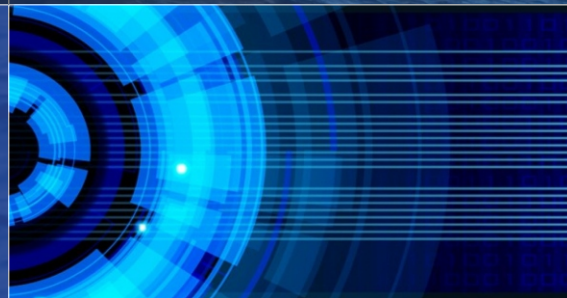
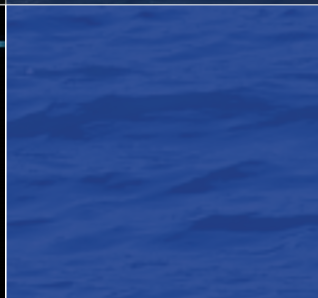
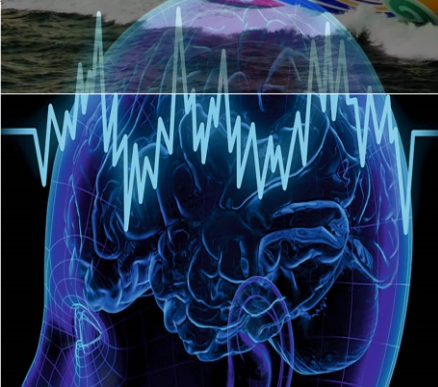


STUDENT SUPPORT MATERIAL

Session : 2019-20



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केन्द्रीय विद्यालय संगठन



Class-XII
BIOLOGY

STUDENT SUPPORT MATERIAL
Class XII
BIOLOGY



Session 2019-20

Kendriya Vidyalaya Sangathan
New Delhi



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BIOLOGY – CLASS XII(044)
UNIT WISEWEIGHTAGE

Unit	Title	Marks
1.	Reproduction	14
2.	Genetics and evolution	18
3.	Biology and human welfare	14
4.	Biotechnology and its applications	10
5.	Ecology and environment	14
	TOTAL	70

BIOLOGY (Code No. 044)

QUESTION PAPER DESIGN Class – XI/XII (2019-20)

1) Board Examination – Theory

Time: 3 Hours

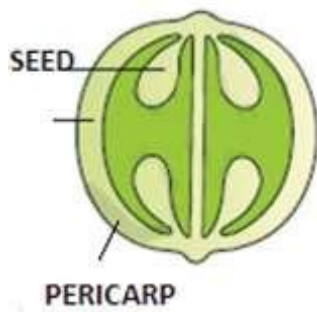
Max. Marks: 70

S. No.	Typology of Questions	Very Short Answer (VSA) (2 Marks)	Short Answer-I (SA-I) (2 Marks)	Short Answer-II (SA-II) (3 marks)	Long Answer (LA) (5 marks)	Total Marks	% Weightage
1.	Remembering- (Knowledge based) Simple recall questions, to know specific facts, terms, concepts, principles, or theories, Identify, define, or recite, information)	2	1	1	-	7	10%
2.	Understanding- (Comprehension - To be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase information)	-	2	4	1	21	30%
3.	Application (Use abstract information in concrete situation, to apply knowledge to new situations, Use given content to interpret a situation, provide an example, or solve a problem)	-	2	4	1	21	30%
4.	Evaluating & Analysis - Classify, Compare, Contrast, or differentiate between different pieces of information, Organize and/or integrate unique pieces of information from a variety of sources)	2	1	1	1	12	17%
5.	Creating - (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	1	1	2	-	9	13%
	TOTAL	5x1=5	7x2=14	12x3=36	3x5=15	70(27)	100%

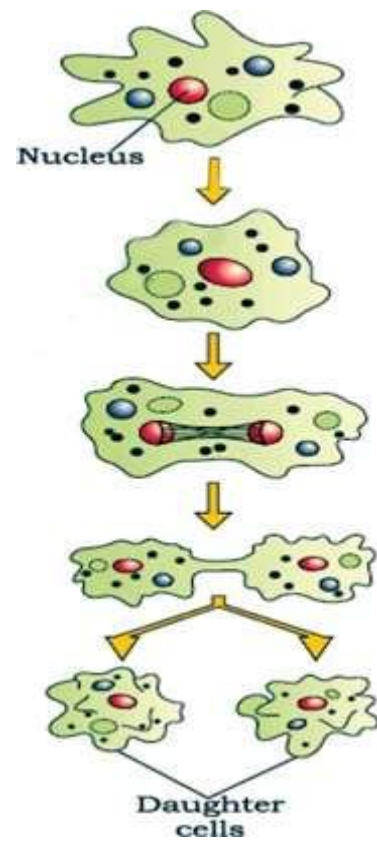
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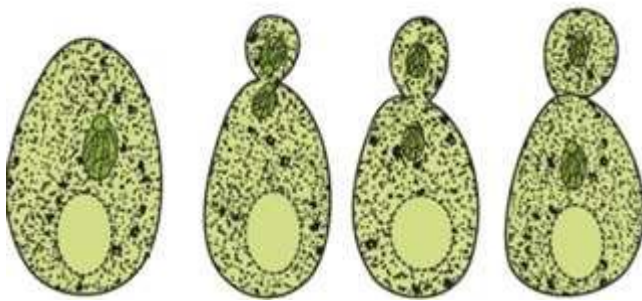
1. FRUIT SHOWING SEEDS



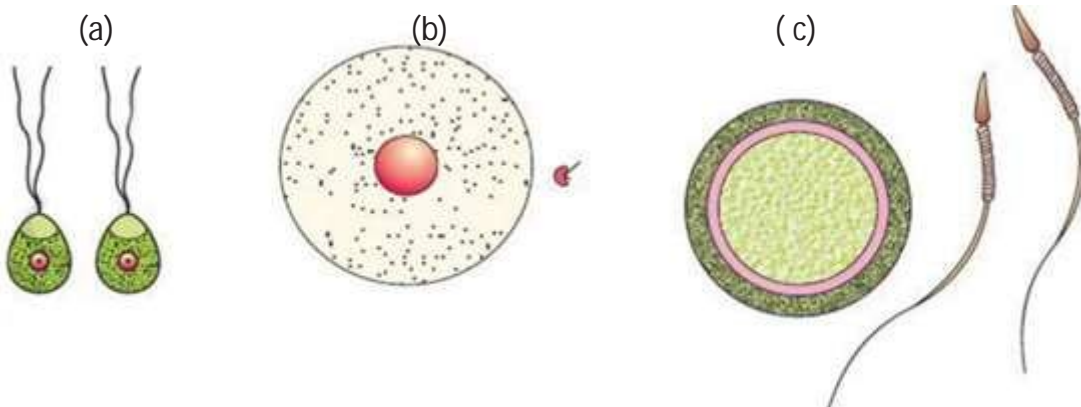
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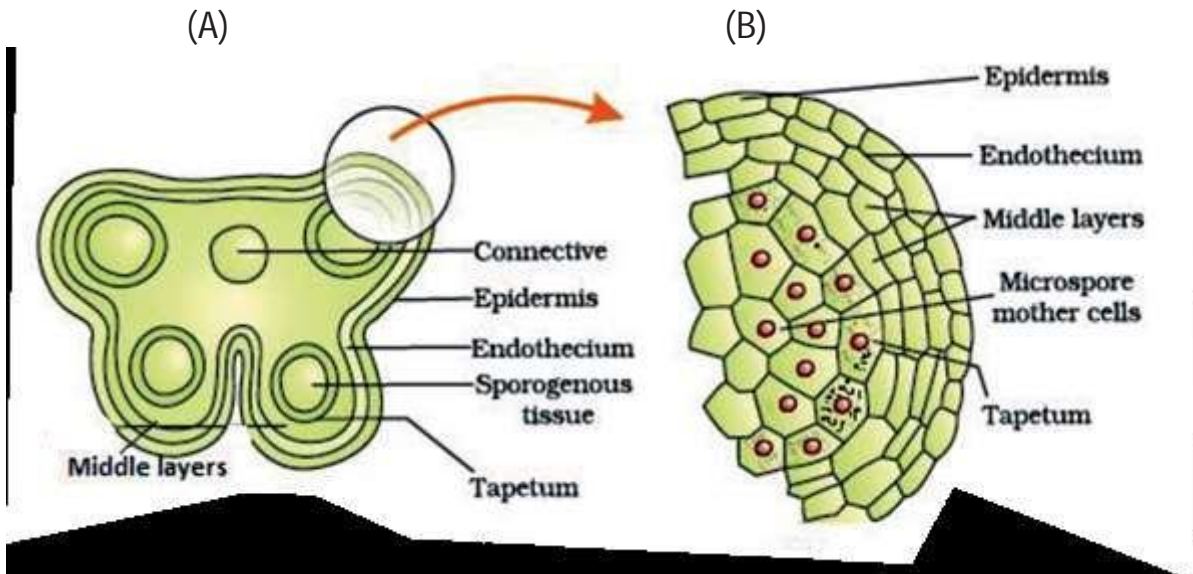
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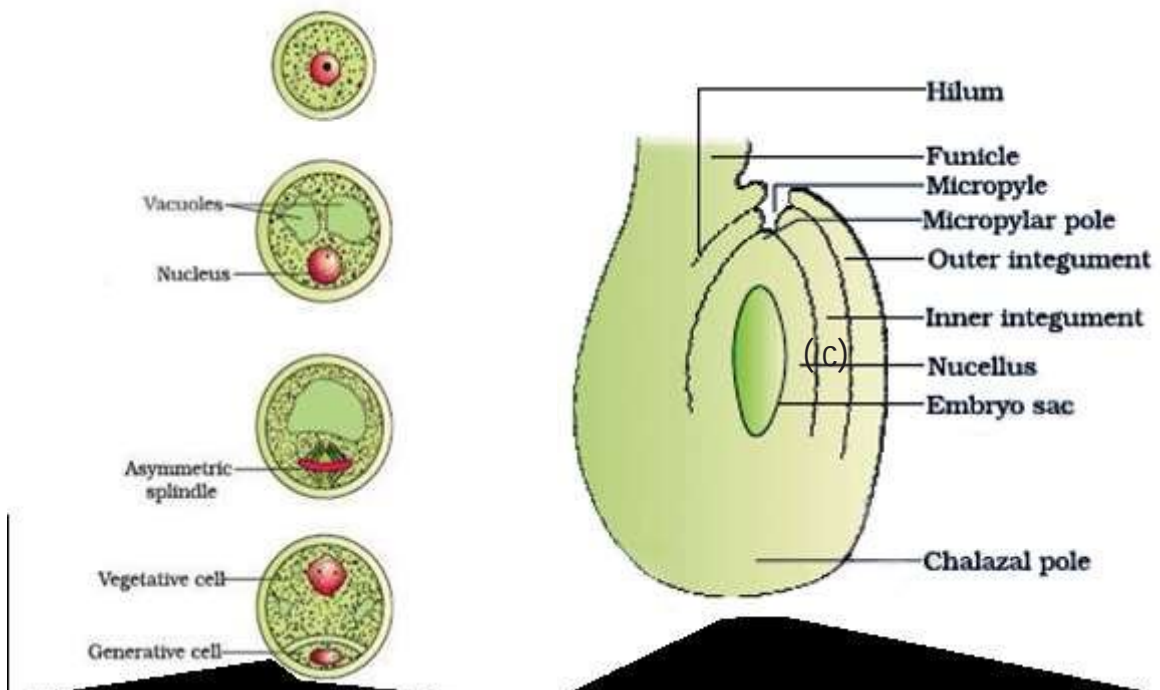
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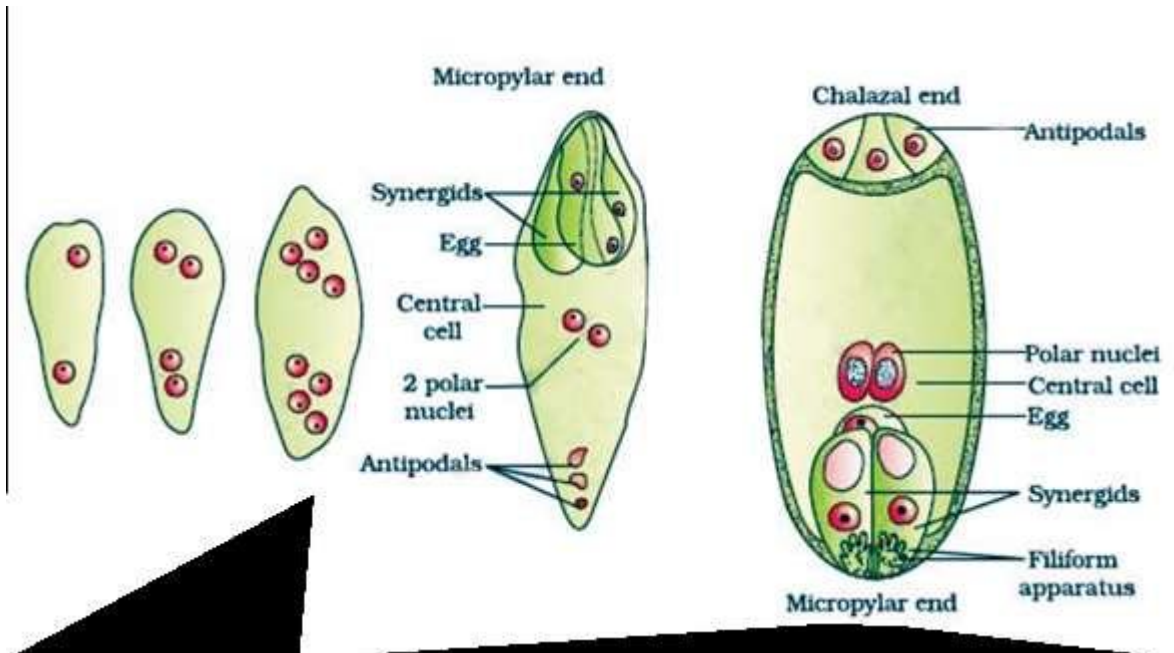


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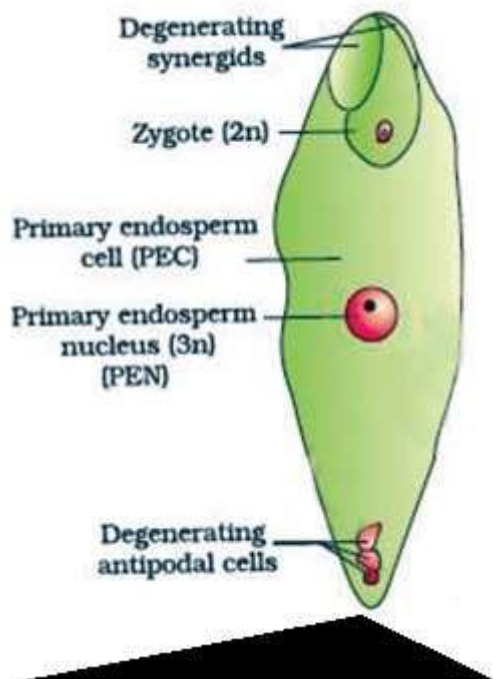
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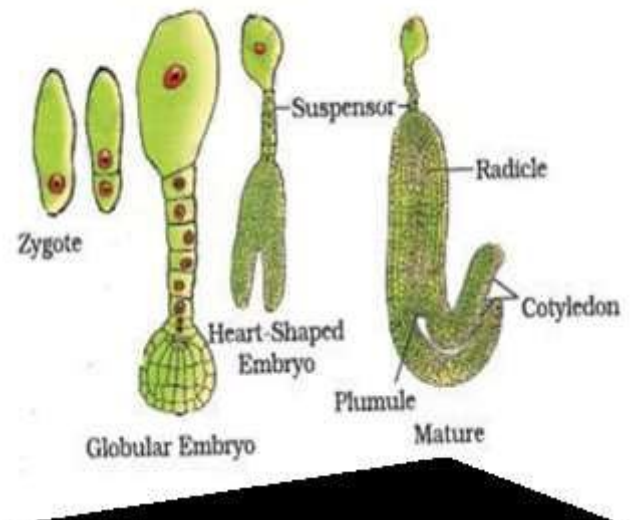
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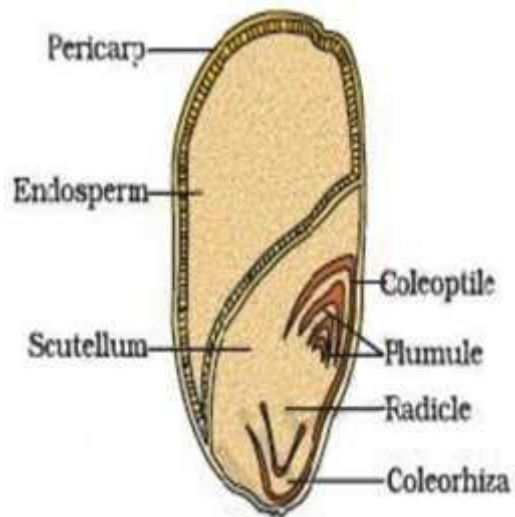
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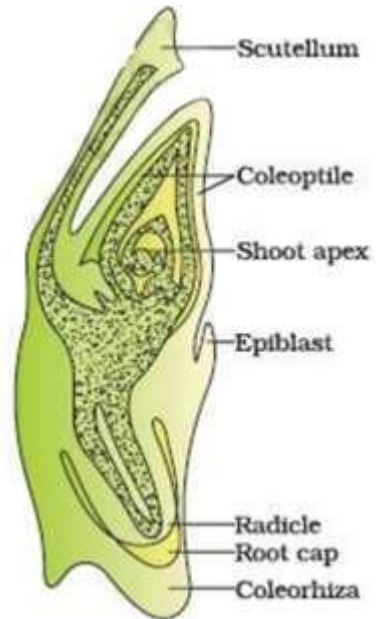
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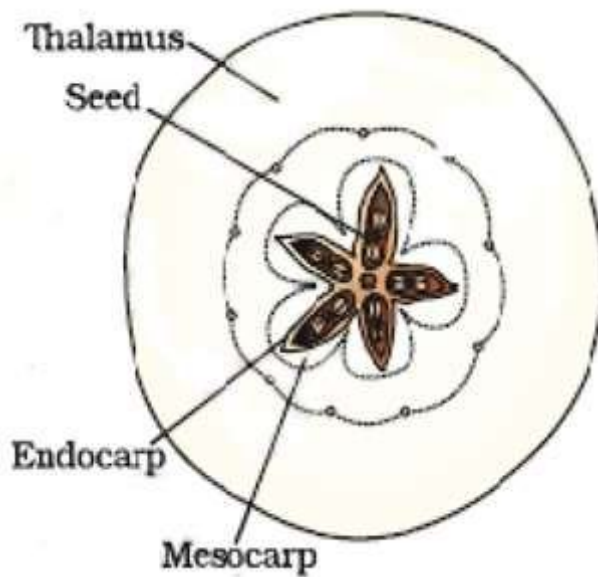
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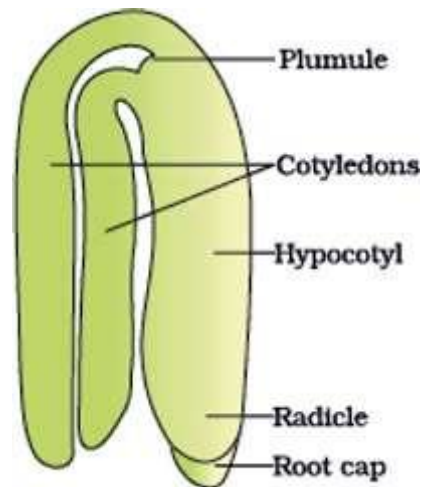
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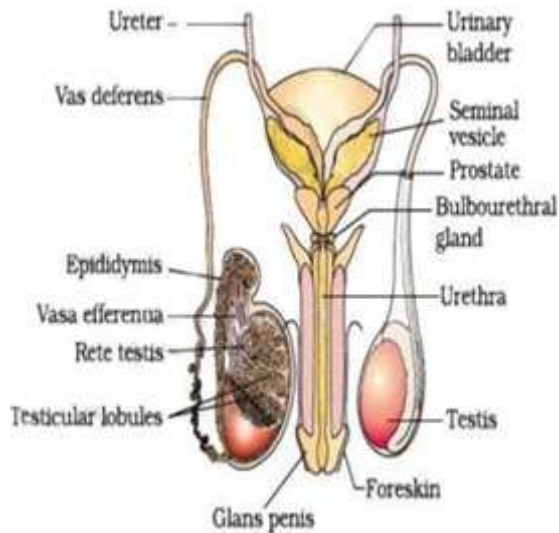


