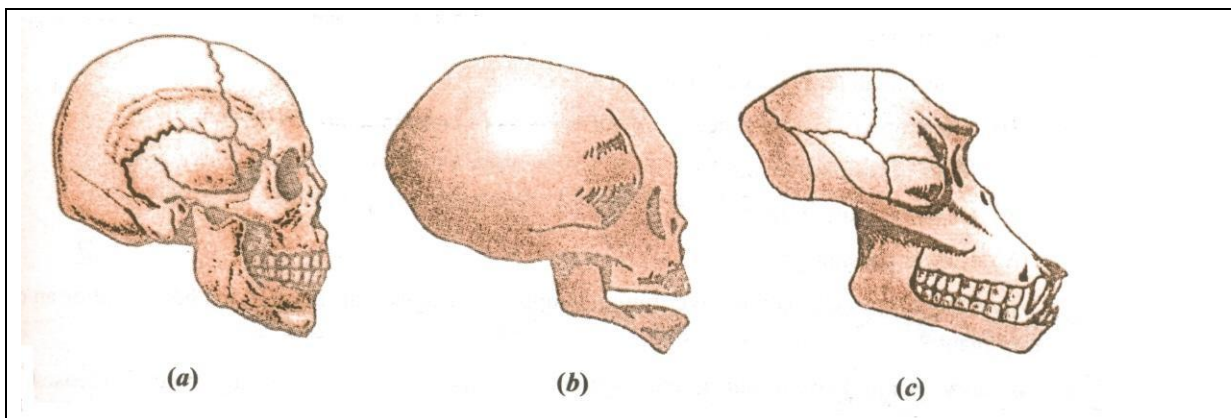
9. Fill in the blanks with the names of the mammals of Australia

Placental mammals	Marsupial mammals
a	Numbat
Lemur	b
Bob Cat	c
d	Flying phalanger

### **LEVEL 3**

1. What is genetic drift?

2. Identify the animal to which each of the following three skulls belong. Which two of them resemble more closely than the others?



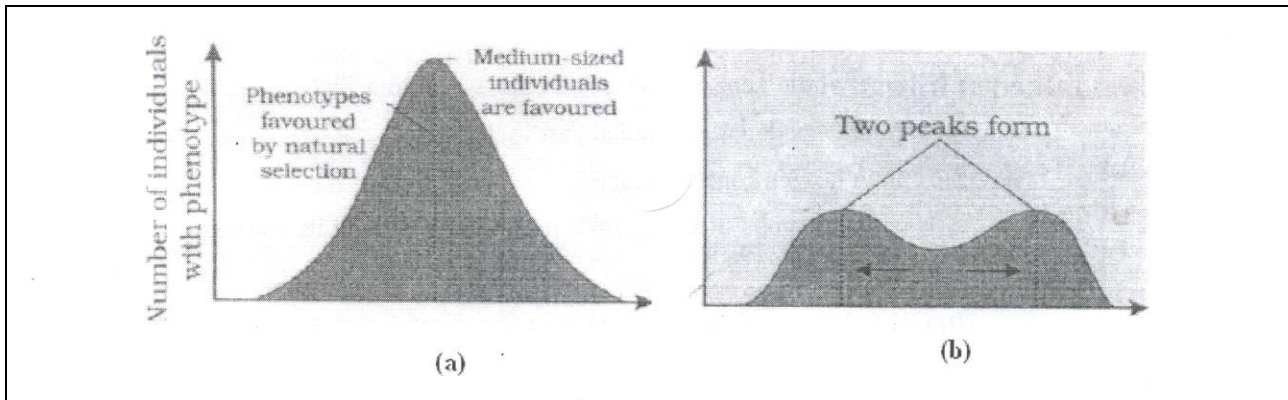
3. Stanley Miller and Harold Urey performed an experiment by recreating in the laboratory the probable conditions of the atmosphere of the primitive earth.

i) what was the purpose of the experiment .

ii) in what form was the energy supplied for the chemical reactions to occur?

4. Why do we consider the lobefins have evolved into amphibians? Give reason.

5. Study the figures (a) and (b) given below and answer the question given after the graph



- i) Under the influence of which type of natural selection would graph (a) become like graph (b)?
  - ii) What could be the likely reasons for new variations arising in the population?
  - iii) Who suggested natural selection as a mechanism of evolution?
6. In England, after industrialization it was observed that white-winged moths did not survive.
- a) What do you think the cause may be?
  - b) What was the change and why did it happen?
  - c) Which organism is known as a natural indicator of air pollution?

### Questions for Self Evaluation

- 1) Why do animals have certain functionless organs in their bodies?
- 2) Which of the following are homologous organs?
  - a) Trunk of an elephant and forelimbs of a monkey
  - b) Wings of a bird and wings of a butterfly
- 3) Which of the following are analogous organs?
  - a) Legs of a cockroach and legs of a cat.
  - b) Pectoral fin of a fish and forelimb of a frog.
- 4) The wing of a bat is homologous to
  - a) Arm of a human
  - b) Tail of a kangaroo
  - c) Wing of a butterfly
- 5) Name the common ancestors of apes and man.
- 6) Give the scientific name of the first human-like ancestors.
- 7) What causes speciation according to Hugo de Vries?
- 8) Which were the first organisms that began to release oxygen as a byproduct of photosynthesis?
- 9) Name the extinct representative of modern man.
- 10) Consider a thorn in *Bougainvillea* and a tendril in *Cucurbita*. Are these two organs homologous or analogous? Give reasons.

## Chapter-8 Human Health & Diseases

Chapter No.	Chapter Name	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
8.	Human Health & Diseases	1.Common Diseases in human 2. Immunity (i) Innate immunity (ii) Aquired immunity (iii) Active and Passive immunity (iv) Vaccination and immunity (v) Allergy (vi) Autoimmunity (vii) Immune System of Body 3. AIDS 4.CANCER 5. Drug and alcohol abuse (i) Adolescence and drugs	**  ** ***   * ** *  *** *** ***	Fig. 8.1 Page 146-149   Page 150-154 NCERT Fig. 8.4  Fig 8.6 Text 156 Text Page 156-158 Text Page 158-163	

### Definitions

- **CIRRHOSIS** :- A fatal disease of liver causes due to chronic use of alcohol.
- **CONTACT INHIBITION** :- A property of normal cells due to which contact with other cells inhibits their uncontrolled growth. Cancerous cells have lost the quality of contact inhibition hence divide uncontrollably.
- **DIEASE** :- A state when functioning of one or more organs or systems of the body is adversely affected, characterized by various symptoms, we say that we have a disease.
- **HEALTH** :- A state of complete physical, mental and social well being.
- **IMMUNITY** :- The overall ability of organisms to fight the disease causing pathogens, conferred by the immune system is called immunity.
- **VACCINE** :- Weakened pathogen or antigenic proteins of the pathogen introduced / injected into a healthy person to protect him from disease is called vaccine e.g. pulse polio.

## Differences

Active Immunity	Passive Immunity
<ol style="list-style-type: none"> <li>1. Antibodies are developed</li> <li>2. By our own body cells in</li> <li>3. Response to antigens.</li> <li>4. It takes time to developed immunity.</li> <li>5. It stays for longer period.</li> </ol>	<ol style="list-style-type: none"> <li>1. Antibodies are developed in other vertebrates in response to deliberate injection of antigens, are injected in our body.</li> <li>2. It is used when immune response has to be faster.</li> <li>2. It stays for short period.</li> </ol>

Infectious Diseases	Non infectious Disease
<ol style="list-style-type: none"> <li>1. They are transmitted from one person to other.</li> <li>2. Caused by pathogens.</li> <li>3. Typhoid , T.B., Flu etc</li> </ol>	<ol style="list-style-type: none"> <li>1. They are not transmitted from one person to other.</li> <li>2. Caused due to habits deficiency, disfunctioning of organs etc.</li> <li>3. Heart attack , cancer etc.</li> </ol>

INNATE IMMUNITY	ACQUIRED IMMUNITY
<ol style="list-style-type: none"> <li>1. It includes all the defense elements with which an individual is born.</li> <li>2. Non specific .</li> <li>3. It consist of Physical , Physiological , Cellular and Cytokine barriers.</li> </ol>	<ol style="list-style-type: none"> <li>1. It acquired after birth either by contacting the disease or by vaccination.</li> <li>2. Specific.</li> <li>3. It includes hummreal or antibody mediated Immunity and cell mediated immunity.</li> </ol>

## Assignment Questions

### LEVEL 1

- 1.It is advised to always complete the course of an anti biotic prescribed by the physician. Give the scientific reason?
- 2.Why is the antibody –mediated immunity called humoral immunity?
- 3.Why do children of metro cities of India suffer from allergies and asthma?
- 4.What is the role of following in body defence against infections?  
(i) B-cells (ii) Histamine (iii) interferons
- 5.Some viruses can make DNA copy from RNA strand .Explain the mechanisms behind this processes

### LEVEL 2

- 1A pathogen enters the small intestine through food and water contamination and migrates through blood, the sustained high fever weakness, stomach pain are symptoms. Which test confirms this disease.
- 2Once a person starts taking alcohol (or)drugs . how he may protect himself
- 3.Only female Anopheles mosquito acts as a vector? Why?

4. Name a plant other than coca plant that has hallucinogenic property?
5. A group of viruses infected only nose and the respiratory passages but not the lungs. Mention the disease and its causative organism.
6. Enumerate any two properties that distinguish the cancer cells from normal cells.
7. A person suddenly develops fever diarrhoea and weight loss. After test his blood was found low in lymphocytes.
  - (i) What could be the disease he is suffering from?
  - (ii) Name the confirmatory test to diagnose the disease.
  - (iii) Which particular part of the immune system is likely to get affected and in what manner?
8. Which chemicals are produced during allergic reactions? Also name the cells which produce these chemicals?

### LEVEL 3

1. complete the table

S.NO	Effect on body	Name of drug	Source
1			poppy plant
2	sense of euphoria	cocaine	
3			<i>cannabis sativa</i>

2. A person need to take immune-suppressive agents all through his/her life after an organ transplant. Why?
3. Name the organism where antigenic polypeptide is produced by recombinant DNA technology
4. A person's nails and lips turn grey to bluish. Find out the disease he is suffering from. Name the pathogen.
5. Name the missing organisms/disease in the table below:-

Organism	Disease
Microsporium	A
B	Elephantiasis
C	Amoebiasis
Plasmodium falciporam	D

6. Lymph nodes are small solid structures located at different points along the lymphatic vessels. How are they involved in our immune system?
7. A person claimed that he has seen sounds, heard colours and smelt light.
  - (i) What could be the possible reasons?
  - (ii) Name two chemicals responsible for this condition.  
Mention any one source for these chemicals.

### Questions for Self Evaluation

- Q 1 Name the type and give the effects of the following drugs on humans-  
A ) LSD B) Morphine C) Barbiturates.
- Q2 What are the two chemical substances released into the blood by the mast cells ?  
Specify the effect of each .
- Q3 Why are some children diseases not appear for a second time ?
- Q4 How does the skin serve as the first line of defence ?

Q5 A person was born without thymus gland but otherwise normal .Mention any four ways the person is likely to suffer due to its absence .

### Chapter-9 Strategies for Enhancement in Food Production

Chapter No.	Chapter Name	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
9.	Strategies for Enhancement in food Production	1. Animal husbandry (i) Management of farm and farm Animal (ii) Animal Breeding (iii) Bee Keeping (iv) Fisheries 2. Plant breeding (i) Method (ii) For disease Resistance (iii) For Pest Resistance (iv) For Improved food quality 3. Single cell Protein 4. Tissue Culture	* ** ** * ** *** *** ** *** **	Page 165-170 Text Page 170-176 Text Portion Page176 Text Portion Page 177 Text Portion	

### Definitions

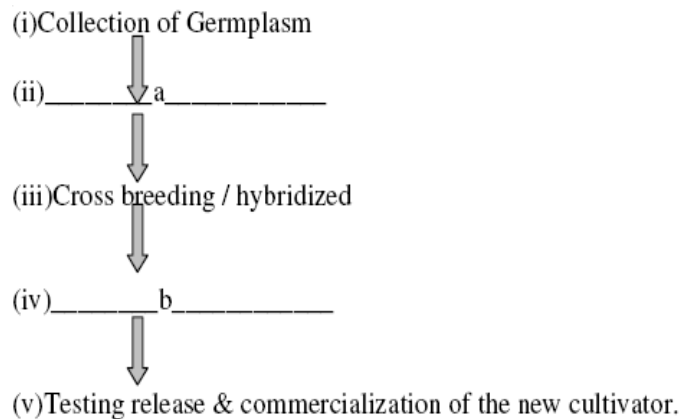
- **ANIMAL BREEDING** :- Mating or crossing of animals to improve the desirable qualities and yield or produce.
- **ANIMAL HUSBANDRY** :- The agricultural practice of breeding and raising livestock e.g. buffaloes, cows, pigs, horses, sheep, camel etc including poultry and fisheries.
- **APICULTURE** :- Bee keeping for production of honey.
- **BREED** :- A group of animals related by descent and similar in most characters, like appearance, features, size, configuration etc.
- **DAIRY FARM MANAGEMENT** :- The management of animals for milk and its products for human consumption.
- **FISHERIES** :- An industry devoted of rearing, catching, processing or selling of fish, shellfish or other aquatic animals.
- **GREEN REVOLUTION** :- Dramatic increase in food production in mid 1960s as a result of cultivation of high yielding disease resistant varieties of wheat, rice and maize etc developed through breeding techniques is referred to as green revolution.
- **MUTATION BREEDING** :- Obtaining crop plants with desirable characters by artificial or induced mutations and using them a material in breeding programmes is called mutation breeding.

- **PLANT BREEDING** :- The purposeful manipulation of plant species (Crop) to create desired plants best suited for cultivation, give better yields and are disease resistant.
- **SCP OR SINGLE CELL PROTEINS** :- Industrially or commercially produced edible proteins by culturing suitable micro organisms on large scale for nutrition for animals and human beings.
- **SOMACLONES** :- Genetically identical organisms or plants derived from single organisms through micro propagation are called somatic hybrid e.g. Tomato protoplast and potato protoplast.
- **TISSUE CULTURE** :- Growing whole plant from a part of plant such as leaf, root, pollen etc by growing these on an artificial nutrient medium under aseptic conditions is called tissue culture.
- **TOTIPOTENCY** :- The quality of isolated cells or tissue of an organism by virtue of which it can generate the whole of organism is called totipotency.

## Assignment Questions

### LEVEL 1

1. During a meristem culture some explants were kept in culture medium containing more of auxins than cytokinins. Which organ of the plant is expected to differentiate from the callus?
2. Why hybrids of selected parents are self pollinated till a state of homozygosity?
3. To which product is blue revolution related?
4. Following are the steps in a particular process. Name the process and fill in the steps that are given as blanks.