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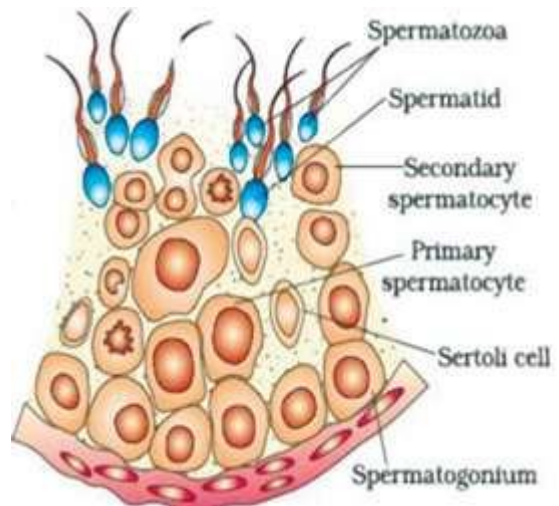


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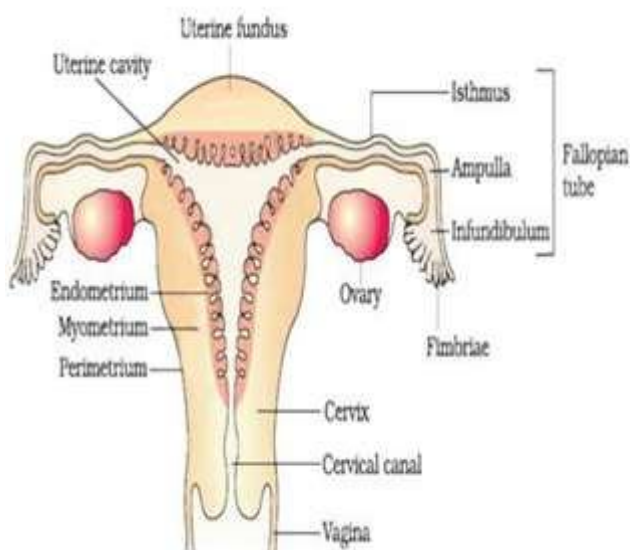
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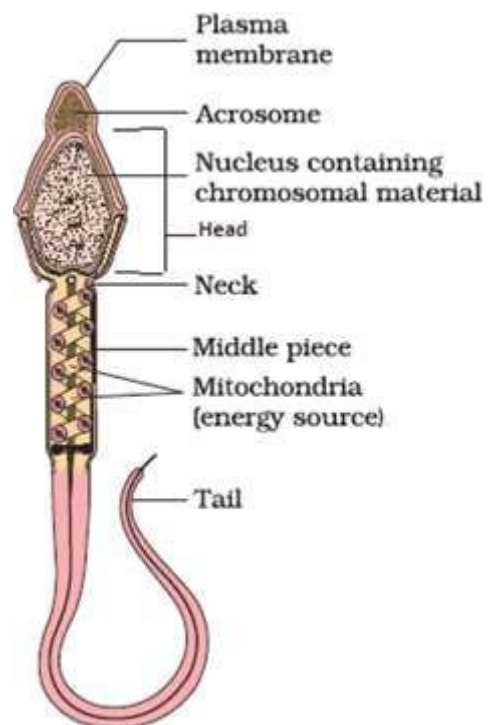
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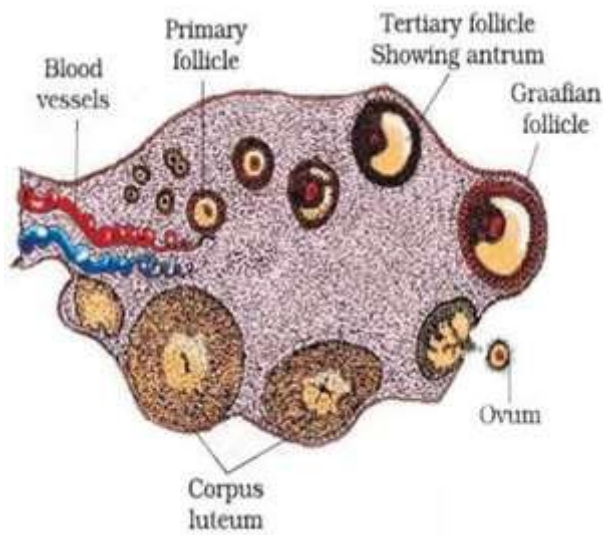
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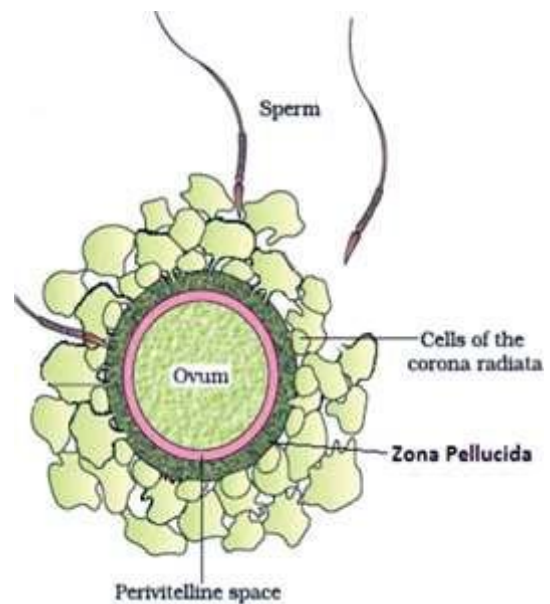
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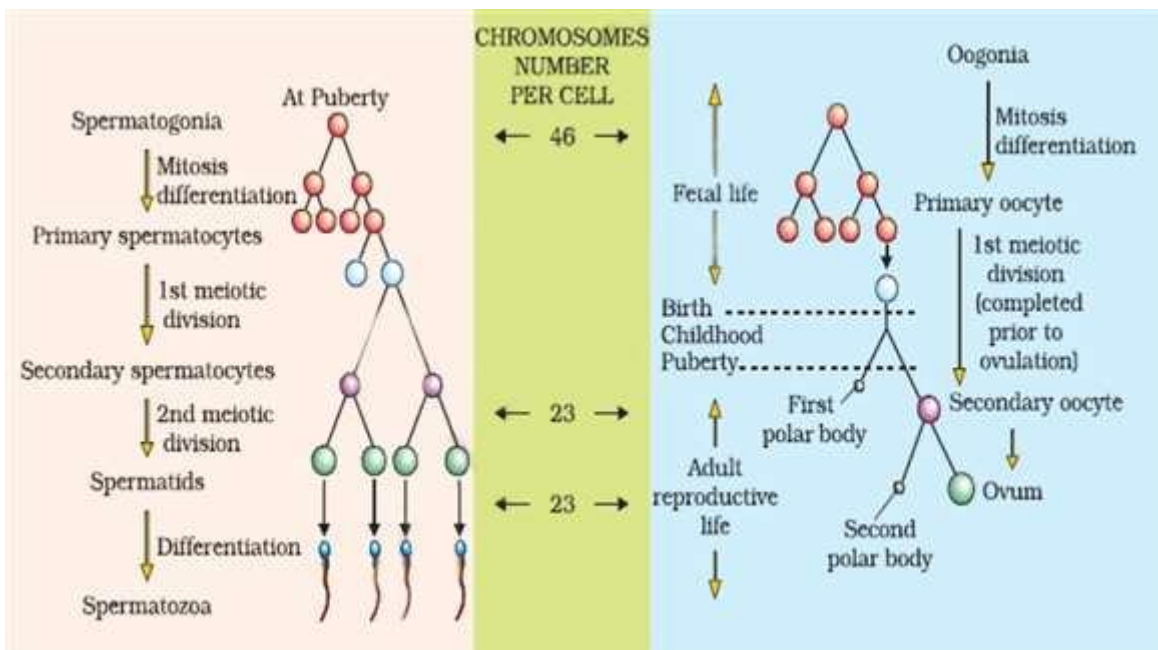
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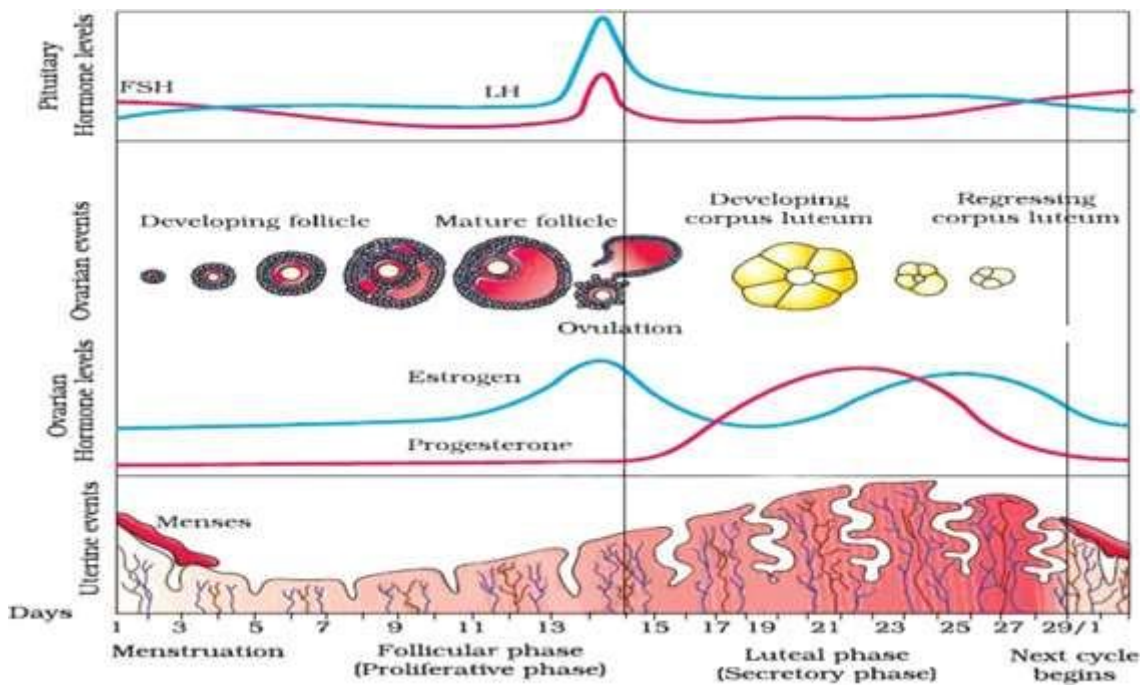
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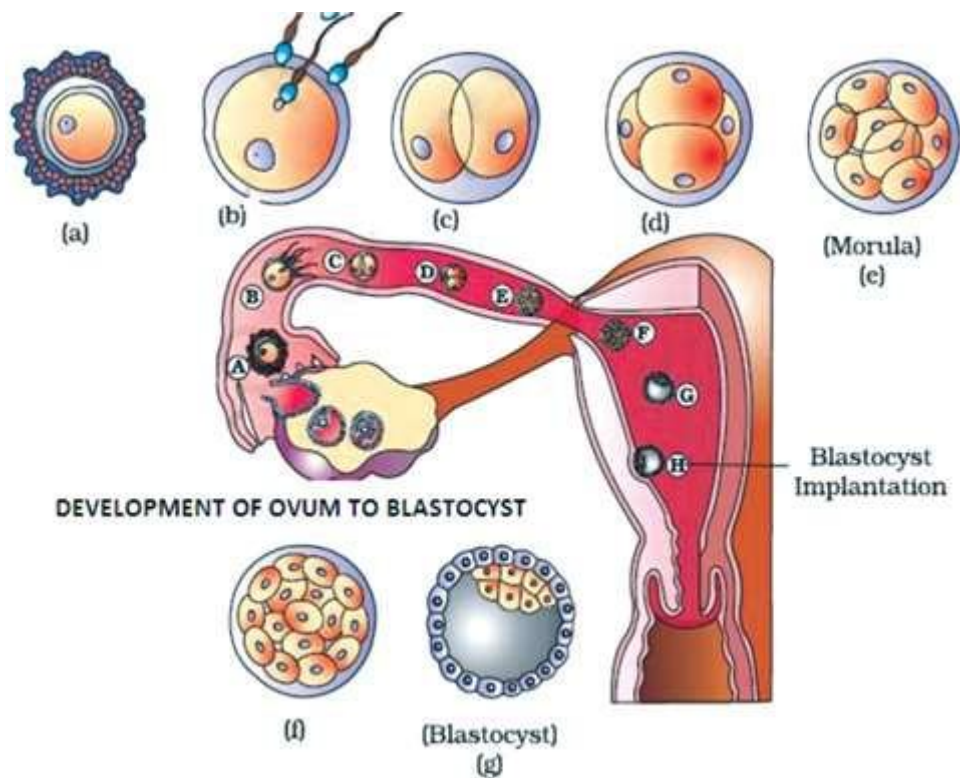
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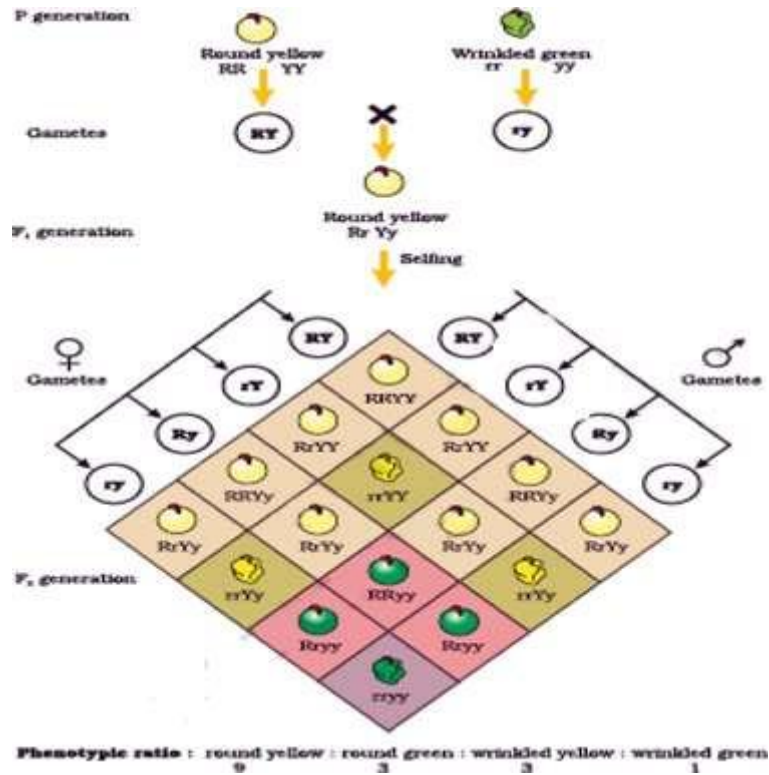


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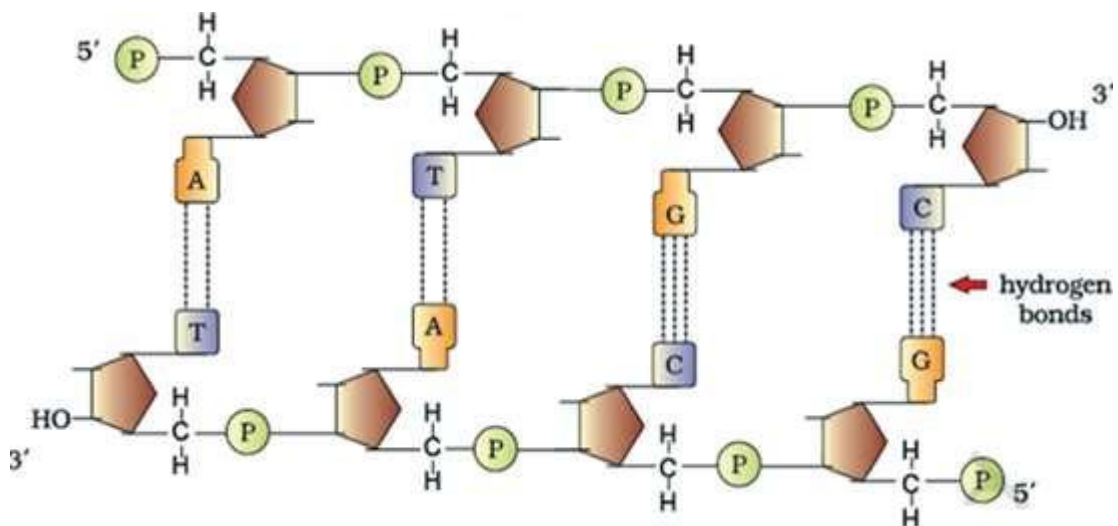
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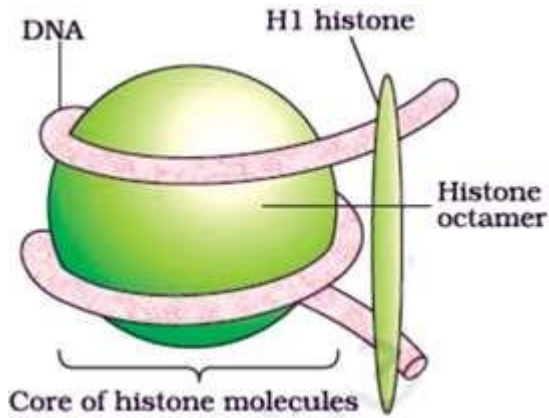
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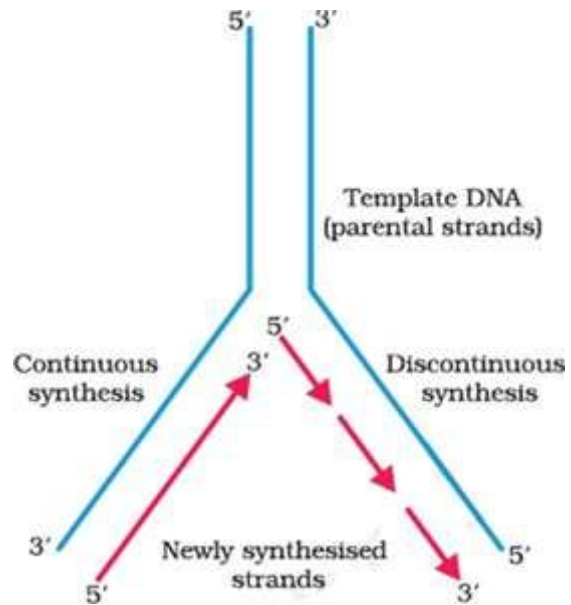




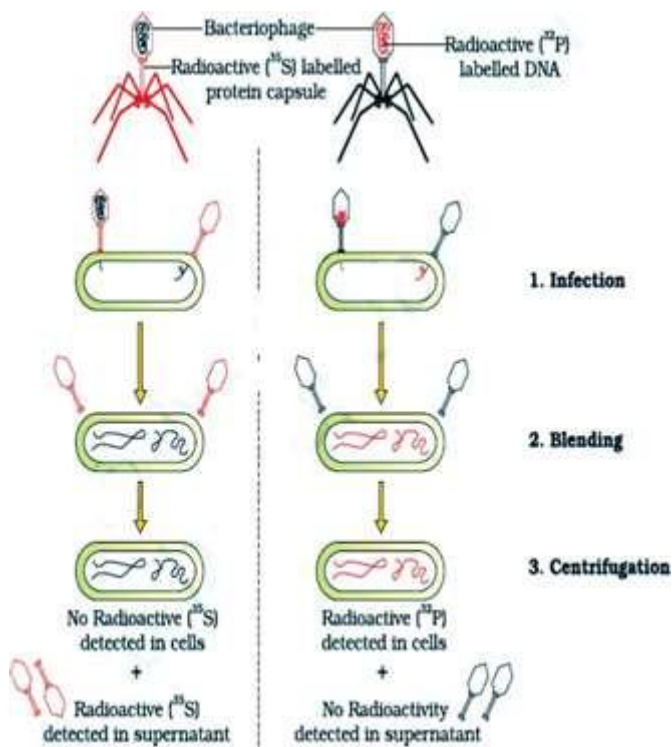
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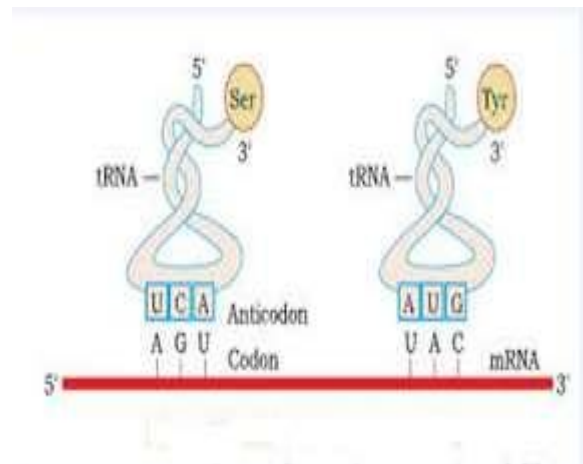
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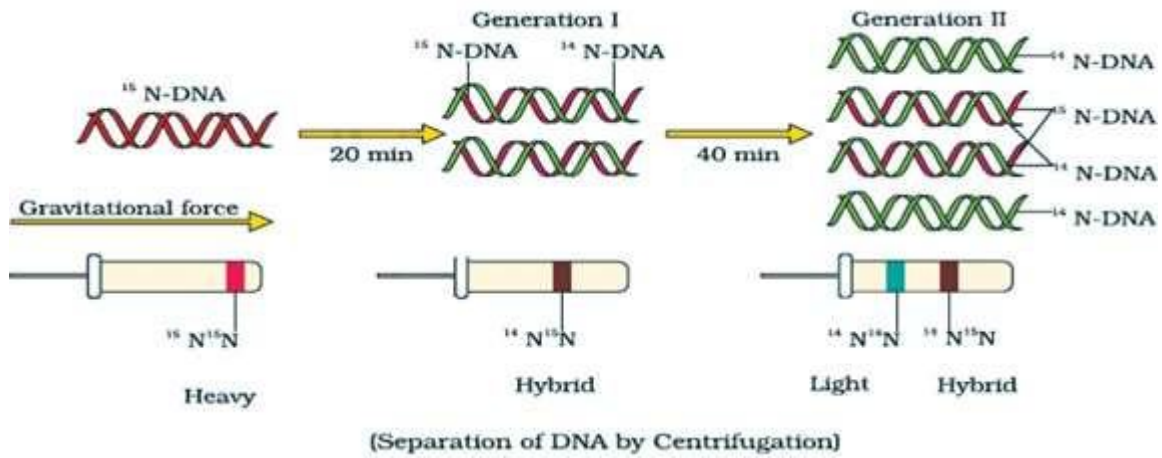