5. Artificial insemination is a better approach than natural mating. Justify?

### LEVEL 2

1. Clones are identical each other ?Is there any social implications of human cloning?
2. A technique by which cattle herd is increased in number in short period of time.name and describe it.
3. Why do we use apical and axillary meristems for tissue culture?
4. If your family owned a dairy farm, what measure would you undertake to improve the quality and quantity of milk production?
5. Biofortification can solve the problems of “hidden hunger” to a large extent. Prove it?

6. Insect/pest resistance in plants can be due to morphological, chemical or physiological features. Give one example each of the features and the species in which it is found?

### LEVEL 3

1. What is reference material for comparison of any improved variety?
2. For which amino acid maize is biofortified?
3. Some time the disease resistance gene is present in the wild relative of crop plant. Give an example of crop plant where the resistance gene is present in its wild relative and name the wild relative
4. Two different plant of the same species, each with a different desirable trait are crossed to produce a hybrid that will have both the desirable character of the two parents. But, what are the drawbacks in the process of hybridisation of the selected parents?

### Questions for Self Evaluation

- Q1 What is interspecific hybridization ?
- Q2 What should be done when inbreeding depression becomes a problem ?
- Q3 Name any five hybrid varieties of crop plants which have been developed in India .
- Q4 What are the commonly used growth regulators in plant tissue culture ? What for they are required ?
- Q5 Define germplasm . How is it maintain ?

## **Chapter-10** **Microbes in Human Welfare**

Chapter No.	Chapter Name	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
10.	Microbes in Human Welfare	1. Role of Microbes in:- (i) House Hold (ii) Industrial Product (iii) Sewage Treatment (iv) Production of Bio Gas (v) As Biocontrol Agent (vi) As Biofertilizers	* *** ** * *** ***	Text Page 181 Page 182,183 Ex. Question 12 Page 184-185 Ex. Question 7,8,11 Page 185 Page 186-187 Page 188	

### Definitions

- **BIOCHEMICAL OXYGEN DEMAND (BOD)** :- The amount of the oxygen that would be consumed if all the organic matter in 1 ltr. Of water were oxidized by bacteria.
- **BIOCONTROL** :- The use of biological method for controlling plant disease & pests.
- **BIOFERTILISER** :- The organisms that enrich the nutrient quality of the soil.
- **BIOGAS** :- The mixture of gases {mainly CH<sub>4</sub>, CO<sub>2</sub>} produced by the microbial activity & which can be used as fuel.
- **BT COTTON** :- A variety of cotton which is incorporated with Bt gene and it is resistant for insects & pests.

- **CLOT BUSTER** :- The microbial product for removing clots from the blood vessels of patients who have undergone myocardial infraction leading to heart attack.
- **FERMENTATION** :- The process of Anaerobic respiration in which complex molecules incompletely breaks into simple one by the microbial action.
- **FERMENTORS** :- The large containers made up of stainless steel require to grow microbes for industrial products.
- **METHANOGENS** :- The anaerobic bacteria which produce large amount of CH<sub>4</sub>, CO<sub>2</sub> & H<sub>2</sub> as they grow on cellulosic material.
- **MYCORRHIZA** :- A symbiotic association between fungal hyphal & roots of trees (Higher Plants)
- **PEST** :- Organism that destroys crop or its product is known as pest.
- **SEWAGE** :- The Municipal waste – water containing large amount of organic matter & microbes

## Assignment Questions

### LEVEL 1

1. Fungi associate with higher plant roots absorb phosphorus from the soil passes it to the plant. Mention the association between them
2. What is the key difference between primary and secondary sewage treatment?
3. How are the holes (spongy texture) produced in bread and cheese?
4. What is “Anaerobic Sludge digest”?

### LEVEL 2

1. Do you think microbes can also be used as energy converters? If yes how?
2. Single cell protein is one of the alternative source proteins for animal and human nutrition. Justify your answer.
3. Bottled juices are clearer compare to homemade juices. Give reason?
4. For the brain haemorrhage of a patient, the doctor prescribed Streptokinase. Why? Mention the source of industrial production of this biomolecule.
5. What is cyclosporine A? Name the micro organism from which it is obtained. How it is used in human welfare?
6. Why is organic farming favoured these days? Describe the method employed in the process.

### LEVEL 3

1. Some Microbes are used to control other microbes, elaborate with examples
2. Why are most of the antibiotics sold in combination with lactobacillus, these days?
3. The Yamuna action plan and the Ganga action plan have been initiated to reduce BOD of these rivers in and around Delhi. What is understood by this statement?
4. Drinks like whisky and rum more intoxicating than wine. Why?

### Questions for Self Evaluation

- Q1 Which gas gives the puffed appearance to the dough? Name the metabolic pathway taking place Resulting in the formation of this gas.
- Q2 What is the key difference in the primary and secondary treatment?
- Q3 Describe the bio gas plant structure. Give various steps involved in obtaining biogas.
- Q4 Why are chemical pesticides not preferred by the farmers in controlling pests?
- Q5 What is the advantage of “Legume –Rhizobium” symbiosis

## Chapter-11 Biotechnology Principles and Processes

Chapter No.	Chapter Name	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
11.	Biotechnology principles and processes	1. Principles of biotechnology (i) techniques used in modern biotechnology (ii) advantages of sexual reproduction over a sexual reproduction (iii) genetic engineering includes recombinant dna, genecloning a gene transfer (iv) meaning and use of plasmid restriction enzymen (v) basic steps for gmo 2. Tools of Recombinant DNA Technology 3. Cloning Vectors 4. Processes of Recombinant DNA Technology – Steps	*  * *  ***  *** ***	NCERT text book xii fig . 1.2(a) (b) fig. 1.3, 1.4 page 5-8  NCERT book p – 15 - 19 ex q 2,6,9,13,15,18  Fig. 11.1-11.2-11.3 Page-195- 198 Fig. 11.4 Page-198-200 Fig. 11.6,11.7 Page 201-205	Fail to differentiate asexual reproductive structures- zoospores, conidium, gemules etc.  Differentiation in monoecious & dioecious

### Definitions

- **BIOTECHNOLOGY** :- Technique of using living organism or enzymes from organism to produce product & processes useful to Humans.
- **CLONING** :- Producing exact copy or copies of a single parent.
- **DNA LIGASE** :- An enzyme that can seal one DNA fragment with another DNA segment, both having sticky ends.
- **ELUTION** :- The process to separate bands of DNA which are cut out from the Agarose gel & extracted from the gel piece.
- **ENDONUCLEASES** :- The enzymes which make cut at specific position within the DNA.
- **GEL ELECTROPHORESIS** :- The technique of separation of DNA fragments on a natural polymer(gel).
- **GENETIC ENGINEERING** :- The technique to alter the chemistry of genetic material DNA / RNA to introduce these into host organisms & thus change the phenotype of the host organism.
- **GENOME** :- Total DNA in the cell of an organism.
- **LIGASE** :- An enzyme that joins the ends of two strands of Nucleic acid.

- **MICRO INJECTION** :- Introduction of foreign genes into animal or plant cell by injecting DNA directly.
- **PLASMID** :- Autonomously replicating circular extra chromosomal DNA of bacteria is known as plasmid.
- **TRANSFORMATION** : - It is a process through which a piece of DNA is introduced in a host.