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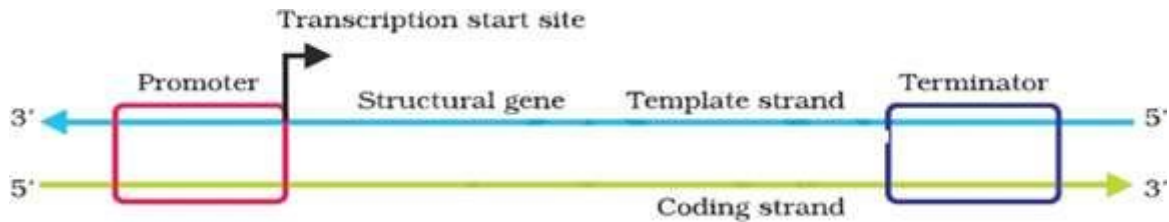




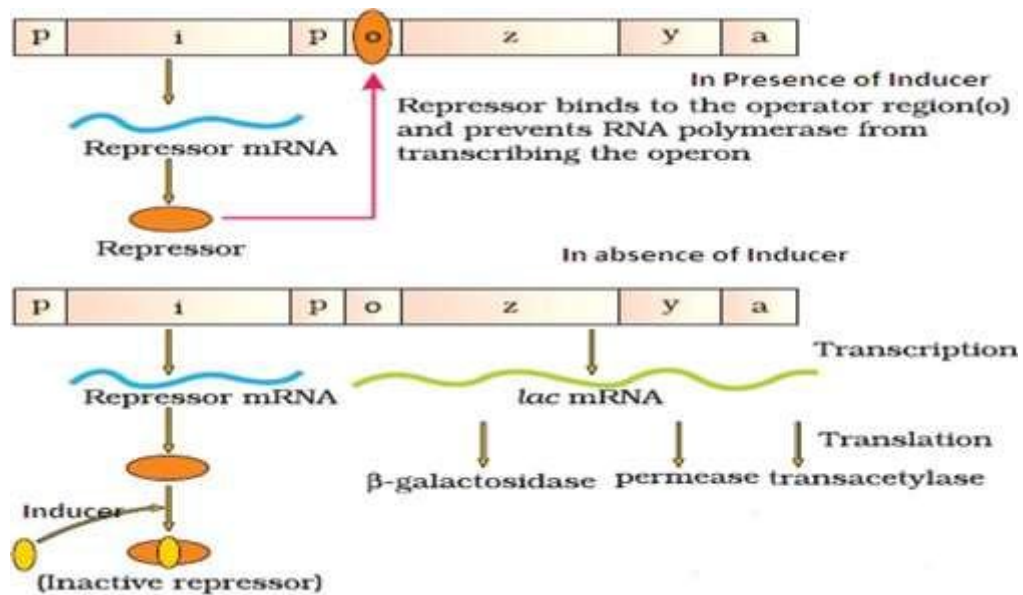
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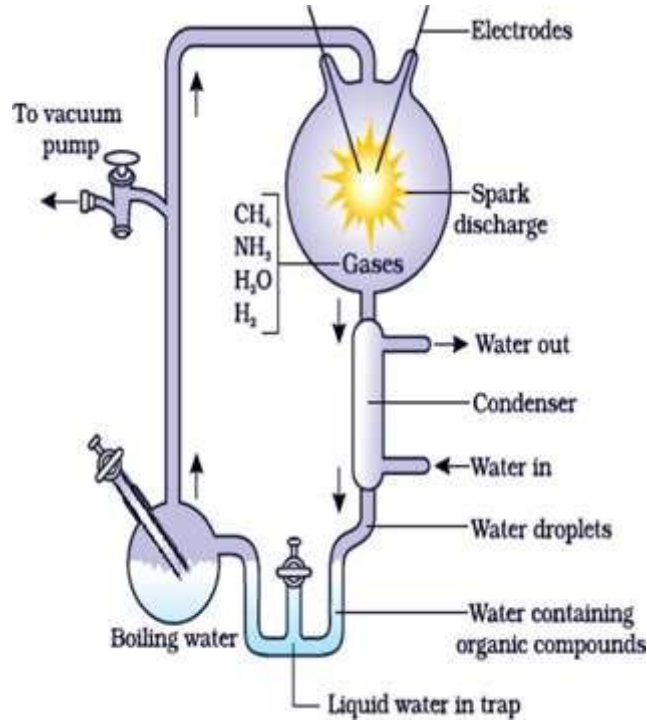


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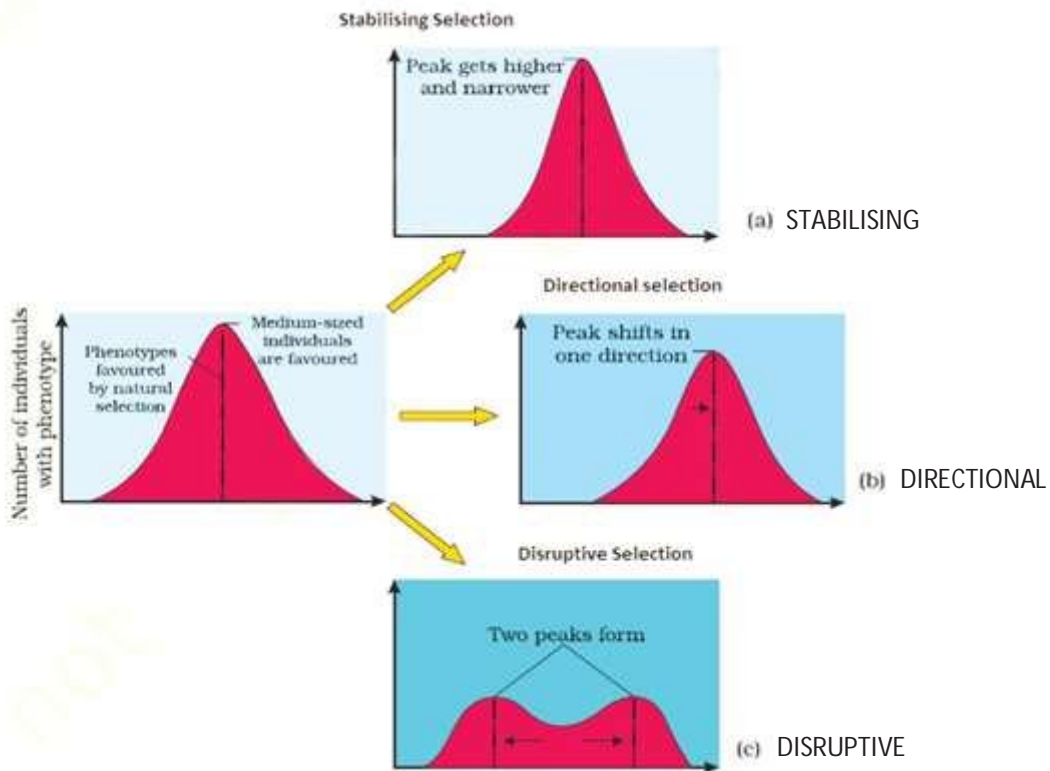




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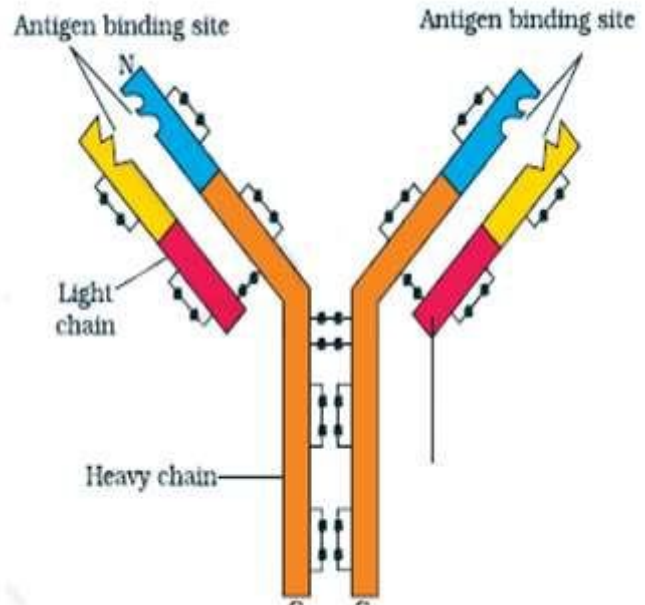
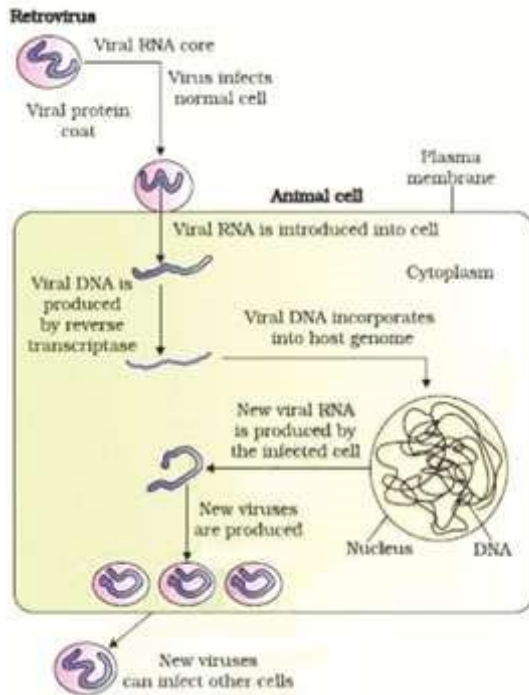




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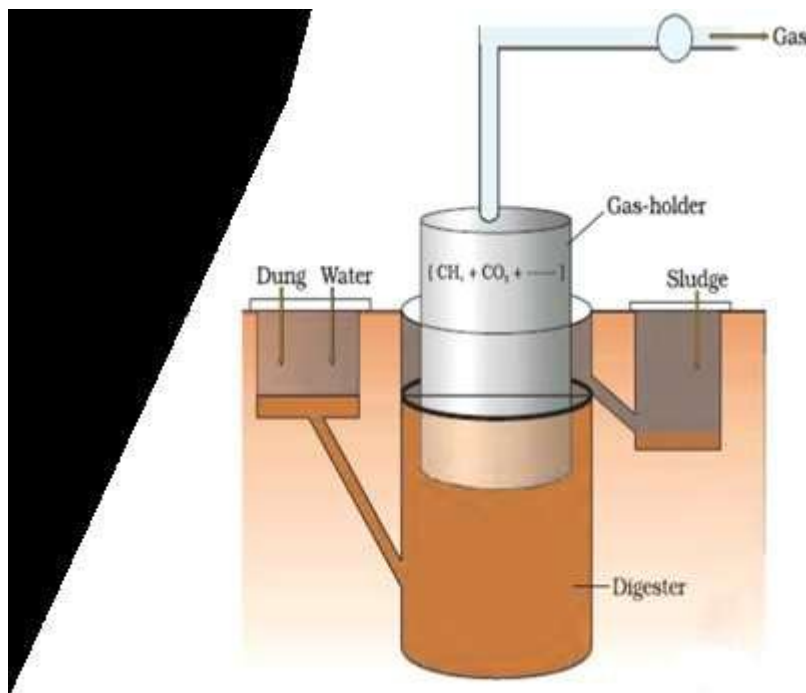
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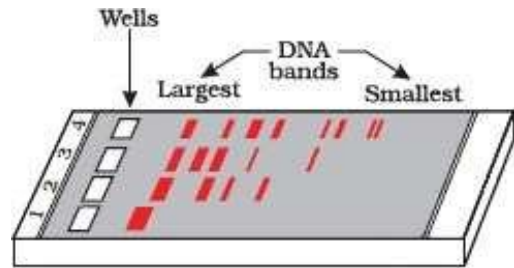
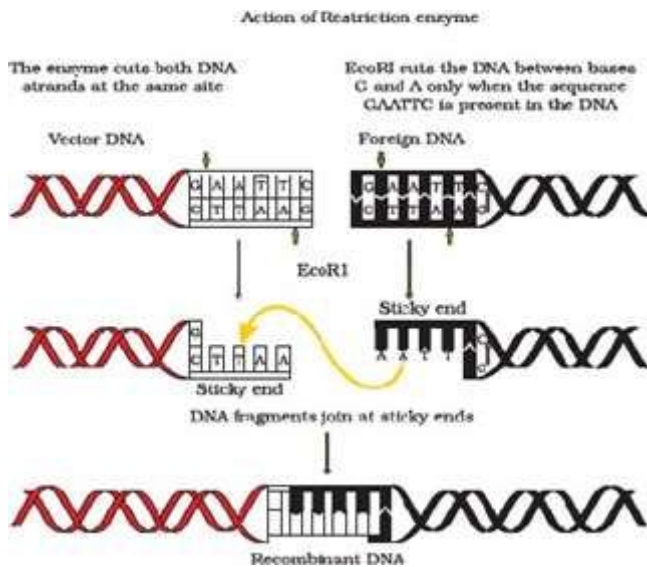




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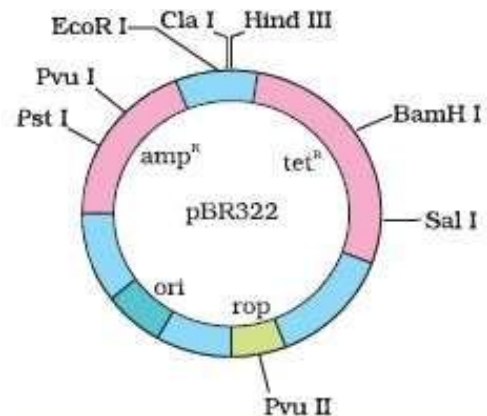
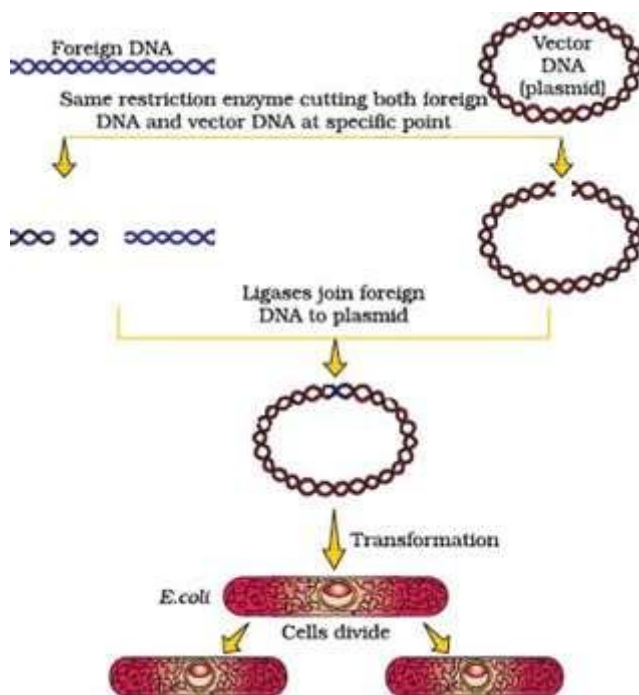
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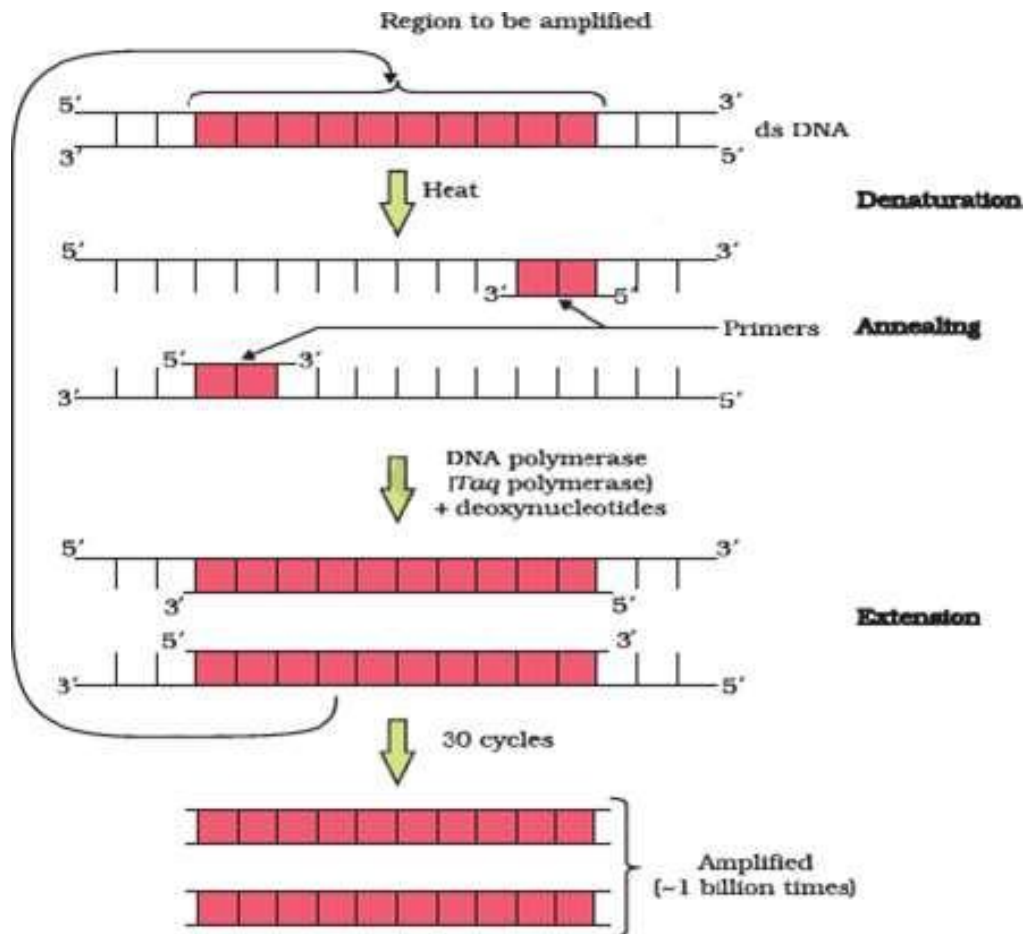
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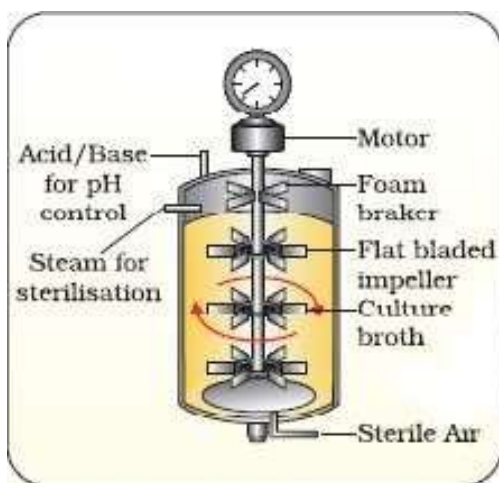
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5. POLYMERASE CHAIN REACTION{PCR}

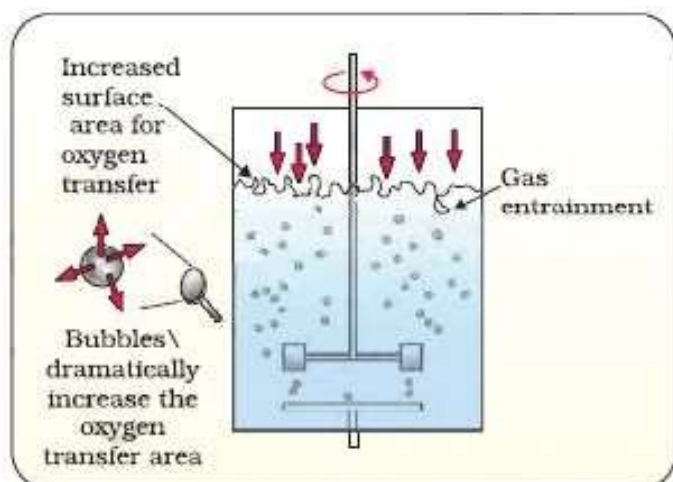


6. SIMPLE STIRRED-TANK BIOREACTOR



(a)

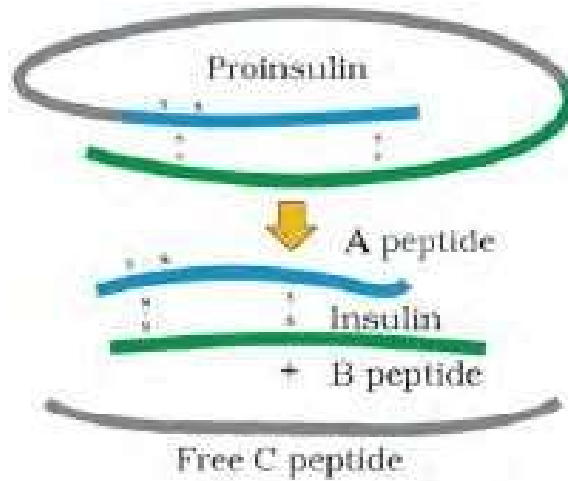
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(b)

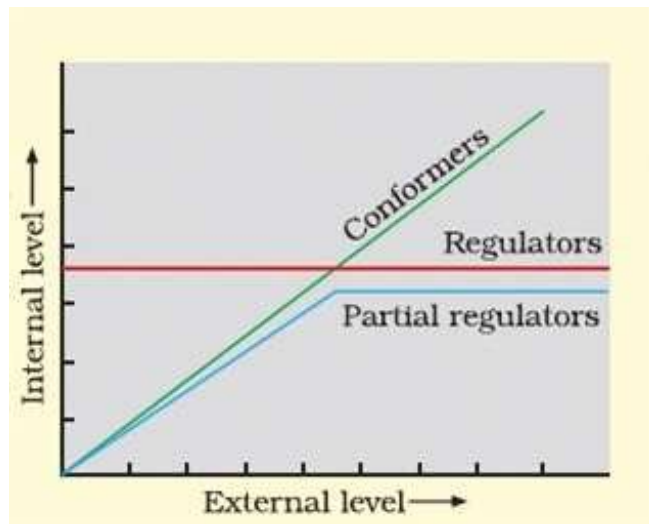


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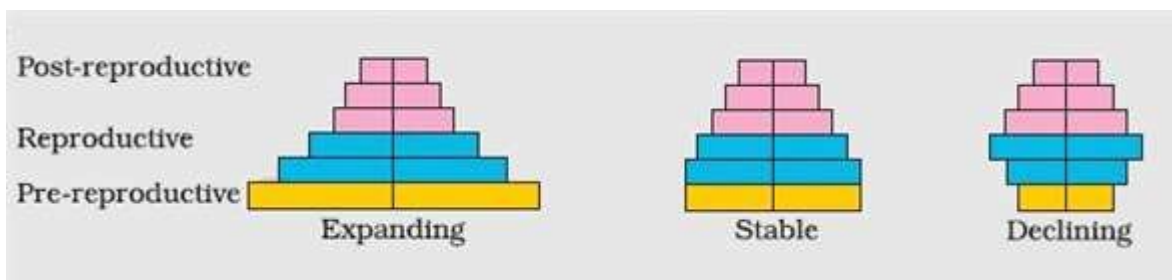


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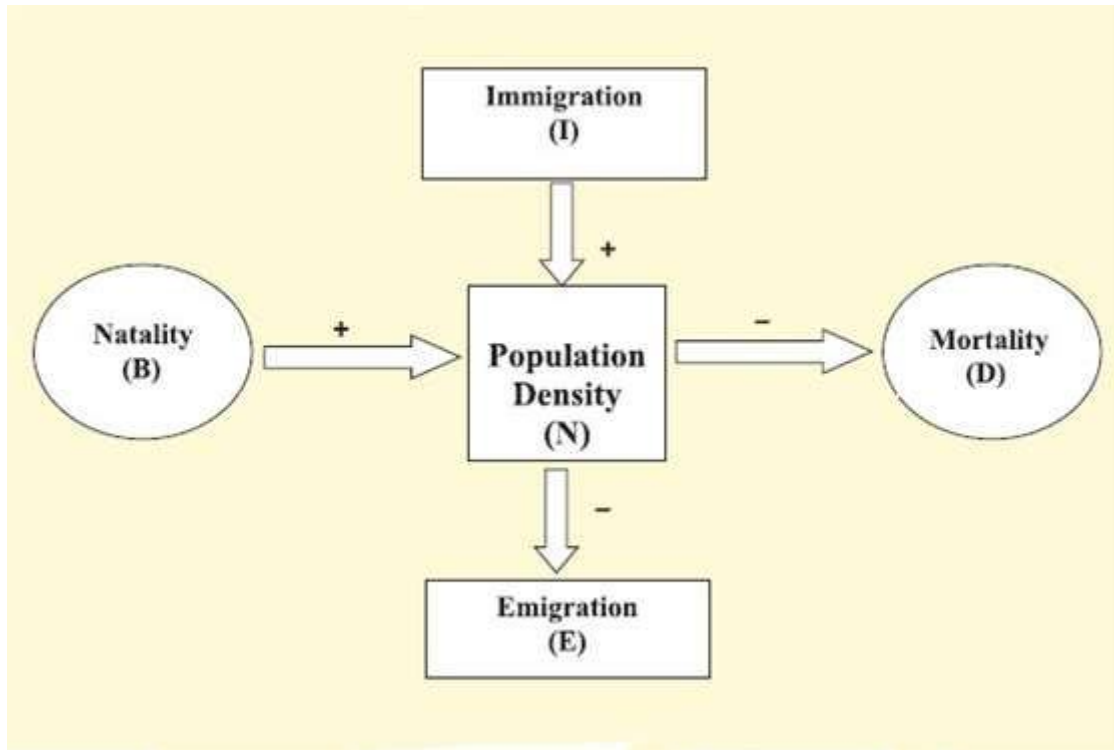


2. REPRESENTATION OF AGE PYRAMIDS FOR HUMAN POPULATION



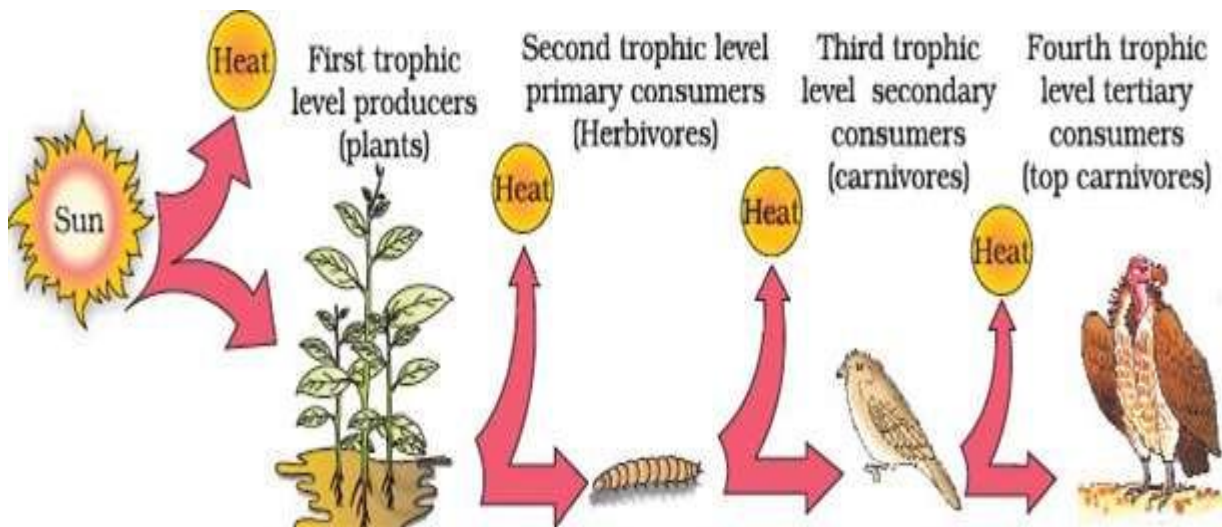


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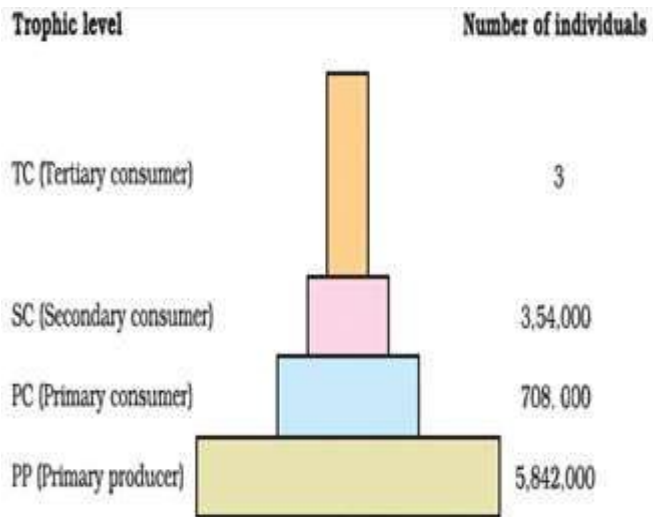
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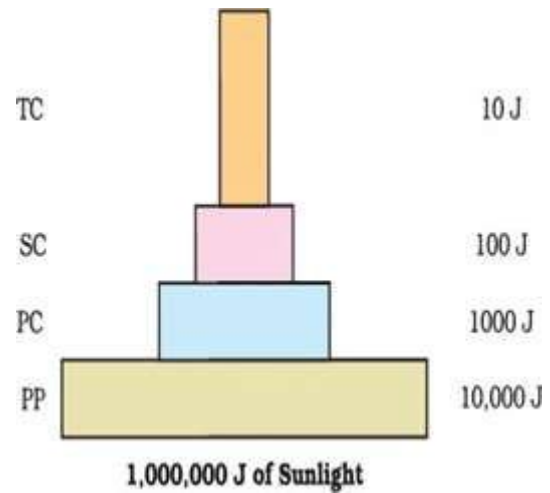


2. ECOLOGICAL PYRAMIDS

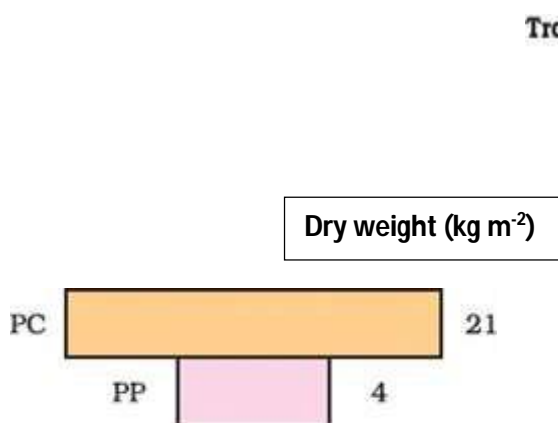
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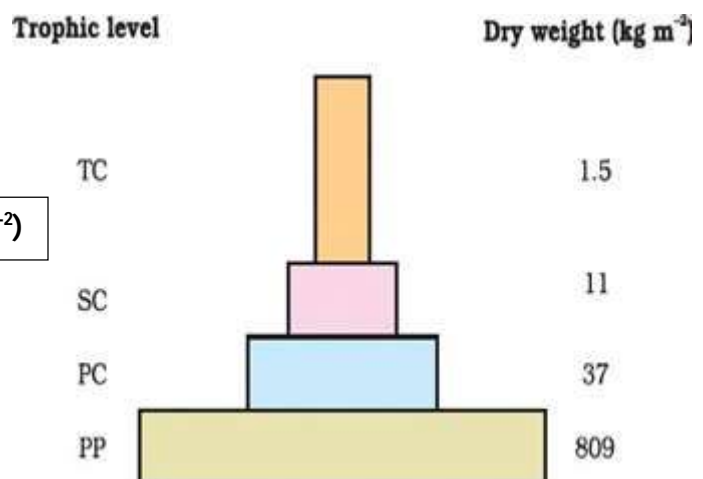
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C. INVERTED PYRAMID OF BIOMASS



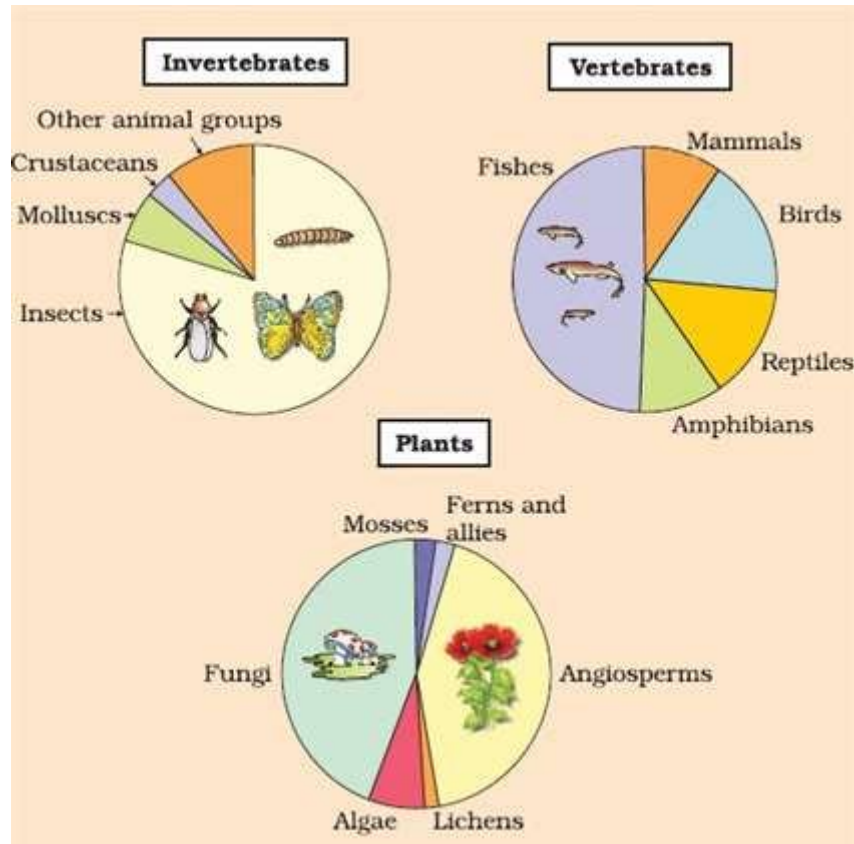
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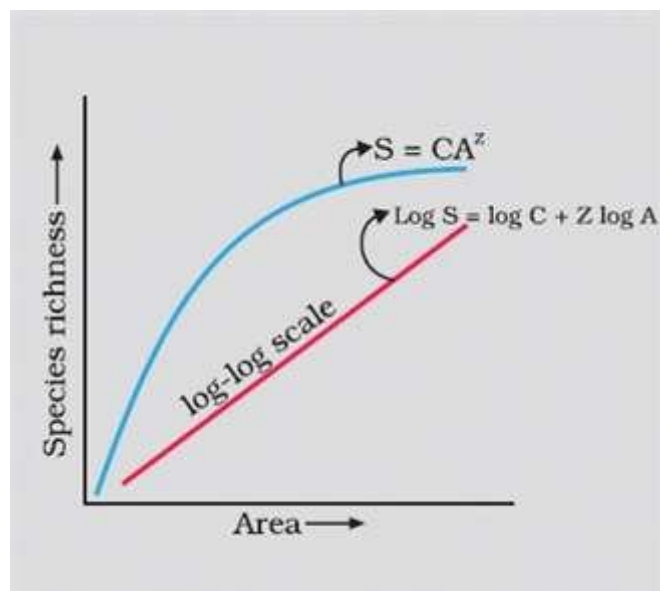


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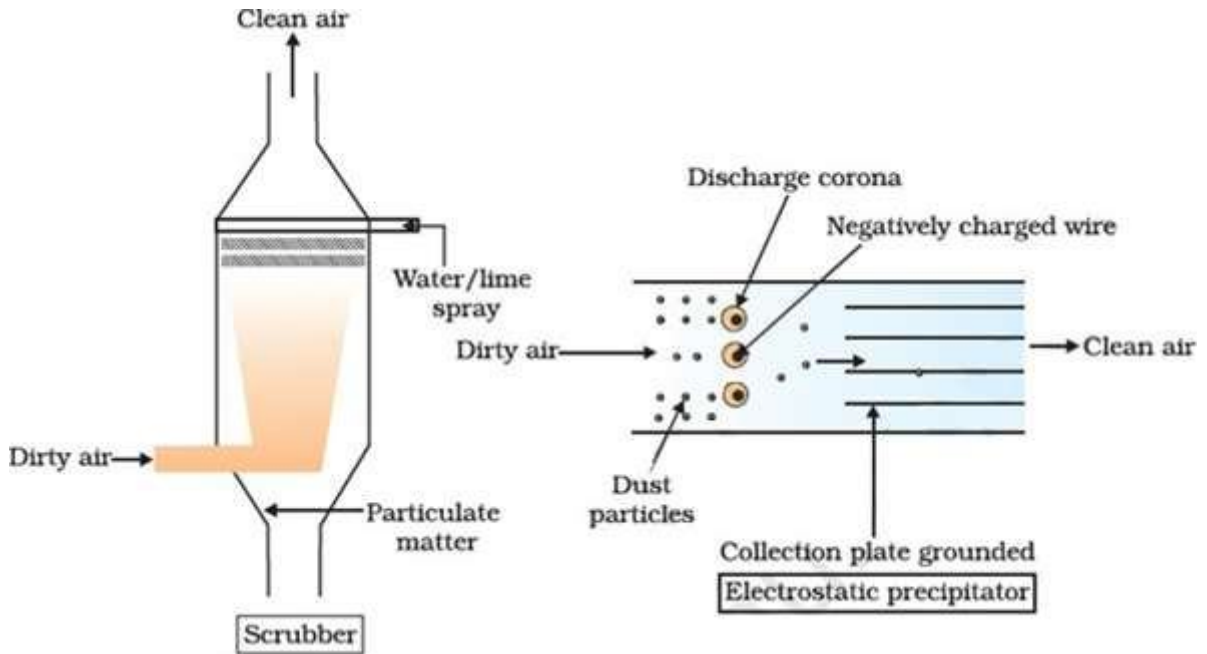
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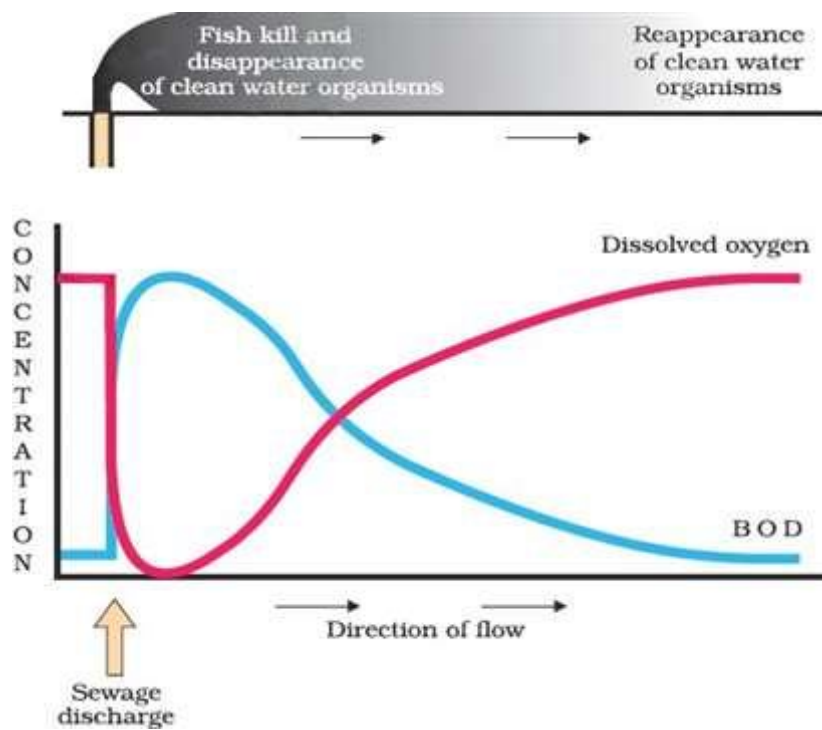