### Differences

Plasmid DNA	Chromosomal DNA
<ol style="list-style-type: none"> <li>1. It is extra nuclear DNA</li> <li>2. It carries non vital genes.</li> <li>3. A bacterial cell may carry one to several plasmid DNAs</li> </ol>	<ol style="list-style-type: none"> <li>1. It is nuclear DNA</li> <li>2. It possesses vital genes</li> <li>3. A bacterial cell carries only one Chromosomal DNA</li> </ol>

Exonucleases	Endonucleases
<ol style="list-style-type: none"> <li>1. It breaks DNA from the ends.</li> <li>2. The separated fragments are small nucleotides.</li> <li>3. The separated fragments can not be used in genetic engineering.</li> </ol>	<ol style="list-style-type: none"> <li>1. It cuts DNA from inside.</li> <li>2. The separated fragments are large nucleotides</li> <li>3. The desirable separated fragments are used in genetic engineering.</li> </ol>

Blunt Ends	Sticky Ends
<ol style="list-style-type: none"> <li>1. Are cut in the centre of recognition sequence.</li> <li>2. Are known as flush ends.</li> </ol> <p>Example:</p> <pre> 5' C C C G G G 3' <math>\xrightarrow{Sma I}</math> 5' C C C 3' + 5' G G G 3' G G G C C C 5'          3' G G G 5' + 3' C C C 5' </pre>	<ol style="list-style-type: none"> <li>1. Are short, single stranded end which can join single stranded ends of other DNA fragments having complementary sequences.</li> <li>2. Are known as cohesive ends.</li> </ol> <p>Example:</p> <pre> 5' G A A T T C 3' <math>\xrightarrow{EcoRI}</math> 5' G 3' + 5' A A T T C 3' 3' C T T A A G 5'          3' C T T A A 5' + 3' G 5' </pre>

YAC	BAC
<ol style="list-style-type: none"> <li>1. Called Yeast Artificial Chromosomes.</li> <li>2. Used to clone DNA fragments of more than 1 Mb in size.</li> <li>3. Used in mapping large genomes e.g. human genome project</li> <li>4. Insert size is 2500 – 1000.</li> </ol>	<ol style="list-style-type: none"> <li>1. Called Bacterial Artificial Chromosomes.</li> <li>2. Used to clone 300-350 kb of foreign DNA.</li> <li>3. Used in genome sequencing project.</li> <li>4. Insert size is 50– 300.</li> </ol>

## Assignment Questions

### LEVEL1

1. Which enzyme is called molecular scissors?
2. What do you mean by Ori?
3. Name the polymerase which is generally used in PCR reactions.
4. How is a host cell made competent in introducing rDNA?
5. Name the enzyme commonly used to dissolve the cell wall of bacterial cell?

### LEVEL2

1. Why is a thermo stable DNA Polymerase needed in amplification/genetic engineering.
2. For the isolation of the genetic material , cells are treated with cellulose or chitinase . Give reason for it
3. Name the enzyme which cut the DNA molecules into fragments with sticky ends?
4. Which cloning vector was discovered first time?
5. Name the method in which foreign DNA is directly introduced into host cell?
6. Name a 'Natural genetic engineer' of plants?
7. What are the three basic steps involved in a single PCR amplification cycle.
8. Draw the diagram of PBR322 vector showing restrictions site
9. How is isolation of the genetic material done?
10. Give diagrammatic representation of rDNA technology

### LEVEL3

1. "Normal Polymerase can not be used in PCR. A particular polymerase is used in PCR." Name the source of that polymerase.
2. Each restriction enzyme cuts the DNA at a specific nucleotide sequence . Name such a sequence.
3. What type of cut ends are formed when both are formed when both stands of DNA molecule is cleaved exactly at the same nucleotide position?
4. How does a transgenic organism differ from the rest of its population? Cite any two examples of such organism for human advantage
5. How is the gene z (for B-galactosidase) used as marker?
6. Besides better aeration and mixing properties what other advantages do stirred tank bioreactors have over shake flasks ?
7. How are bacteria made capable to take up recombinant DNA? Name the bacteria used for this process.
8. State the principle underlying 'gel electrophoresis' and mention two applications of this technique in Biotechnology.
9. DNA being hydrophilic cannot pass through the cell membrane of a cell. Explain how does recombination DNA get introduced into the cell to transform the latter.
10. In bacterial culture some of the colonies produce blue colour in the presence of a chromogenic substrate and some did not due to the presence or absence of an insert (rDNA) in the coding sequence of the beta- galactosidase.
  - a) Mention the mechanism and steps involved in the above experiments .
  - b) How is it better than the technique of plating on two plates having different antibiotics?

### Questions for Self Evaluation

- 1 Differentiate between direct gene transfer and indirect gene transfer .
- 2 How is gene transfer in animals done ? Give the suitable example .
- 3 Name two recombinant proteins
- 4 Name atleast three therapeutically important products obtained through recombinant genetic engineering .

5 At what stage of meiosis a recombinant DNA made ?

## Chapter-12

### Biotechnology and its applications

Chapter No.	Chapter Name	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
12.	Biotechnology and its applications	1. Applications of Biotechnology in agriculture (i) Advantages of GMO (ii) Bt Cotton (iii) RNA interference 2. Applications of Biotechnology in Medicines (i) Genetically engineered insulin. (ii) Gene Therapy- ADA (iii) Molecular Diagnosis of diseases. 3. Transgenic animals 4. Ethical issues , Biopiracy	* ** *** *** *** *** * ** **	Page 207-208 Page 208 Page 208-209 Page 209-210 Page-210-211 Page 211 Page-212 Page-213 Page-214	Differentiation of Cry and cry nRNA silencing , nematode – Meloidegyne incognitia Steps in production of insulin Role of Biotechnology in molecular diagnosis.

### Definitions

- **BIO PATENT** :- A right given to inventor to get the economic benefits of the product. It also prevents the others to get benefit without permission.
- **BIOPIRACY** :- The use of bio resources by multinationals companies & other organizations with out proper authorization from the countries & people concerned without compensatory payment.
- **ELISA** :- It is a diagnostic technique based on the principle of antigen- antibody interaction.
- **GENE THERAPY** :- A collection of methods that allow correction of agene defect that has been diagnosed in a child / embryo.
- **GENETICALLY MODIFIED ORGANISM (GMO)**:- Plants, bacteria , fungi & animals(organisms) whose genes have been altered by manipulations are called G.M.O.
- **GREEN REVOLUTION** :- The process of increase in crop yields with the use of improved crop varieties, better management practices& use of agrochemicals.
- **PROBE** :- These are the detectable sequence of polynucleotide which are used to detect the presence of complimentary DNA sequence.
- **TRANSGENIC ANIMALS** :- Animals that had their DNA manipulated to possess & express an extra (Foreign) gene are known as transgenic animals.
- **TRANSPOSONS** :- these are the mobile genetic elements which replicate via an RNA intermediate.

## Assignment Questions

### LEVEL1

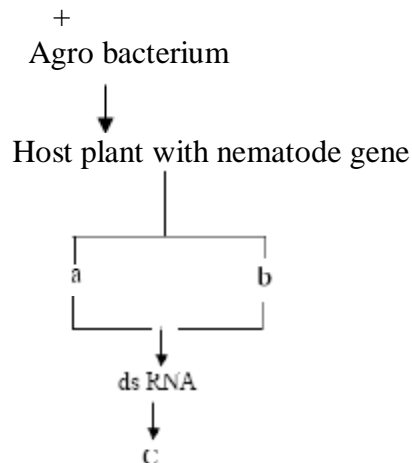
1. Excessive use of fertilizers and chemicals has harmful effects on environment. Suggest a possible solution to minimise this.
2. Which crops other than Bt cotton have been made pest resistance by genetic engineering?
3. Expand GEAC. What is its function?