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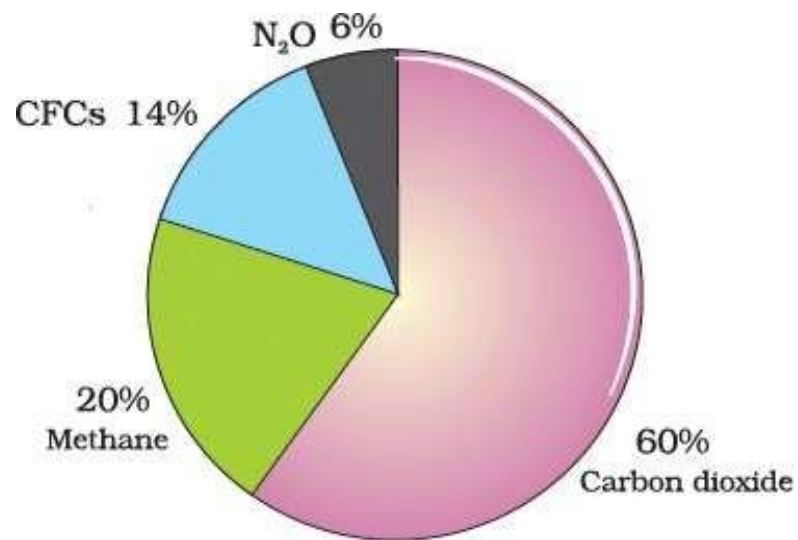


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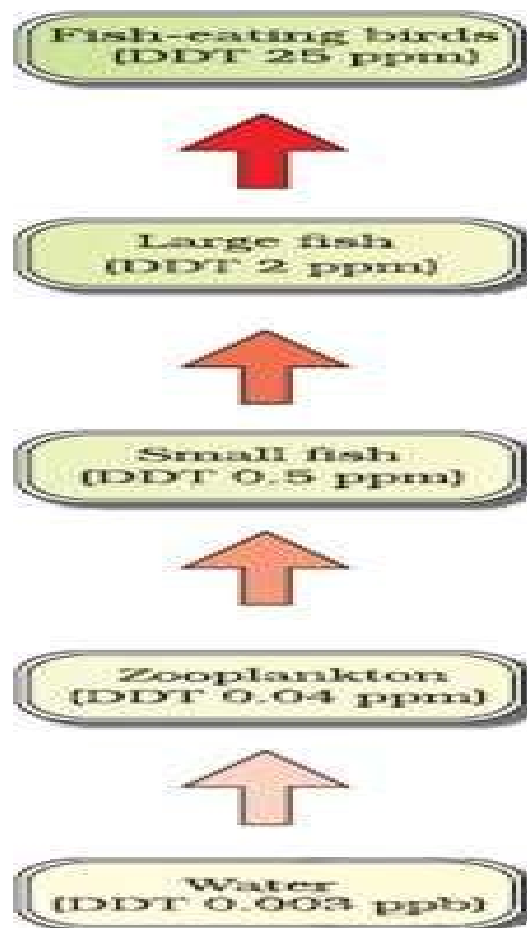




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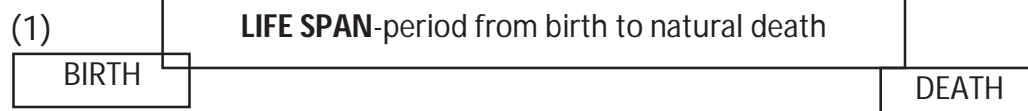


UNIT VI - REPRODUCTION
CHAPTER - 1 REPRODUCTION IN ORGANISMS
(KEY POINTS)

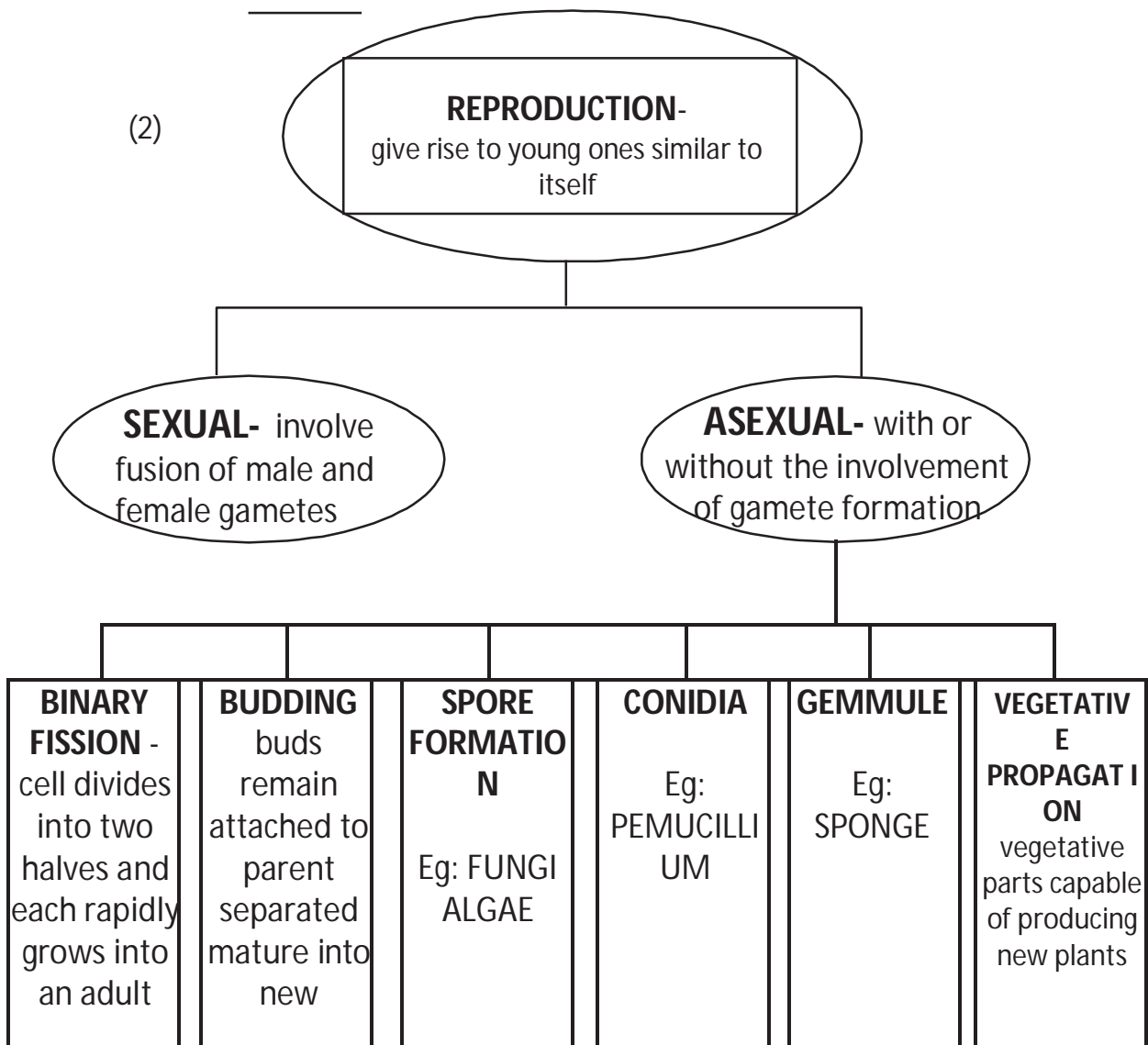
S.NO	Term	Explanation
1	Pollination	Transfer of pollen grains from anther to stigma
2	Syngamy	The fusion of male and female gamete
3	Parthenogenesis	The female gamete undergoes development to form new organisms without fertilisation
4	Oviparous	Fertilised eggs covered by a calcareous shell are laid in a safe place and after a period of incubation young ones hatch out
5	Viviparous	Zygote develops into a young one inside the body of the female organism
6	Cell differentiation	Cells undergo certain modifications to form specialised tissues and organs to form an organism
7	Clone	Morphologically and genetically similar individuals
8	Zoospore	Microscopic motile structures
9	Homogametes (isogametes)	Similar in appearance
10	Hetero gametes (Anisogametes)	Morphologically distinct
11	Homothallic/monoecious	Denote bisexual condition
12	Heterothallic/dioecious	Describe unisexual condition
13	Staminate Flowers	Male flower
14	Pistillate Flowers	Female flower
15	Hermaphrodite	Possess both male and female reproductive organs within the same body.
16	Meiocytes	Gamete mother cell undergo meiosis
17	Pericarp	Protective thick wall of the fruit
18	Pollination	Transfer of pollen grains from anther to stigma
19	Syngamy	The fusion of male and female gamete
20	Neelakurinji <i>Strobilanthus kunthiana</i>	Flowers once in 12 yrs. Found in Nilgiris



**CHAPTER 1- REPRODUCTION IN ORGANISMS
(FlowChart)**

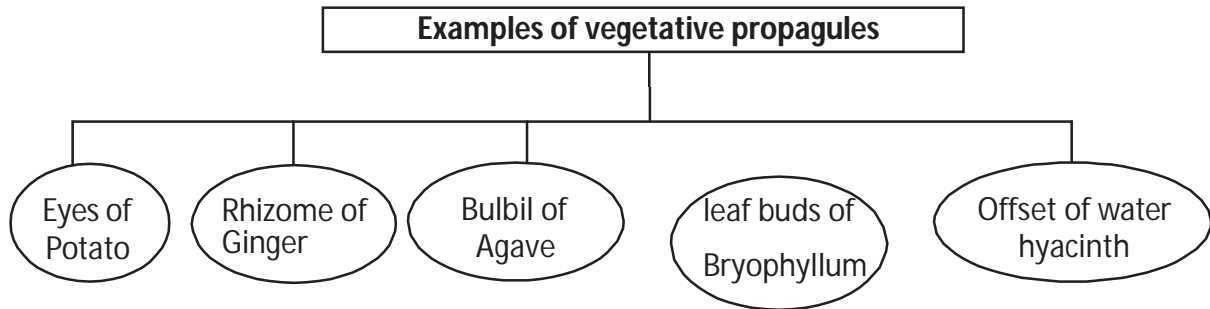


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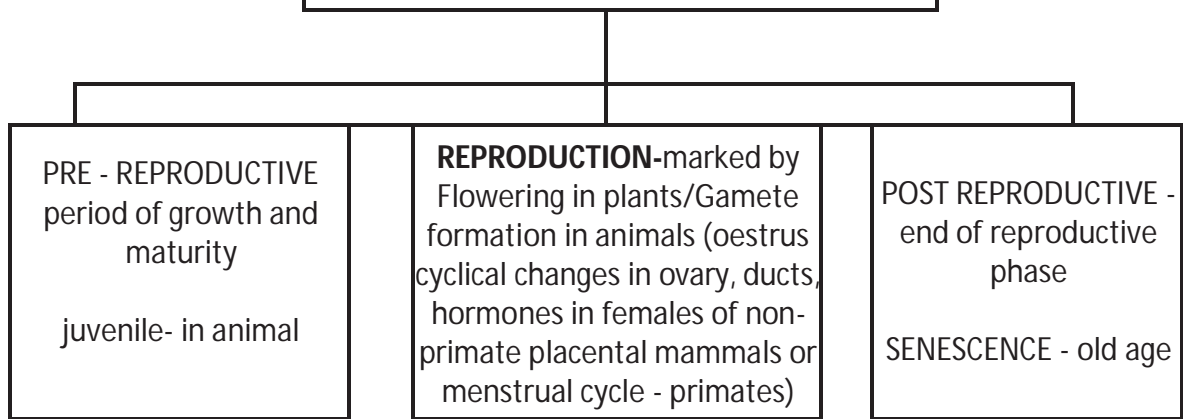




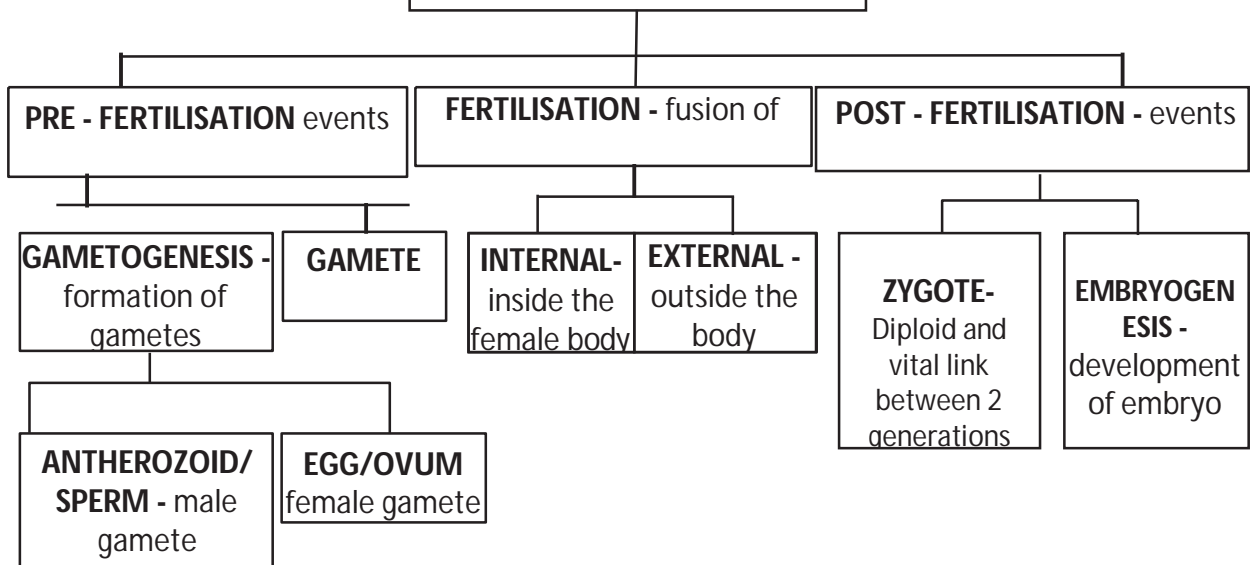
(3) **VEGETATIVE PROPAGULES-** Structures used for vegetative propagation



(4) **SEXUAL REPRODUCTION**

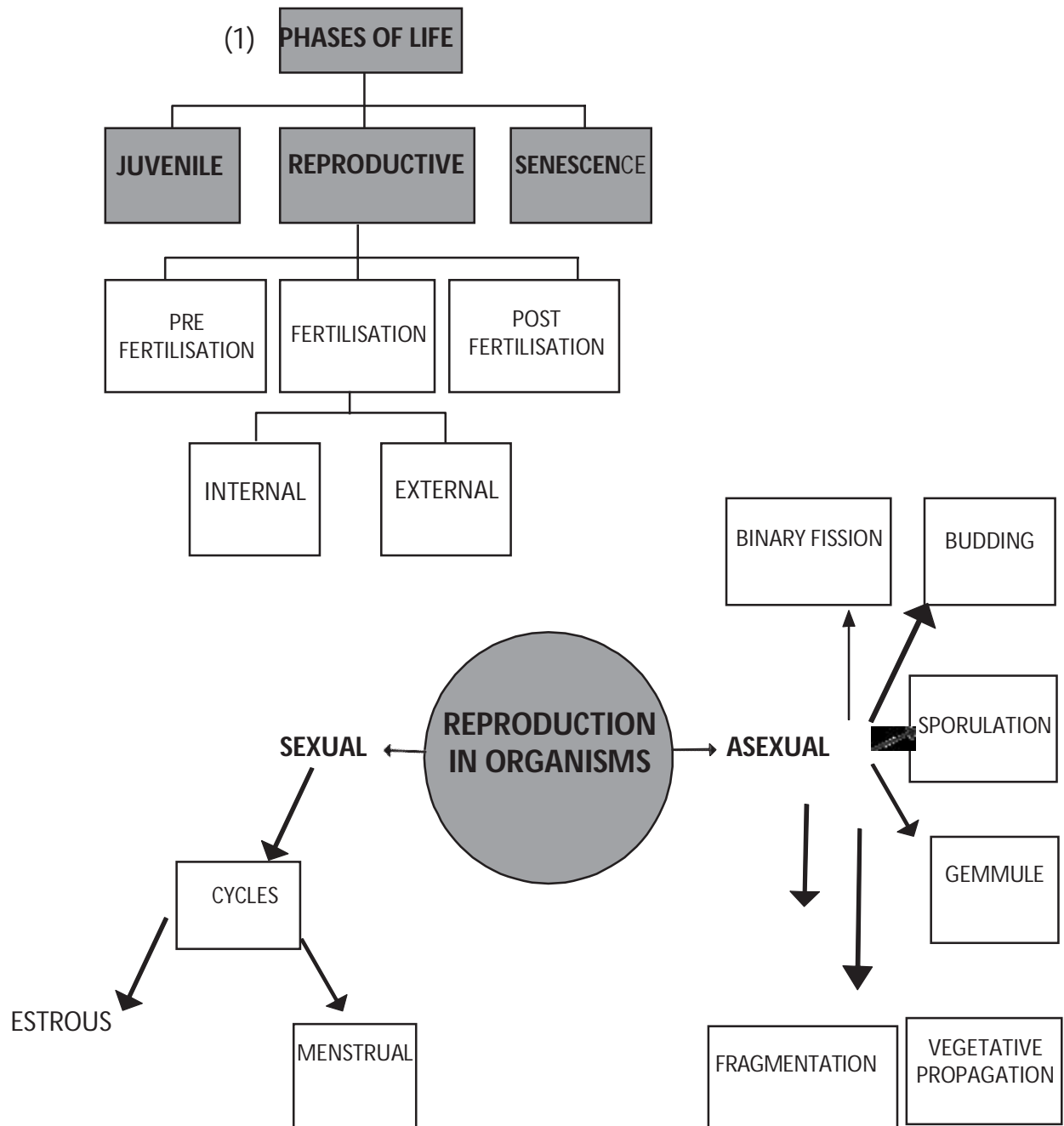


EVENTS IN SEXUAL REPRODUCTION



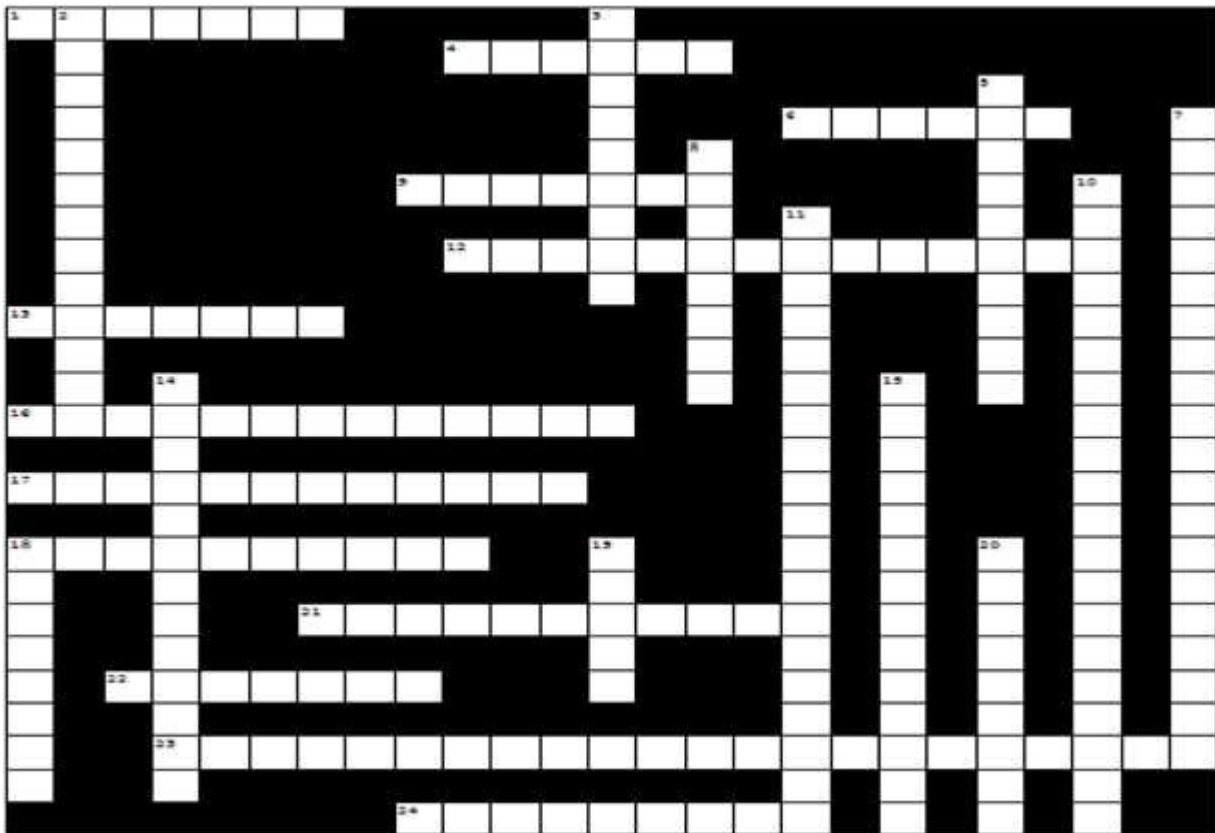


CHAPTER : 1 REPRODUCTION IN ORGANISMS (Concept Map)





CHAPTER 1 : REPRODUCTION IN ORGANISMS (CROSS WORD)



Across

- 1 ASEXUAL REPRODUCTIVE STRUCTURE OF PENICILLIUM
- 4 SEXUAL REPRODUCING ORGANISM BEGINS ITS LIFE
- 6 VEGETATIVE PROPAGULE OF AGAVE
- 9 VEGETATIVE PROPAGULE OF AGAVE
- 12 STAGE OF GROWTH AND MATURITY IN ANIMALS
- 13 FUSION OF GAMETES
- 16 BISEXUAL ANIMALS
- 17 BIOLOGICAL PROCESS GIVING RISE TO YOUNG ONES
- 18 DENOTE BISEXUAL CONDITION
- 21 MALE GAMETE
- 22 ASEXUAL REPRODUCTIVE STRUCTURE OF SPONGE
- 23 FUSION OF GAMETES OCCUR INSIDE THE BODY
- 24 PERIOD FROM BIRTH TO NATURAL DEATH

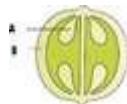
Down

- 2 CYCLICAL CHANGES IN FEMALES OF NON-PRIMATE MAMMALS
- 3 MICROSCOPIC MOTILE STRUCTURES
- 5 GIVE BIRTH TO YOUNG ONES
- 7 CELLS UNDERGO MODIFICATION TO FORM SPECIALISED TISSUES
- 8 PROTECTIVE THICK WALL OF THE FRUIT
- 10 OFFSPRINGS PRODUCED WITHOUT GAMETE FORMATION
- 11 PROCESS WHICH INVOLVES FUSION OF MALE AND FEMALE GAMETES
- 14 PROCESS OF DEVELOPMENT OF EMBRYO
- 15 CELL DIVIDES INTO TWO HALVES
- 18 GAMETE MOTHER CELL MALE GAMETE
- 19 IDENTICAL INDIVIDUALS
- 20 UNISEXUAL MALE FLOWER



**CHAPTER: 1 REPRODUCTION IN ORGANISMS
(QUESTION BANK)**

1. No organism is immortal, then why do we say there is no natural death in single – celled organisms?
2. What is the significance of reproduction?
3. Name the type of reproduction where in the off springs produced are identical to each other and to the parent.
4. Name the stage of growth and maturity in the life of animals before they can reproduce sexually.
5. Name the scientific name of the plant which flower once in 12 years.
6. Name the type of fertilization where in the survival of the organism up to adulthood is threatened.
7. Name the stage from where every sexually reproducing organism begins their life.
8. What is a meiocyte?
9. What do you mean by clones?
10. What is a vegetative phase in plants?
11. Name the type of plants that show clear cut vegetative, reproductive and senescent phases.
12. Name the plant which flower only once in their lifetime.
13. In seed plants how the non-motile gametes are carried to female gamete?
14. Differentiate between asexual and sexual method of reproduction.
15. Gametes are always haploid. How are the gametes produced from a haploid plant body and a diploid plant body?
16. How do the following organisms reproduce? Yeast, Amoeba.
17. Life spans of organisms are not necessarily correlated with their sizes. Explain
18. Name the asexual reproductive structures of the following: Chlamydomonas, Penicillium, Hydra, Sponge.
19. Explain the following terms. Isogametes, An isogametes, staminate flower, Pistillate flower.
20. Why are Chara and Marchantia are referred to as monoecious and dioecious plants?
21. What are hermaphrodite? Give an example.
22. Why do you refer Water Hyacinth as an invasive weed? Why is it difficult to get rid off them?
23. Why the number of male gametes produced is more than the number of female gamete?
24. Name the gametes produced by staminate and pistillate flowers.
25. Why are offsprings of oviparous animals at a greater risk as compared to offsprings of viviparous animals?
26. Cell division is itself a mode of reproduction .Name two single celled organisms and explains this.
27. What are zoospores ? Why are they referred so?
28. What do the following parts of a flower develop into after fertilization? Ovary, zygote, ovary wall, ovules.
29. Mention the three phases in the life cycle of plants and animals.
30. Study the figure, label the parts

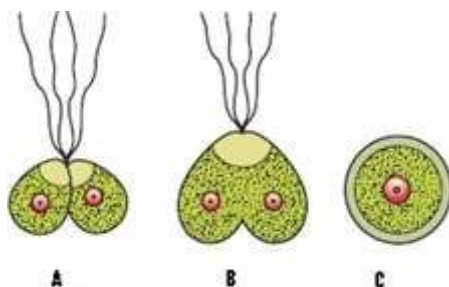


31. What are vegetative propagules? Name the vegetative propagules of the following plants. Ginger, Agave, Bryophyllum , Water hyacinth.
32. What are continuous breeders and seasonal breeders?
33. Where does syngamy occur? Explain with examples.
34. Explain the features exhibited by the organisms showing external fertilization to enhance the chances of syngamy .What is the disadvantage of external fertilization?
35. Differentiate between oestrus and menstrual cycle with examples.
36. Write the sexuality in the following organisms. (a)earthworm(b)Cockroach(c)Chara(d)Marchantia(e) Sweet Potato(f)Leech.
37. What is parthenogenesis? Give an example.
38. What are oviparous and viviparous animals? Give examples.

BIOLOGY



39. Give the term for the following figure A,B and C.



40. Give the term for kinds of gametes in the given figures A and B . In the figure A give the specific terms for the gametes



41. Child marriages are more prevalent in our society.i)As a student of biology how will you support a ban stating the biological reasons for the same and give valid reasons.

CHAPTER 1 :REPRODUCTION IN ORGANISMS

Q.NO.	(MARKING SCHEME)	Marks allotted
1	Parent cell divides to give rise to new individuals	1
2	Continuity of species	1
3	Asexual reproduction	1
4	Juvenile phase	1
5	Strobilanthus kunthiana	1
6	External fertilisation	1
7	Zygote	1
8	Gamete mother cell undergo meiosis	1
9	Morphologically and genetically similar individuals	$\frac{1}{2} + \frac{1}{2}$
10	Period of growth in plants	1
11	Annual , biennial	$\frac{1}{2} + \frac{1}{2}$
12	Bamboo	1

BIOLOGY



13	Through Pollen grains	1
14	Single parent ,two parents ;with or without gamete formation , fusion of gametes	$\frac{1}{2} \times 4$
15	Mitosis by haploid ,meiosis by diploid	1 x 2
16	Yeast- Budding , Amoeba-binary fission	1 x 2
17	Size of crow and parrot are not very different ,life span is 15 and 140 years	1 x 2
18	Zoospores ,Conidia , Buds ,Gem mules	$\frac{1}{2} \times 4$
19	Similar in appearance ,dissimilar in appearance, male flower , female flower	$\frac{1}{2} \times 4$
20	Both sex organs in the same individual; male & female sex organs in separate individuals	1 x 2
21	Bisexual animals earthworm or any other	1 + 1
22	Drains oxygen from water, death of fishes=?	1 x 2
23	Fail to reach female gamete , to compensate loss during transport	1 x 2
24	Male gamete , female gamete	1 x 2
25	Viviparous animals – development of embryo inside female organism proper care and protection, chances of survival is more than in oviparous	1 x 2
26	Binary fission in Amoeba cell divides into two halves , buds in yeast attached to parent gets separated and mature into yeast	$\frac{1}{2} \times 4$
27	Asexual reproductive structures of Fungi , algae , microscopic motile structures	1 x 2
28	Fruit , embryo, pericarp, seed	$\frac{1}{2} \times 4$
29	Vegetative , reproductive , senescent phases	$\frac{1}{2} \times 2 + 1$
30	A -Seed B – Pericarp	1 x 2
31	Structures used for vegetative propagation , Rhizome , bulbil ,leaf buds, offset	1 x $\frac{1}{2} \times 4$
32	Reproductively active throughout their reproductive phase, exhibit only during favourable seasons	$\frac{1}{2} \times 2$
33	External fertilization- outside amphibians , internal fertilization- internal reptiles	$\frac{1}{2} \times 2$
34	Synchrony between sexes ,release of large number of gametes. Vulnerable to predators	1 x 3
35	Female placental animals , exhibit cyclical changes; non-primate-cows , primate-monkeys	6 x $\frac{1}{2}$
36	Bisexual – leech , earthworm, chara, sweet potato; unisexual-cockroach , Marchantia	6 x $\frac{1}{2}$
37	Femal gamete, undergoes development, to form new organism, without fertilization ,Rotifers	$\frac{1}{2} \times 4 \times 1$
38	Oviparous –fertilised eggs covered by hard calcareous shell ,incubation, young ones hatch out eg. reptiles Viviparous – zygote develops into a young ones inside the body of female eg. mammals	1 x $\frac{1}{2} \times 2$
39	(A) Fusion of gametes (B) zygote (c) new individual	1 x 3
40	(A) Heterogametes (B) Homogametes.Egg and Sperm	1 x 3
41	(I) Genuine and valid reason	2 +1



CHAPTER : 2 SEXUAL REPRODUCTION IN FLOWERING PLANTS (KEY POINTS)

S.No	Term	Explanation
1	Microsporogenesis	Formation of microspores from a PMC through meiosis
2	Megasporogenesis	Formation of megaspores from the mega spore mother cell
3	Monosporic development	Embryo sac formation from a single megaspore
4	Pollination	Transfer of pollen grains from anther to the stigma of a pistil
5	Auto gamy	Transfer of pollen grains from the anther to the stigma of the same flower
6	Geitonogamy	Transfer of pollen grains from the anther to the stigma of another flower of the same plant
7	Xenogamy	Transfer of pollen grains from anther to the stigma of a different plant
8	Artificial hybridisation	Crossing different species to combine desirable characters to produce superior varieties
9	Emasculation	Removal of anthers from flower bud before the anther dehisces
10	Bagging	Covering emasculated flowers with a bag to prevent contamination of its stigma with unwanted pollen
11	Syngamy	Fusion of male and female gamete
12	Triple fusion	Fusion of three haploid nuclei
13	Double Fertilisation	Two types of fusions syngamy and triple fusion that takes place in an embryo sac
14	Post fertilization events	Events of endosperm ,embryo development ,maturation of ovule into seed, ovary into fruit
15	Free –nuclear endosperm	The stage of endosperm development wherein PEN undergoes successive nuclear divisions to give rise to free nuclei
16	Dormancy of seed	Embryo enter a state of inactivity (Resting period of seed)
17	False fruit	Thalamus contributes to fruit formation
18	True fruit	Fruits develop from the ovary
19	Parthenocarpic fruits	Fruits develop without fertilisation
20	Apomixis	Production of seeds without fertilization, in grasses
21	Polyembryony	More than one embryo in a seed
22	Filament	Long slender stalk of stamen
23	Anther	Bilobed structure of stamen
24	Dithecous	Two theca in each lobe
25	Tapetum	Innermost wall layer of micro sporangia
26	Sporogenous tissue	Compactly arranged homogenous cells in the centre of microsporangia
27	Microspore tetrad	Cluster of four microspores
28	Pollen grains	Male gametophyte

BIOLOGY



29	Exine	Hard outer layer of pollen grain
30	Sporopollenin	Most resistant organic material of exine
31	Germ pore	Apertures in pollen grain
32	Intine	Inner wall of the pollen grain
33	Generative cell	Cell floats in the cytoplasm of vegetative cell
34	Monocarpellary	Single pistil
35	Multicarpellary	More than one pistil
36	Syncarpous	Fused pistils
37	Apocarpous	Free pistils
38	Stigma	Landing platform of pollen grains
39	Style	Elongated slender part beneath the stigma
40	Ovary	Basal bulged part of pistil
41	Ovule	Megasporangia
42	Funicle	Stalk of ovule
43	Hilum	Region ,the body of the ovule fuses with funicle
44	Integuments	Protective envelopes of ovule
45	Micropyle	Small opening in the ovule
46	Chalaza	Basal part of the ovule
47	Embryo sac	Female gametophyte
48	Egg apparatus	Three cells at the micropylar end with two synergids and one egg cell
49	Antipodals	Three cells at the chalazal end
50	Cleistogamous flower	Flowers which do not open at all
51	Zygote	Diploid cell resulting out of fertilisation
52	Primary endosperm cell	Central cell after triple fusion becomes PEC
53	Embryogeny	Embryo development
54	Epicotyl	Portion of embryonal axis above the level of cotyledons
55	Hypocotyl	Portion of embrogenic axis below the level of cotyledons
56	Scutellum	Cotyledon of grass family situated towards one side of embryonal axis
57	Coleorrhiza	Undifferentiated sheath that encloses radical and root cap
58	Coleoptile	Hollow foliar structure that encloses a shoot apex and a few leaf primordia
59	Non-albuminous seed or ex-albuminous	No residual endosperm as it is completely consumed during embryo development
60	Albuminous	Retain a part of endosperm as it is not completely used up during embryo development
61	Perisperm	Residual persistent nucellus
62	Pericarp	Wall of the fruit



**CHAPTER : 2 SEXUAL REPRODUCTION IN FLOWERING PLANTS
(FLOW CHART)**

**CHAPTER : 2 SEXUAL REPRODUCTION IN FLOWERING PLANTS
(FLOW CHART)**

(1) **Male reproductive structure - Androecium**

Stamen

Anther – bilobed , ditheous

Four microsporangia –Epidermis ,
endothecium , middle layers & tapetum

Microsporangium - sporogenous tissue
undergoes meiosis

Microspore
tetrad

Microspore

Exine - Sporopollenin

Pollen grain

Intine - cellulose, pectin

Vegetative cell

Generative cell – 2 male gametes

(2) **Female Reproductive structure -**

Ovary

Ovule - Megasporangium

Nucellar cell undergo meiosis to form Megaspore tetrad

Embryo Sac - Female gametophyte develops from 1 Megaspore

Egg apparatus - egg
& synergids at
micropylar end

Antipodals at
chalazal end

Central cell with 2
polar nuclei



(3) **Pollination –transfer of pollen grains from anther to stigma**

Autogamy – same flower

Geitonogamy- different flower

Xenogamy – different plants

(4) **Agents of Pollination & characteristics of flower**

Wind - light , nonsticky, well exposed stamens

Water - mucilaginous , long ribbon – like pollen

Insects - large , colourful, fragrant, nectar producing

(5) **Outbreeding devices**

Non-synchronisation of pollen release and stigma receptivity

Anther and stigma in different positions

Self - incompatibility

Unisexual flower

(6) **Artificial hybridization**

Emasculation, Bagging

Pollination Retagging

(7) **Double fertilisation**

Male gamete+Egg-----Zygote —Embryo

Male gamete + two polar nuclei PEN — PEC

(8) **Post - fertilisation**

PEN -----Endosperm--free nuclear/nuclear development

ZYGOTE develops into Embryo

Polyembryony - many embryos in a seed

OVULE develops into

OVARY develops into FRUIT

Albuminous

Non - Albuminous

Apomictic

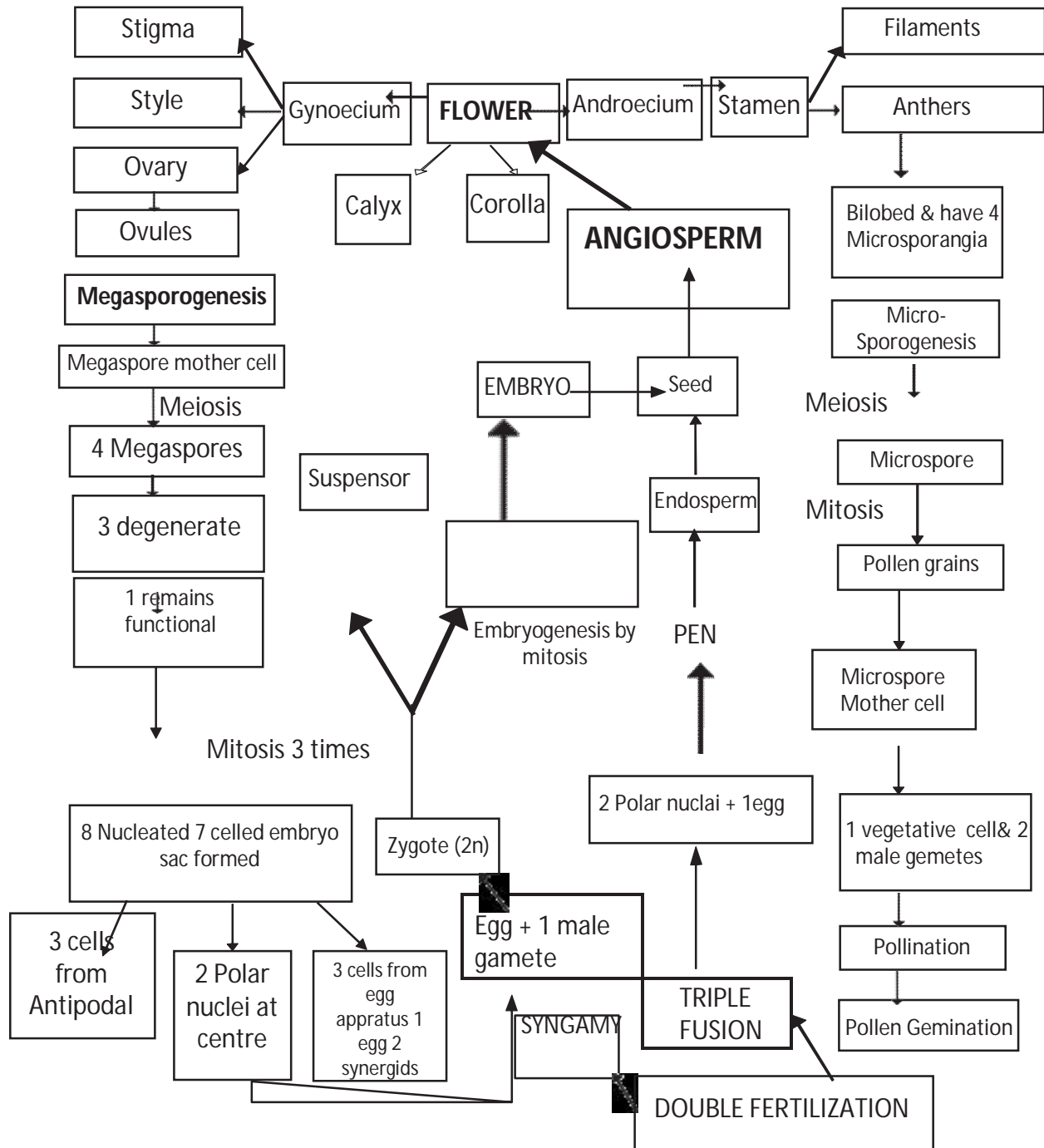
False fruit - thalamus becomes fruit

Parthenocarpic fruit - fruit develop without fertilization

True fruit - ovary develops into fruit

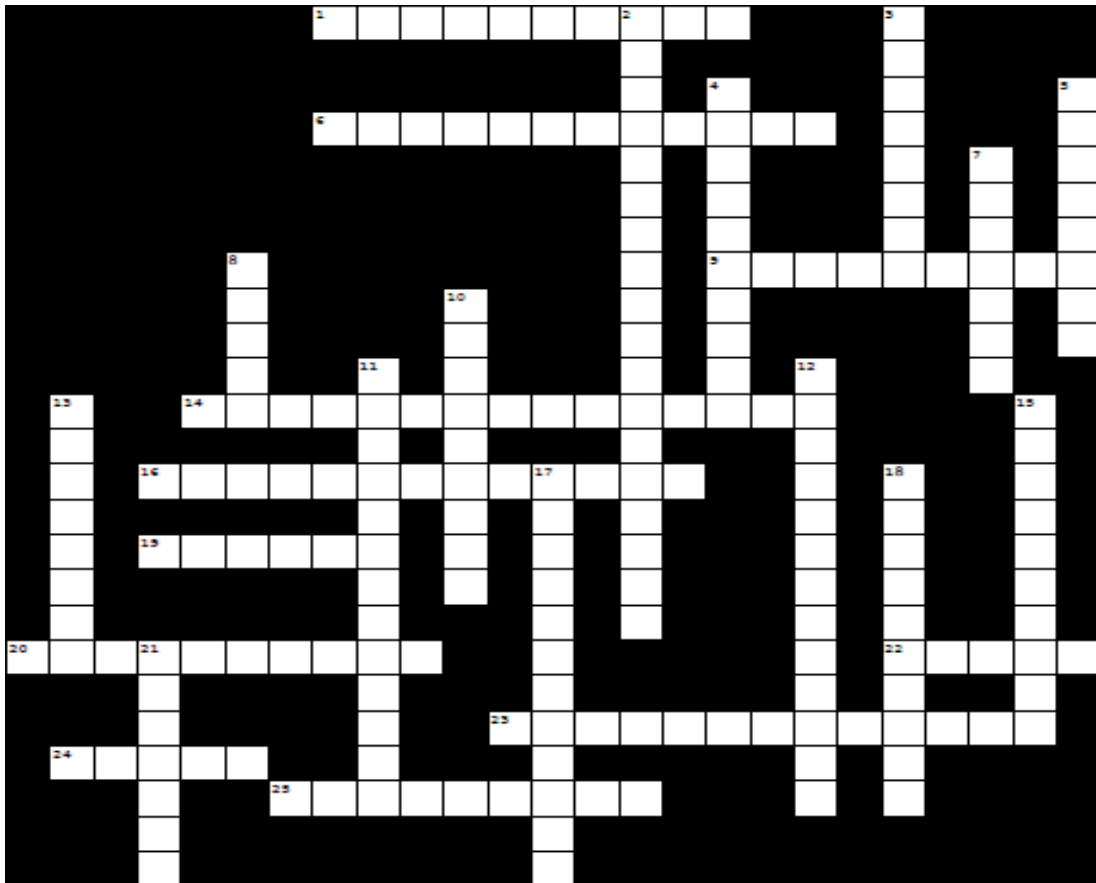


CHAPTER 2 : SEXUAL REPRODUCTION IN FLOWERING PLANTS





**2 SEXUAL REPRODUCTION IN PLANTS
(CROSS WORD)**



Across

- 1 Female gametophyte
- 6 More than one embryo in a seed
- 9 Residual persistent nucellus
- 14 The cell that floats in the cytoplasm of the vegetative cell
- 16 Most resistant organic material
- 19 Thin and continuous layer made up of cellulose and pectin
- 20 Fused pistils
- 22 Basal bulged part of the pistil
- 23 Fruits develop without fertilisation
- 24 The region where the body of the ovule fuses with funicle
- 25 The cells at the micropylar end guiding the entry of pollen tubes