### LEVEL2

1. Some cotton plants grown by farmers are known as 'Bt cotton'.
  - a) What does Bt stand for?.
  - b) What is the advantage of this cotton plant?
  - c) How did scientists achieve this?
2. Name the vector which was used to introduce nematode specific gene into tobacco plant.
3. Transgenic cow Rosie was produced in 1997.
  - (a) Name the protein present in its milk.
  - (b) Advantage of protein enriched milk.
4. Dr. Arun developed a vitamin A rich potato through his research on genetics.
  - a) What do you call such potato plants?
  - b) Who can approve the validity and safety of introducing potato for public uses.

### LEVEL3

1. How cryIAb differs from cryIIAb gene?
2. A method to prevent infestation of a nematode *Meloidogyne incognita* on roots of tobacco is silencing the specific mRNA. What is the scientific name of the technique? How is this performed by ds-RNA?
3. A baby loses his mother in infancy. He was totally depended on breast feeding as cows milk creates digestive problems. Name the first cow whose milk is nutritionally more balanced than normal cow's milk. Which extra nutritional element does it contain and how much magnitude?
4. Shahid a two years old baby is deficient in his immune system since birth. His father was told that this was due to an enzyme deficiency which is crucial for the immune system to function. Name the enzyme, the cause of its deficiency and the cure of the disease?
5. Nematode specific genes.



i) What is this technique of pest control called?ii) Specify a, b & c in the chart given.

### Questions for Self Evaluation

1. A four years old girl suffered from ADA deficiency. She was cured by inserting a correct gene into her.a) what is this process called? b) In which cells are the genes introduced ?
2. What is the other name of mobile genetic elements?
3. Differentiate between insulin and pro insulin?
4. Explain down stream processes?
5. Differentiate exonuclease and endonuclease.
6. Expand the term PCR.
7. What is its importance in genetic engineering?

### CHAPTER 13

### Organisms and Populations

S.NO	CHAPTER	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
13.	Organisms and Populations	1. Organisms and its Environment (i) Major Abiotic Factors (ii) Responses to Abiotic Factors (iii) Adaptations 4. Populations:- (v) Population Attributes (vi) Population Growth (vii) Life History variation (viii) Population interactions	** ** *** *** *** * **	Page -221-223 NCERT Fig. 13.3 Page 223-225 Page 225-226 Fig. 13.4 Page 226-228 Fig. 13.5 Page 228-231 Page 231-232 Table 13.1 Page 232-238	Eurythermal & stenothermal Conformers, Regulators Distinction between Expanding, stable, declining population. Distinction between Exponential and Logistic growth curve. Distinction between commensalisms and Amaensalism.

### DEFINITIONS

- **AMENSALISM** :- Interaction in which one species is harmed whereas the other one is unaffected.
- **CARRYING CAPACITY** :- Maximum size of population that can be sustained by the environment.

- **COMMENSALISM** :- Interaction in which one species gets benefits and other is neither harmed nor benefited.
- **CONFORMERS** :- Majority of animals and nearly all plants which cannot maintain constant internal environment.
- **EURYTHERMAL** :- the organisms that can tolerate and thrive in a wider range of temperature.
- **EXPONENTIAL GROWTH** :- Unimpeded growth of a population in an environment with abundant resources.
- **LOGISTIC GROWTH** :- Growth of a population in an environment with limited resources (initial lag phase, phase of acceleration and finally stationary phase).
- **MORTALITY** :- The number of deaths in a population during a given period.
- **NATALITY** :- The number of births in a population during a given period.
- **POPULATION DENSITY** :-The number of individuals of a species present in per unit area at given time.
- **REGULATORS** :- The organisms which maintain homeostasis (constant body temperature and osmotic concentration) by physiological means.
- **STENOTHERMAL** :- The organisms that are restricted to narrow range of temperature.

### ASSIGNMENTS

#### LEVEL 1

- 1 Why is thermoregulation more effectively achieved in larger animals than smaller ones?
- 2 What are osmoconformers?
3. What are the 2 forms of population growth?
4. What type of interaction is shown by sparrow eating the seeds?
5. How are eurythermal animals differ from stenothermal?
6. Name the four levels of organization that are studied in ecology.
7. Give any one example of brood parasitism.
8. Write an expression, which gives the change in population size after a given time.

#### LEVEL 2

1. Mention the adaptations the mammals of colder areas have.
2. When does a population growth curve assume J-shape?
3. What is Gause's Competition Exclusion Principle? Give 1 example.
4. How is cactus adapted to survive?
5. Lichen and mycorrhiza are very important examples of mutualism.
  - (i) Define mutualism.
  - (ii) Write the names of components of both.
  - (iii) What is the benefit of mutualism to both of them.
6. What type of morphological and physiological defences have been evolved by plants.

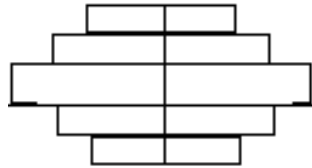
#### LEVEL 3

1. Mr. Ram on a trip to Rohtang Pass Suddenly experienced heart Palpitations, Nausea, fatigue etc on reaching the destination. Suggest the reasons for his sudden deterioration of health and also state whether his body will withstand this problem if he stays there for long and how?

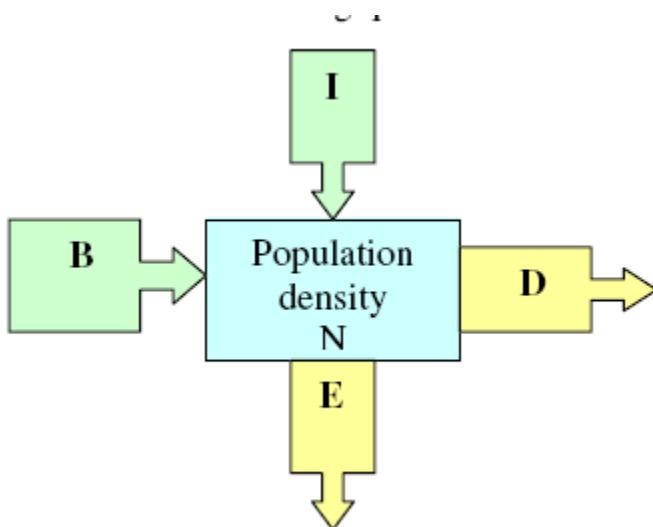
2. Observe the following equation :

$$\frac{dN}{dt} = rN \left[ \frac{K-N}{K} \right]$$

- i) Name the population growth curve.
- ii) What does N, r and K represent?
- iii) What type of growth status the following pyramid represents.