Down

- 2 Tissue that occupies the centre of each microsporangium
- 3 Production of seeds without fertilisation
- 4 Hollow foliar structure enclosing leaf primordia
- 5 The floral part that contributes to fruit formation in apple
- 7 Innermost wall layer of anther
- 8 Megaspore
- 10 Cotyledon of grass family
- 11 The fusion of three haploid nuclei
- 12 flowers which do not open at all
- 13 Transfer of pollen grains from another to the stigma of a different plant
- 15 Example of a false fruit
- 17 Removal of anthers from the flower bud
- 18 Cells at the chalazal end of the embryo sac
- 21 The region opposite to the micropylar end

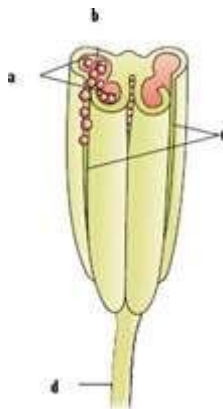


**CHAPTER.2 : SEXUAL REPRODUCTION IN FLOWERING PLANTS (QUESTION BANK)
ONE MARK**

1. Why are pollen grains produced in enormous quantity in maize?
2. What is the ploidy of the cells in the microspore tetrad?
3. What is the ploidy of PEN?
4. How many eggs are present in an embryo sac?
5. Even though each pollen grain has two male gametes, why are at least 10 pollen grains and not 5 pollen grains required to fertilize 10 ovules present in a particular carpel?
6. What are parthenocarpic fruits?
7. What is scutellum?
8. What is a pollen bank?

TWO MARKS

9. Identify the given figure and label the parts.



10. Of the eight nuclei of the embryo sac in flowering plants three are at the micropylar end. How many are there at the chalazal end and how many nuclei located in the central cell?
11. How could pollen grains be well preserved as fossils?
12. What are the effects of pollen in some people and how are the pollen grains are being used as food supplements?
13. How many haploid nuclei and haploid cells are present in the female gametophyte of angiosperm?
14. Why is the process of fertilization in flowering plant referred to as double fertilization? Explain.
15. How does geitonogamy differ from xenogamy in plants?
16. What are the stages of embryogeny in a Dicotyledonous embryo?
17. How long do the seeds remain alive after they are dispersed?

THREE MARKS

18. Draw a diagram of the following and label any six / three parts. (i) T.S. of a mature anther. (ii) Maturepollengrain.(iii)A diagrammatic view of a typical anatropous ovule.(iv)A diagrammatic representation of the mature embryo sac . (v) Fertilized embryo sac (vi) Stages in embryo development in a dicot. (vii) Dicot embryo. (viii) L.S. of an embryo of grass(ix) a longitudinal section of a flower showing growth of pollen tube.

BIOLOGY



19. Explain the structure of microsporangium.
20. Explain the structure of pollen grain.
21. Explain artificial hybridization technique.
22. Explain double fertilization schematically.
23. What is pollination and explain its types?
24. Endosperm development precedes embryo development. Why?
25. Explain free nuclear endosperm development.
26. What are advantages of seeds to Angiosperms?
27. What do you mean by seed dormancy? What is its significance?

FIVE MARKS

28. Continued self-pollination result in inbreeding depression. What are the out breeding devices developed in flowering plants to discourage self-pollination? Which type of pollination seen in Papaya?
29. What are the characteristics of wind ,water and insect pollinated flowers?
30. Explain the pollen pistil interaction with a sketch showing entry of pollen tube into asynergid.
31. Define triple fusion. What is the product of this process? What does the product develop into?
32. Trace the development of a mature female gametophyte from a megaspore mother cell.
33. Describe the development of male gametophyte in angiosperms.
34. Explain the following terms : Non-albuminous, Albuminous, Perisperm, Pericarp, seed dormancy.
35. Explain the following terms : False fruit ,True fruit, Parthenocarpic fruit, Apomixis, Polyembryony,
36. Mr.Y, a farmer has kept heaps of seeds to be packed for future use in a room. His children while playing poured water on to the seeds.
 - A) As a student of biology suggest the measures to be taken before storage and why?
 - B) What is the significance of seeds for a farmer?



**CHAPTER.2 : SEXUAL REPRODUCTION IN FLOWERING PLANTS
(MARKING SCHEME)**

Q. No.	Answer	Mark Allotted
1	Compensate to the losses during transfer of pollens	1
2	Haploid	1
3	Triploid	1
4	One	1
5	Double fertilisation	1
6	Fruits formed without fertilisation	1
7	Cotyledon of monocot	1
8	Stored pollen	1
9	a. Pollen sac b. pollen grains c. line of dehiscence d. filament	$\frac{1}{2} \times 4$
10	Three – chalazal end, two – central cell	1×2
11	Sporopollenin , highly resistant organic material forms exine	1×2
12	Cause severe allergies and bronchial afflictions ,tablet and syrups	1×2
13	8-nucleate 7-celled	1×2
14	Syngamy and triple fusion take place in an embryo sac	1×2
15	Transfer of pollen grains from anther to stigma of another flower of same plant, different plant /genetically similar , different	$\frac{1}{2} \times 4$
16	Proembryo , globular , heart-shaped , mature embryo	$\frac{1}{2} \times 4$
17	In a few species lose viability within a few months ,live for several years in some species.	1×2
18	Diagram	$6 \times \frac{1}{2}$
19	Wall layers , epidermis , endothecium , middle layers – protection , tapetum-nourishes , sporogenous tissue	$6 \times \frac{1}{2}$
20	Exine- sporopollenin resistant organic material,intine –cellulose and pectin , , generative cell ,vegetative cell	$1 + 1 \times \frac{1}{2} \times 2$
21	Emasculation- removal of anther, bagging- to prevent contamination , dusting of desired pollen on stigma,rebaggging	1×3
22	Male gamete + egg----->Zygote---->Embryo(Syngamy). Male gamete + two polar nuclei-->triple fusion --->PEN...endosperm	$1\frac{1}{2} \times 2$
23	Transfer of pollen grains auto gamy- same flower ,geitonogamy- different flower , xenogamy- different plant of same plant	1×3

BIOLOGY



24	PEC divides to form endosperm tissue – filled with reserve food material , nutrition of the developing embryo	1 x 3
25	PEN → successive nuclear divisions , cell wall formation occurs later –endosperm	1 x 3
26	Pollination and fertilization are independent of water-seed formation is more dependable ,better strategies for dispersal to new habitats ,hard seed coat provides protection to embryo	1 x 3
27	Water content is reduced seeds become dry , metabolic activity slows down ,state of inactivity ,storage of seeds –food throughout the year / raise crop in next season	½ x 6
28	Non –synchronisation of stigma receptivity and pollen release , different positions , self-incompatibility, unisexual flowers /xenogamy	1 x 5
29	Wind-large amount of pollens ,light non-sticky ,well exposed stamens, feathery stigma Water – mucilaginous covering, long ribbon –like Insect-large, colourful, fragrant , nectar	2+1+1
30	Dialogue by chemical components pollen grain ,germinates to produce pollen tube ,content move into pollen tube, grows through stigma ,style reaches ovary , generative cell divide into two male gametes enters through micropyle , filiform apparatus guides the entry	8 x½+ 2
31	Male gamete moves towards two polar nuclei located in central cell and fuses to produce triploid primary endosperm nucleus involves fusion of three nuclei – triple fusion , PEN – product , Endosperm	3+1+1
32	MMC – meiosis , four megaspores , three degenerate , one functional develop into embryo sac ,mitosis of nucleus 2- nucleate , one mitosis 4-nucleate one mitosis 8 nucleate egg apparatus ,polar nuclei in central cell ,antipodals.	10 x ½
33	MMC- meiosis – microspore tetrad , pollen grains exine , sporopollenin , intine , germ pore , vegetative cell , generative cell, two male gametes	10 x ½
34	No residual endosperm, retain endosperm, residual persistent nucellus, fruit wall , state of inactivity	1 x5
35	Thalamus become fruit, ovary becomes fruit , fruit formation without fertilisation, produce seeds without fertilization ,more than one embργο in a seed	1 x5
36	(A) Measures to be taken before storage with reason (B) Significance of seeds for farmers	2 +1

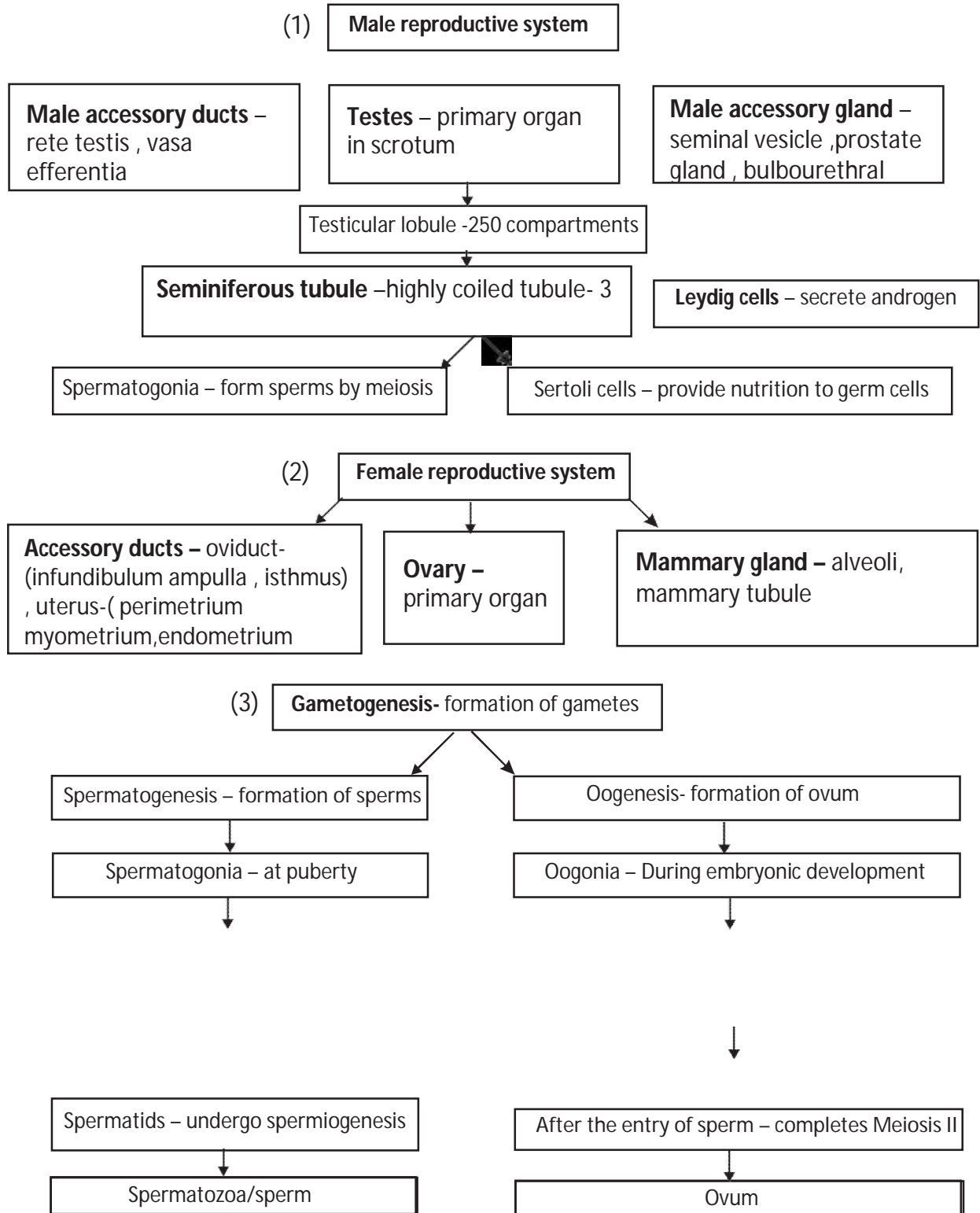


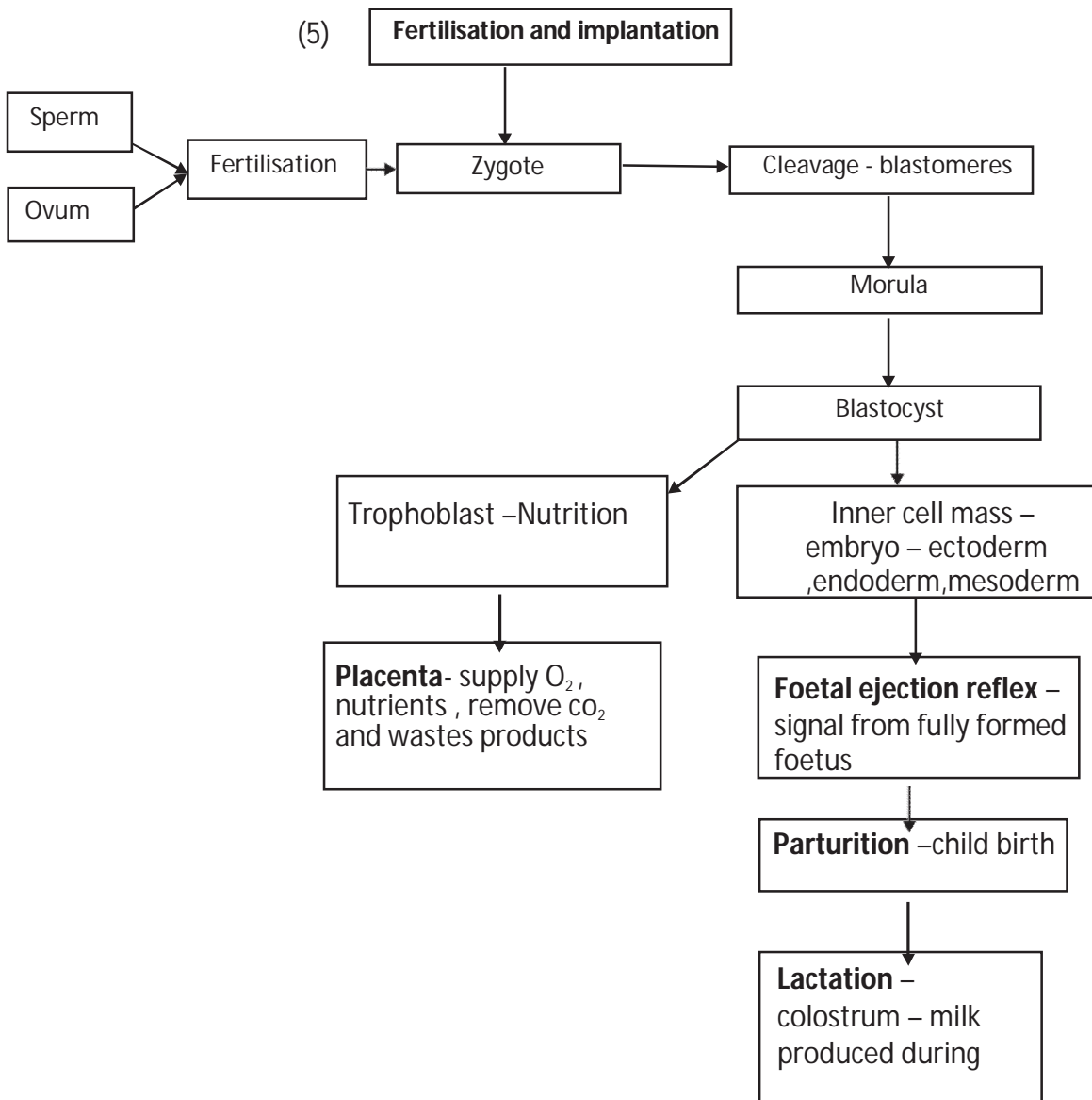
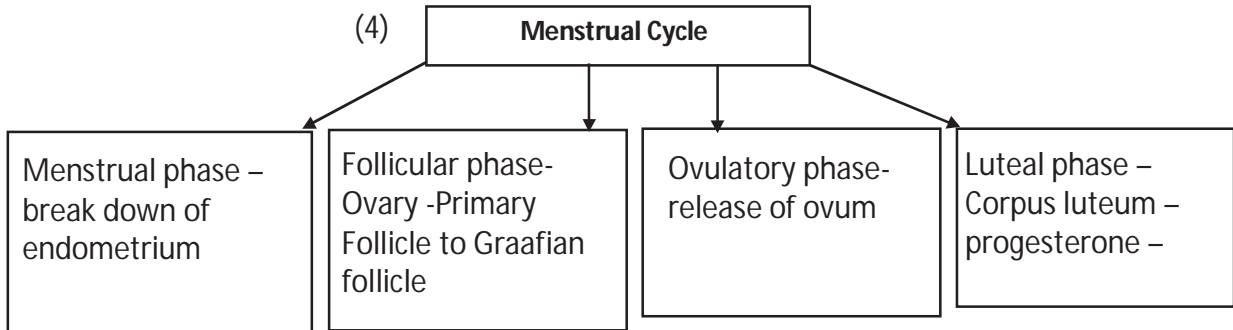
UNIT VI CHAPTER 3: HUMAN REPRODUCTION (KEYPOINTS)

S.NO	Term	Explanation
1	Spermatogenesis	The immature male germ cells produce sperms that begins at puberty (Production of sperm)
2	Spermiogenesis	The process of transformation of spermatids into sperm
3	Spermiation	Release of sperms from seminiferous tubule
4	Oogenesis	Process of formation of a mature female gamete initiated during embryonic development
5	Ovulation	The process during which the Graafian follicle ruptures to release the secondary oocyte (ovum) from the ovary
6	Menarche	The first menstruation that begins at puberty (Starting of first menstrual flow in females)
7	Menstrual cycle	Cycle of events starting from one menstruation till the next one after every 28 / 29 days
8	Menopause	Ceasation of menstrual cycle around 50 years of age
9	Cleavage	The mitotic division the zygote undergoes when it moves toward uterus and forms blastomeres
10	Implantation	Embedding of blastocyst in the endometrium of the uterus leads to pregnancy
11	Parturition	Vigorous contraction of the uterus at the end of pregnancy causing expulsion/delivery of the foetus (child birth)
12	Foetal ejection reflex	Mild uterine contractions induced by the signals for parturition from the fully developed foetus and the placenta
13	Lactation	The process by which the mammary gland start producing milk
14	GnRH	Gonadotropin releasing hormone
15	LH	Luteinising hormone
16	FSH	Follicle stimulating hormone
17	hCG	Human chorionic gonadotropin
18	hPL	Human placental lactogen