3. Anand on a visit through an under the ocean aquarium found that many sea anemones are attached to hermit crab shells, sucker fisher attached to the ventral surface of sharks and clown fish living among the sea anemones. He wondered whether all these associations are of the same type; can you help him to arrive at the correct conclusion.
4. Abingdon tortoise in Galapagos Island became extinct with in a decade after goats were introduced on the island. Why? What could be principle behind this situation?
5. An orchid plant is growing on the branch of a mango tree. How do we describe this interaction b/w orchid and mango tree?
6. Observe this diagram and answer the following question



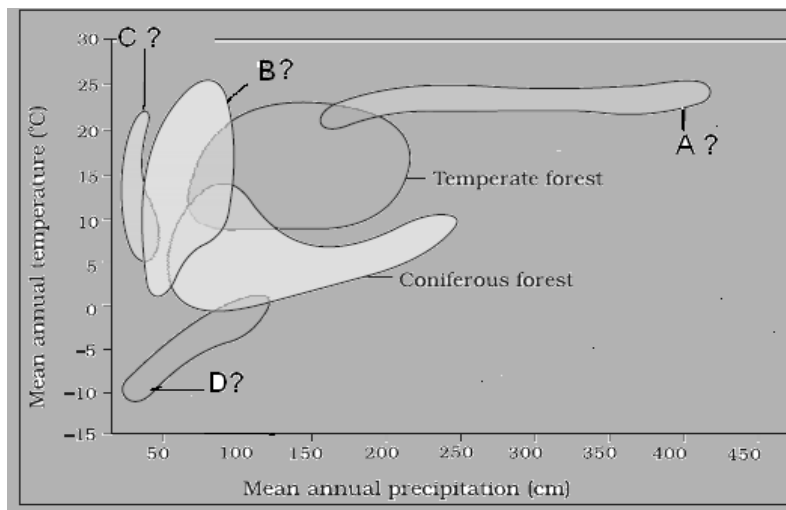
- a. What is the terminology for B& E.?
- b. If B + I is more then D + E then what will happen to population density.

(c) What are the most important factors which influence a population density of an area under normal condition ?

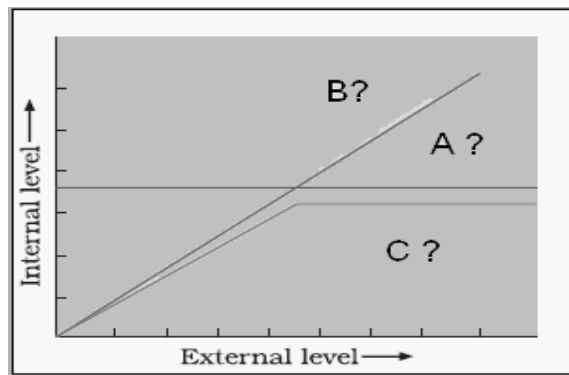
(d) If a habitat is being colonised recently then which factor contribute more to the population growth

**QUESTIONS FOR SELF EVALUATION**

1. An orchid plant is growing on the branch of a mango tree. How do we describe this interaction between orchid and mango tree?
2. The population of tigers in a forest becomes zero, due to uncontrolled hunting. What would be the long term effects of this situation in the forest?
3. Identify the biome distribution with respect to annual temperature and Precipitation from the following graph. Answer A, B, C & D.

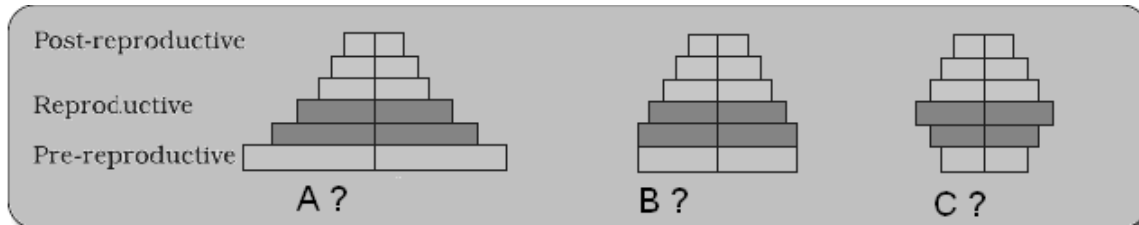


4. The following graph represents the organismic response to certain environmental condition.
- (i) which one of these, A , B , C depicts conformers?
  - (ii) How do A , B differ from each other with reference to homeostasis?
  - (iii) What does C of graph depict?
  - (iv) Mention the category to which man belongs.



- (i) Men Study the given age profiles related to human population and answer the following questions.

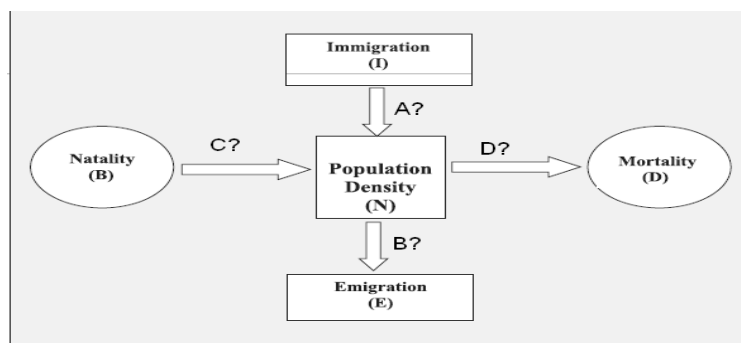
- (ii) tion the names given to A , B , C kinds of age profiles.
- (iii) Which one of these is ideal for a population?
- (iv) How do such age profile studies help policy makers prepare for future planning?



- 5. Why small animals are rarely found in polar region?
- 6. How does the special photosynthetic pathway like CAM support desert plants?
- 7. Why do animals migrate from one region to the other region in the cold season?
- 8. What type of population interaction in A, B, C, D between the species A and B as per the tabular column given below.

Species A	Species B	Name of Interaction
+	+	A?
+	-	B?
+	-	C?
-	0	D?

Which of the following A, B, C and D represent increase and decrease in population growth?



## Chapter-14 Ecosystem

S.NO	CHAPTER	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
14.	Ecosystem	8. Structure and function 9. Productivity 10. Decomposition 11. Energy Flow 12. Ecological Pyramids 13. Ecological succession 14. Nutrient cycling	* ** ** *	Page 242 Ex Q. 9 Fig. 14.1 Page 243-244 Ex. Q10 Page 245,247 Ex. Q. 11 Fig. 14.4 Page 248 Fig. 14.5 Page 250-251 Fig. 14.6 Page 253-255 Ex. Q. 12,13	GPP,NPP

- **BIOGEOCHEMICAL CYCLE** :- The movement of nutrient elements through various components of an ecosystem( between living organisms, soil, air and water).
- **BIOMASS** :- The amount of organic matter present in an organism/ a trophic level / an ecosystem.
- **DETRITIVORES** :- Organisms which feed on the detritus and break it down into smaller particles.
- **DETRITUS** :- Dead remains of plants and animals or their wastes.
- **ECOLOGICAL PYRAMIDS** :- Representation of trophic structure ( Number, Biomass . or Energy at various trophic levels) of a food chain.
- **ECOLOGICAL SUCCESSION** :- Phenomenon in which structure and composition of a community changes in an orderly and sequential manner leading to the climax community.
- **ECOSYSTEM:** - Functional unit of nature where living organism interact among themselves and also with physical environment.
- **ECOSYSTEM SERVICES:** - The products of ecosystems processes are termed as ecosystem services.
- **FOOD WEB:** - A network formed by interconnected the food chain.

- **HUMIFICATION:** - Process of changing Detritus into a dark coloured amorphous matter called humus.
- **HYDRARCH:** - Ecological succession in water bodies like lakes resulting in climax community.
- **MINERALISATION** :- Process of Degradation of Humus by some microbes into Inorganic nutrients.
- **PIONEER SPECIES:-**The species which invade a bare area and initiate the ecological succession.
- **PRIMARY PRODUCTIVITY:** - Amount of biomass or organic matter produced per unit area over a time period by the plants.
- **PRIMARY SUCCESSSION:** - Ecological succession on previously sterile area such as bare rocks or lake forming climax community.
- **PRODUCTIVITY:-**Rate of production of biomass.
- **SECONDARY PRODUCTIVITY:-** The rate of assimilation and formation of new organic matter by consumer.
- **SECONDARY SUCCESSION:** - Ecological succession in an area where previously established community is destroyed due to fire or floods etc.
- **SERE** :- The sequence in which one community is replaced in an area by another resulting in a climax community.
- **STANDING CROP** :- The amount of living matter(biomass) present at a trophic level.
- **STANDING STATE** :- The amount of nutrients present in the soil at any given time.
- **STRATIFICATION** :-Vertical distribution of different species occupying different levels in an ecosystems.
- **TROPHIC LEVEL** :- Every step or link of a food chain.
- **XERARCH** :- Ecological succession on bare rocks or sand resulting in climax climax community.

### ASSIGNMENTS

#### LEVEL1:-

Q1 ) What is biomass ?

Q2 ) Name the four important functional aspects of ecosystem

Q3) Name the two forms of reservoir of carbon that regulate the ecosystem carbon cycle .

Q4) Name the dominant producers in a deep aquatic ecosystem .

Q5) What is NPP?

Q6. What are the two basic catagories of ecosystem? Give example

Q7.What is food chain? Give an example.

Q8. Describe the major components of ecosystem

#### LEVEL 2

Q1) What do you mean by transducers ?

Q2) What is meant by productivity of a trophic level ?

Q3) Which species is the pioneer species on a bare rock

Q4.What are decomposers? Write their function.

- Q5. What is the difference between gaseous and sedimentary cycle?  
 Q6. Mention two factors by which productivity is limited in an aquatic ecosystem.  
 Q7. Expand PAR, How much PAR is used in gross primary productivity?  
 Q8. Give account of factors affecting the rate of decomposition.  
 Q9) What are ecological pyramids ? Mention its limitations .  
 Q11. Give an account of energy flow in an ecosystem.

**LEVEL 3**

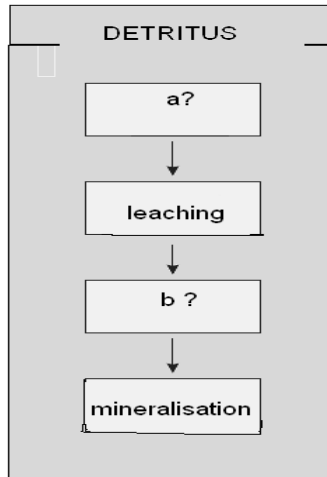
- Q1) Why the pyramid of energy is always upright ?  
 Q2) What is bioenergetics ?  
 Q3. Why is the length of a food chain in an ecosystem generally limited to 3-4 trophic levels?  
 Q4. What are the differences between detritus and grazing food chains?  
 Q5. Briefly describe the process of decomposition  
 Q6 . Describe pond as an ecosystem .  
 Q7. What is xerosere? Describe the process of succession on a bare rock

**QUESTIONS FOR SELF EVALUATION**

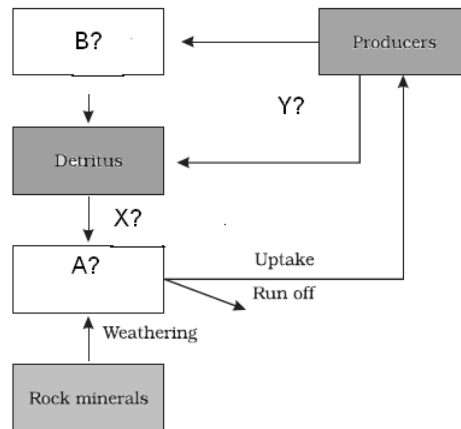
1. Which ecosystem has maximum stratification?
2. What is the approximate value of Net Primary Productivity of the biosphere?
3. Find out the consumer of top order/ top carnivore from the following food chains.
  - a) Phytoplankton - small fishes - large fishes - Hawk
4. Based on the following information, answer the A, B, C and D with reference to Grass land ecosystem



5. . Longer food chains are not viable in the ecosystem from the energy point of view. Why?
6. Why food chains in the environment are operative in the form of food web?
7. i) Complete the steps of decomposition process by using a suitable terminology in a & b.  
 (ii) List the factors which affect decomposition process.



8. Complete the following simplified schematic diagram of Phosphorous cycle by writing the correct answer for 'A', 'B', 'X' and 'Y'.



9. Why are all the pyramids upright in most of the ecosystems?

10. Primary productivity of tropical rain forest is highest among terrestrial ecosystems while that of desert is lowest. Which factors are responsible for this difference?

## Chapter-15 Biodiversity And Conservation

S.NO	CHAPTER	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
15.	Biodiversity and Conservation	5. Patterns of Biodiversity 6. Importance of species diversity to ecosystem. 7. Loss of Biodiversity 8. Conservation of Biodiversity	***  *  ***  ***	Fig. 15.1 Text page 259 Ex. Q 3 Page 263 Page 264-265 Ex. Q. 5 Page 265-267 Ex. Q. 7	Graphical representation , species area relationships   Crypreservation

- **BIODIVERSITY** :- It is the term used to describe the combine diversity at all the levels of biological organization.
- **ECOLOGICAL DIVERSITY** :- The diversity at the ecosystem level .
- **ENDEMISM** :- It is the condition when species confined to that region and not found anywhere else.
- **GENETIC DIVERSITY** :- The High diversity shown by a single species at the genetic level(distributional level .)
- **SPECIES AREA RELATIONSHIPS** :- The relation between species richness and area.

### DIFFERENCES

Alpha Diversity	Beta Diversity
1. It refers to the diversity of the organism sharing the same habitat or community.  2. It is within community diversity.	1. It refers to the diversity of the organism in different communities in a habitat.  2. It is between community diversity.

Ex-situ Conservation	In-situ conservation
1.It is called off-site conservation. 2.Includes botanical garden, zoos, gene bank, seedlings etc.	1.It is called on-site conservation. 2.It includes wildlife sanctuaries, national parks, as well as protected areas to protect endangered species in natural habitats.

**ASSIGNMENTS**  
**LEVEL1**

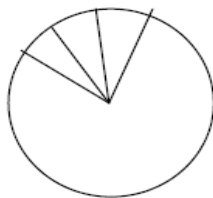
1. What is the approximate no of plant and animal species described so far by IUCN (2004) report?
2. Which type of graph curve is obtained when species richness is plotted against area?
3. Name a few weeds that have invaded our crop fields as alien species. Why these have become uncontrollable
4. Categorize the following into in-situ and ex-situ approaches of biodiversity conservation.  
i) Botanical gardens ii) Wild life sanctuaries iii) Gene bank  
iv) Biosphere reserves v) Sacred forests/lakes vi) Pollen banks  
vii) Tissue culture viii) Cryo-preservation

**LEVEL2**

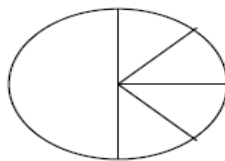
1. Reserpine is obtained from a plant found in Himalayan ranges. Name the plant.
2. Western Ghats have greater amphibian species diversity than Eastern Ghats. Why?
3. Who proposed rivet popper hypothesis? Describe this hypothesis briefly.
4. Which type of organism are prone to co extinction and why?

**LEVEL3**

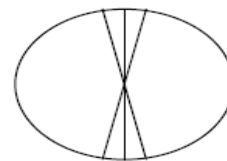
1. What do you mean by bioprospecting?
2. What is depicted by the following representation of species diversity? Why these estimates do not give any figure-for prokaryotes.



(a)



(b)



(c)

3. The invasion of alien species is responsible for extinction of the indigenous species. Give 2 examples to support this statement.
4. If a species of fish becomes extinct, all those parasites, specific to that fish also face extinction. Which of the major cause describe as “the evil Quartet’s is being accounted?

5. Categorize the followings statement into narrowly utilitarian, broadly utilitarian and ethical reason:-

i) Every species in biodiversity has an intrinsic value even if it not of value to us.

ii) Human beings derive a number of economic benefits like food, fiber etc from biodiversity.

iii) Biodiversity provides ecosystem services which can not be given price tag. Justify your categorization also.

6. Since the origin of life on earth and evolution there have been 5 episodes of mass extinction, but the current rate of extinction is 100-1000 times. What are the main causes of high extinction rate and how is it going to harm human beings

### **QUESTIONS FOR SELF EVALUATION**

1 What is IUCN Red list ? Give any two uses of this list .

2 Name any 2 threatened animal species of India .

3 Which are the biodiversity HOT Spots in India ?

4 Name two alien species introduced in India .

5 What is the importance of sacred forests and sacred lakes ?

6 What is cryo preservation ? Give its one use .

7 What are the major causes of species losses in geographic regions ?

### Chapter-16 Environmental Issues

S. N O	CHAPTER	Concepts	Degree of imp.	Ref. NCERT text book.: page nos	Common errors
16.	Environmental issues	<p>5. Air Pollution and its control</p> <p>(ii) Case study of Delhi</p> <p>6. Water pollution and its control</p> <p>(i) Domestic Sewage &amp; Industrial effluents</p> <p>(ii) Algal Bloom</p> <p>(iii) BOD</p> <p>(iv) Eutrophication</p> <p>(v) Biomagnification</p> <p>7. Solid waste</p> <p>(i) Case study of remedy for plastic waste.</p> <p>(ii) Electronic</p>	<p>**</p> <p>***</p> <p>**</p> <p>***</p> <p>***</p> <p>***</p> <p>***</p> <p>*</p> <p>**</p> <p>***</p>	<p>Fig. 16.1</p> <p>Page 270-273</p> <p>Page 272-273</p> <p>Page-274</p> <p>Fig.16.2,16.3</p> <p>Page 275</p> <p>Page- 275</p> <p>Page-276</p> <p>Fig. 16.5</p> <p>Page-276</p> <p>Page-279</p> <p>Page-279</p> <p>Page-279</p>	<p>Advantages of CNG over Petrol or diesel.</p> <p>Norms of Air Pollution.</p> <p>Types of impurities &amp; their nature in domestic sewage.</p> <p>Effect of Sewage discharge on characteristics of river</p> <p>Concentration of toxic substances at various trophic levels</p> <p>Types of e-wastes &amp; the metals extracted.</p> <p>Role of UV-B radiations</p>

	waste		Page-280	
	8. Ago chemicals & their effects	***	Page-280	
	(i) Case study of organic farming	**	Page-280-282 Fig. 16.6,16.7	
	5. Radioactive wastes			
	6.Greenhouse effect and Global Warming			
	(i) Green house gases & their relative contribution to total global warming		Page-282-283	
	7. Ozone depletion in Stratosphere		Page-284-285	
	8. Deforestation:- Case study of conservation.			

- **ACCELERATED EUTROPHICATION** :- The acceleration of aging process of water by human's activities like effluents from the industries and homes.
- **AGRO-CHEMICALS** :- The chemicals used in agriculture such as inorganic fertilizers, pesticides, herbicides, fungicides etc. are called agro-chemicals.
- **ALGAL BLOOM** :- Presence of large amount of nutrients in water that cause excessive growth of free floating algae.
- **Biochemical Oxygen Demand (BOD)** :- The amount of the oxygen that would be consumed if all the organic matter in one liter of water were oxidized by bacteria.
- **BIOMAGNIFICATION** :- The increase in concentration of the toxicant at successive trophic levels.
- **DESERTIFICATION** :- When large barren patches of land extend and meet over time, a desert is created.
- **EUTROPHICATION** :-The natural aging of a lake by Biological Enrichment of its water.

- **E-WASTE** :- Irreparable computers and other electronic wastes
- **GREEN HOUSE EFFECT** :- The naturally occurring phenomenon that is responsible for heating of Earth's surface and atmosphere.
- **INTEGRATED ORGANIC FARMING** :- A Cyclical, zero waste procedure, where waste products from one process are cycled in as nutrients for other processes.
- **MUNICIPAL SOLID WASTES** :- The wastes from homes offices, stores, schools, hospital etc. that are collected and disposed by municipality.
- **NOISE** :- The undesired high level of sound.
- **POLLUTANTS** :- Agents that bring about undesirable change in air, water land or soil are called pollutants.
- **POLLUTION** :- Any undesirable change in physical, chemical or biological characteristics of air, land, water or soil.
- **POLYBLEND** :- A fine powder of recycled modified plastic.
- **REFORESTATION** :- The process of restoring a forest that once existed but was removed at same point of time in the past.
- **SANITARY LANDFILLS** :- The process in which wastes are dumped in a depression or trench after compaction and covered with dirt everyday.
- **SNOW-BLINDNESS CATARACT** :- High dose of UV-B causes inflammation of cornea.
- **SOIL EROSION** :- Removal of fertile top soil due to human activities over – cultivation, deforestation etc.
- **WATER LOGGING** :- The stagnation of water in the field due to irrigation without proper drainage of water.

### DIFERENCES

Primary pollutants	Secondary pollutants
1. These enter our atmosphere directly from different sources and these may be solid ,liquid and gas. 2.e.g.CO,CO <sub>2</sub> ,SO <sub>2</sub> ,N <sub>2</sub> O	1. These are formed during chemical reaction b/w primary and other atmospheric pollutants 2.e.g.smog, brown air.

Deforestation	Desertification
1.It is called the cutting and clearing of forests.  2.Caused due cattle grazing, urbanization and industrialisation.	1.It is the conversion of grassland into desert.  2.Caused due to cattle grazing and soil erosion.

# ASSIGNMENTS

## LEVEL 1

1. Define eutrophication.
2. What is biomagnification?
3. What is BOD?
4. Which is the world's most problematic weed, also known as —terror of Benga
5. Differentiate between biodegradable and non-biodegradable wastes.
6. Describe Chipko Movement.
7. Mention harmful effects of noise pollution on human health

## LEVEL 2

1. What is meant by algal blooms? What is its significance?
2. What is Jhum cultivation?
3. What is snow blindness?
4. Mention the harm caused by fine particulate matter to human beings?
5. What are the advantages of Organic farming?
6. How do radioactive wastes cause damage to living organism?
7. What measures should be taken to reduce global warming?
8. Write a short note on ozone depletion.

## LEVEL 3

1. What is the effect of DDT in birds?
2. Why are nuclear wastes called potent pollutants?
3. Mention two problems that have arisen due to green revolution.
4. What is ecological sanitation? What are its advantages?
5. How can we reduce automobile pollution?
6. Mention the adverse effects agrochemicals
7. Mention the Supreme Court directions to the Government to reduce pollution.
8. a) Explain the functioning of electrostatic precipitator with the help of a diagram.  
b) Mention the consequence if the electrostatic precipitator does not work in a power plant.

## QUESTIONS FOR SELF EVALUATION

1. What do you mean by point source pollution ?
2. What is the cause of minimata disease ? Write its symptoms .
3. Which type of UV radiations can be lethal to the organisms ?
4. Expand the term PAN ?
5. Write constituents of smog ?

6 BOD of two samples of water A and B were 120 mg./L and 400 mg./L .respectively .Which sample is more polluted ?

7 How do human activities cause deforestation ?

8 DISCUSS e –wastes.

9 Write a note on acid rain .

10 Discuss the causes and effects of global warming .