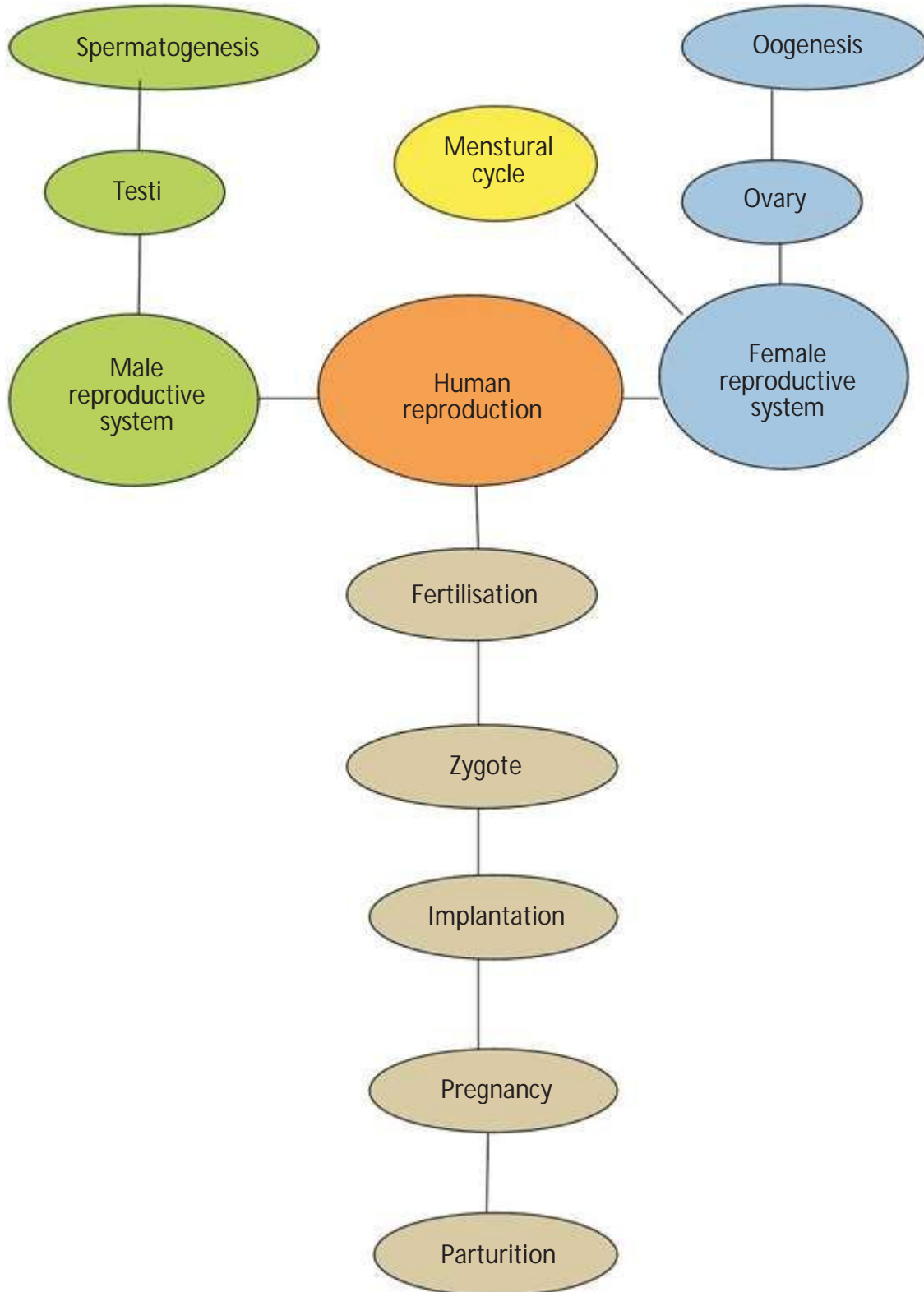
**CHAPTER 3: HUMAN REPRODUCTION
(FLOW CHART)**





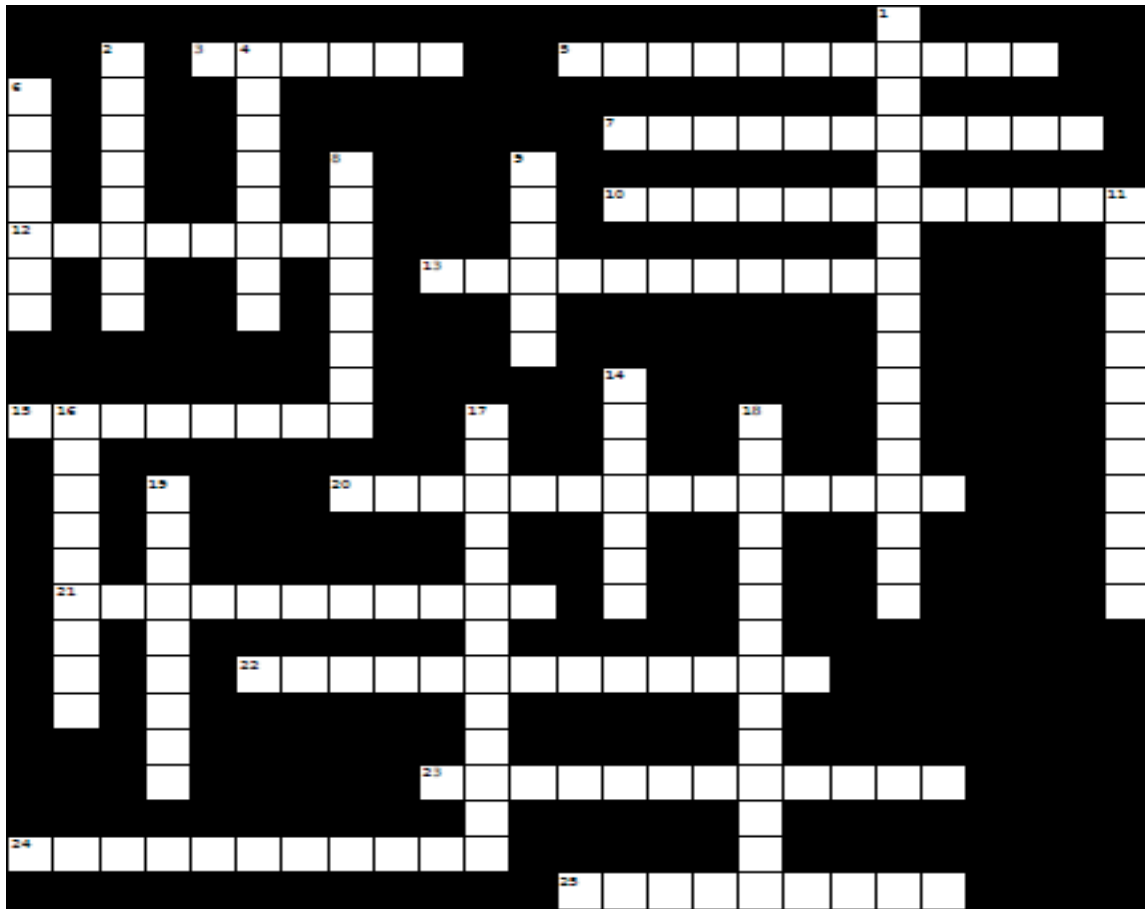


**CHAPTER : 3 HUMAN REPRODUCTION
(CONCEPT MAP)**





**CHAPTER 3 : HUMAN REPRODUCTION
(CROSS WORD)**



Across

- 3 Embryo with eight to sixteen blastomeres
- 5 The layer which undergoes cyclical changes during menstrual cycle
- 7 Release of sperm from seminiferous tubule
- 10 The funnel shaped part of fallopian tube
- 12 First menstruation that begins at puberty
- 13 Process of delivery of foetus
- 15 The part of the sperm filled with enzymes that help in fertilisation
- 20 The process of transformation of spermatid to sperm
- 21 Outer layer of the blastocyst
- 22 Provides nutrition to the male germ cells
- 23 Secrete androgens
- 24 External thin membranous layer of uterus
- 25 Release of secondary oocyte from the ovary

Down

- 1 Matured follicle
- 2 The structure which provides vascular connection between foetus and uterus
- 4 Hormone which causes stronger uterine contractions
- 6 The last part of the oviduct that joins the uterus
- 8 Mitotic division the zygote undergoes
- 9 Fluid filled cavity of a tertiary follicle
- 11 Energy source for swimming of the sperm
- 14 Pouch help in maintaining the low temperature of the testes
- 16 Milk produced during the initial few days of lactation
- 17 Secrete progesterone
- 18 The membrane that surrounds the secondary oocyte
- 19 Cessation of menstrual cycle

**CHAPTER : 3 HUMAN REPRODUCTION (QUESTION BANK)**

1. Name the cells which secrete androgens
2. What does the head of a sperm consists of?
3. Name the structure which secretes progesterone.
4. Name the structures which secrete estrogen.
5. Name the site of fertilization in human beings.
6. What is the main function of Sertoli cells?
7. Name the outermost layer of the blastocyst
8. What promotes completion of second meiotic division in oogenesis?
9. Testes normally remain suspended in scrotum in mammals. Why?
10. How many spermatozoa will be produced from 100 primary spermatocytes and how many ova will be produced from 100 primary oocytes?
11. Name the three layers of embryo that give rise to all tissues and also name the cells which have the potency to give rise to all the tissues and organs.
12. What is oogenesis? Where does it occur?
13. What is ovulation? What happens to Graafian follicle after ovulation?
14. What is colostrum? What is its importance?
15. Draw a labeled diagram of the following and label six parts
 - i) T.S. of a testes ii) T.S. of an ovary iii) Sperm iv) Ovum.
 - v) Embryo development (vi) Female reproductive system
16. Mention any three differences between spermatogenesis and oogenesis.
17. Differentiate between Leydig cells and Sertoli cells with reference to their location in the organ and their function
18. What is parturition? How is it induced? Which hormones are involved in induction of parturition?
19. What is seminiferous tubule? Name the various types of cells present in it and explain its function.
20. Explain different phases of spermatogenesis with schematic representation.
21. Explain different phases of oogenesis with schematic representation
22. Name the glands associated with male reproductive organs and state their functions.
23. Explain the various phase of menstrual cycle with reference to changes in ovary and uterus and hormonal cycle.
24. Explain the process of fertilization.
25. Explain the stages of embryo development from fertilization to implantation.
26. Draw a diagrammatic presentation of various events during a menstrual cycle.
27. What is placenta? What is its role? Justify Placenta as an endocrine tissue.
28. What are the main features of embryonic development at various months of pregnancy?
29. Is it correct to say that the sex of the child is determined by the woman and not by the man? Explain



CHAPTER.3 : HUMAN REPRODUCTION (MARKING SCHEME)

Q.NO	Answer	Marks Allotted
1	Leydig cells	1
2	Haploid nucleus , acrosome	$\frac{1}{2} \times 2$
3	Corpus luteum	1
4	Ovarian follicles	1
5	Ampullary-isthmic junction of fallopian tube	1
6	Provide nutrition to germ cells	1
7	Trophoblast	1
8	Entry of sperm into cytoplasm of the ovum through zona pellucida membrane and plasma	$\frac{1}{2} \times 2$
9	Scrotum helps in maintaining low temperature , necessary for spermatogenesis	1 x 2
10	400 spermatozoa , 100 eggs	1 x 2
11	Ectoderm , endoderm , mesoderm , stem cells	$\frac{1}{2} \times 4$
12	Formation of mature female gamete , Ovary	1 x 2
13	The release of secondary oocyte from ovary , transforms into corpus luteum.	1 x 2
14	Milk produced during initial days of lactation , antibodies (IGA)to give resistance	1 x 2
15	Diagram – six parts	6 x $\frac{1}{2}$
16	At puberty / during embryonic development ;four sperms / one egg ; equal division / unequal division	1 x 3
17	Leydig–in interstitial space, form androgen, Sertoli– in seminiferoustubule, give nutrition to germ cells	$\frac{1}{2} \times 4+1$
18	Delivery of foetus , foetal ejection reflex , oxytocin	1 x 3
19	Highly coiled in testicular lobule ,male germ cells ,sertoli cells ; sperm formation, provide nutrition	1 x 5
20	Spermatogonia – primary spermatocyte (meiosis I)– secondary spermatocyte(meiosis II) – spermatid – sperm	1 x 5

BIOLOGY



21	Oogonia- primary oocyte , primary -->secondary---> tertiary graafian follicles --> secondary oocyte --> ovum	1 x 5
22	Paired seminal vesicles , a prostate gland paired bulbourethral gland ; seminal plasma rich in fructose calcium enzymes , bulbourethral - lubrication of penis	1 x 5
23	Menstrual phase – flow ;follicular phase – follicular growth regeneration of endometrium ;Ovulation ; secretary phase – corpus luteum LH ,FSH role	1 x 5
24	Sperm come s in contact with zona pellucida , block entry of additional sperms , acrosome helps in entry , completion second meiotic division second polar body , ootid , haploid nucleus of sperm fuses with ovum	10 x ½
25	Zygote – cleavage , blastomeres ,morula ,blastocyst ,trophoblast , inner cell mass ,attached to endometrium implantation, diiferentiate as embryo.	10 x ½
26	Schematic representation of menstrual cycle ovarian events , uterine events , hormones of pituitary , ovarian hormones	1 x 5
27	Structural and functional unit between foetus and mother , supply of nutrients and oxygen removal of wastes secretes, hCG, hPL ,estrogens, progestogens	1 + 1+3
28	One month- heart , end of second month –limbs and digits , end of 12 weeks –major organ system – limbs genital organs. fifth month- movements ,second trimester fine hair, eyelids separate eye lashes	1 x 5
29	No, Genuine reason	2 +1

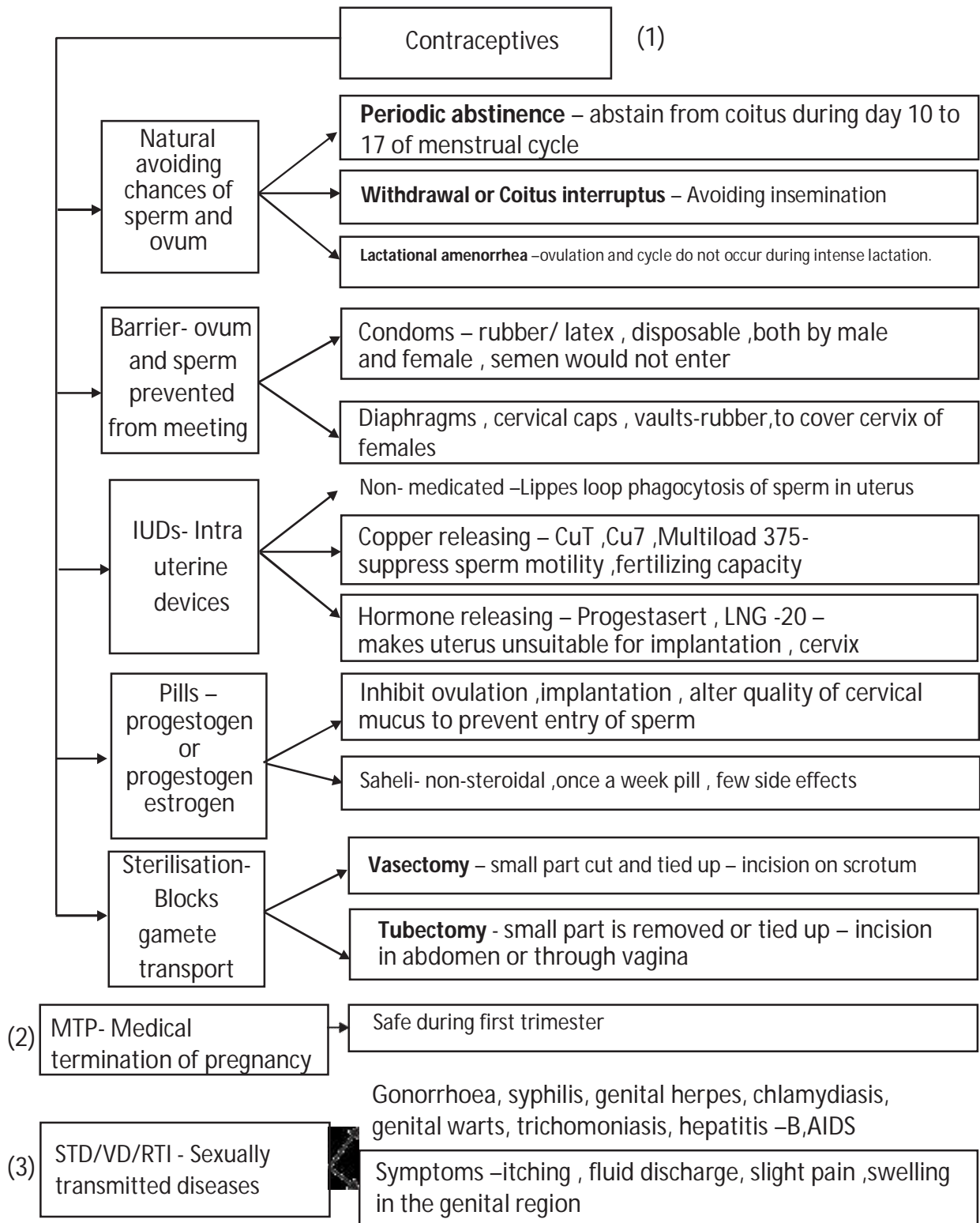


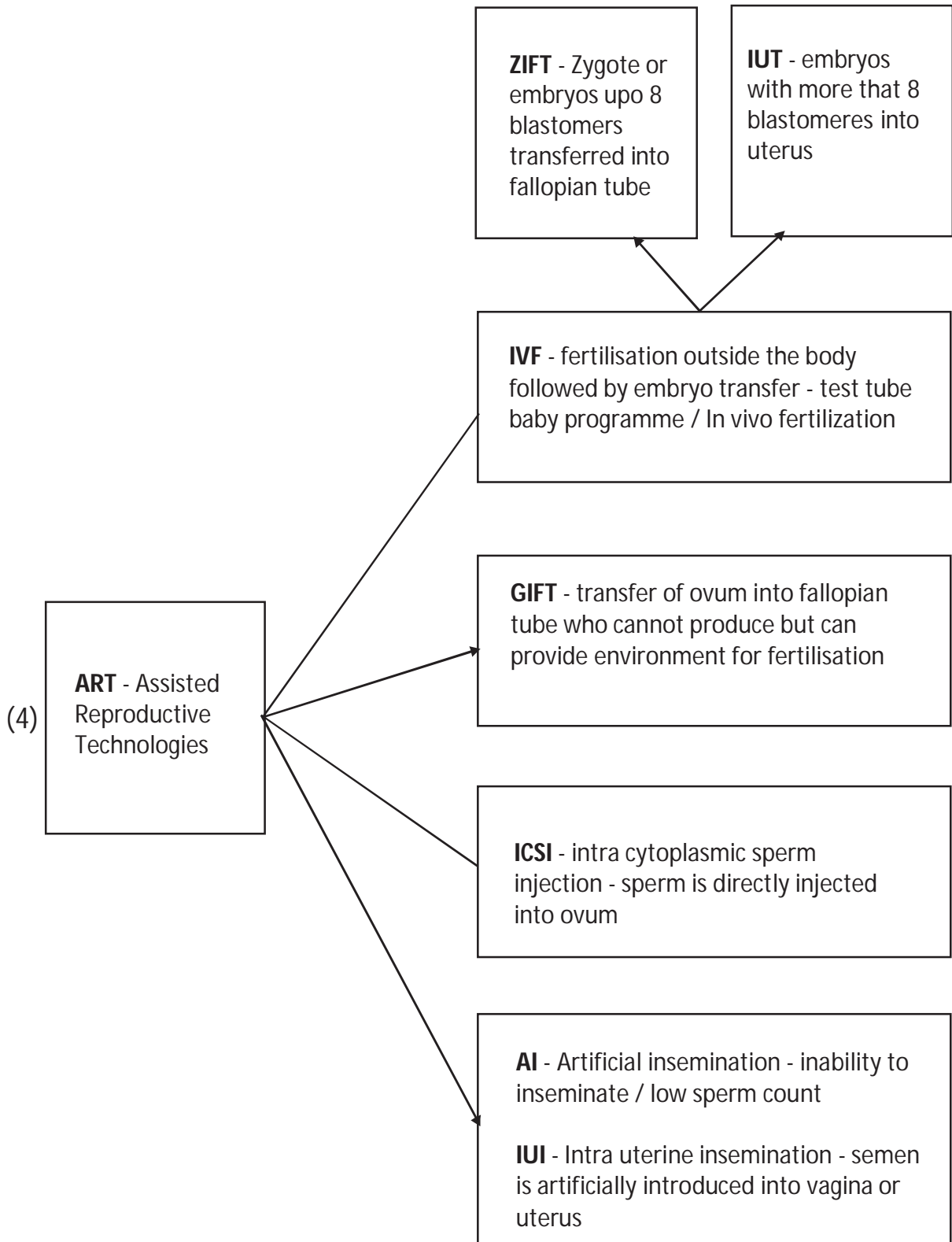
**UNIT VI CHAPTER 4: REPRODUCTIVE HEALTH
(KEY POINTS)**

S.NO	Term	Explanation
1	Amniocentesis	A foetal sex determination test based on the chromosomal pattern in the amniotic fluid surrounding the developing embryo
2	Lactational amenorrhea	Absence of Menstruation during extensive breast feeding.
3	Sterilisation	Surgical method to prevent pregnancy-tubectomy in female and vasectomy in males.
4	Artificial insemination	Introduction of semen artificially into female reproductive tract
5	Sexually transmitted diseases	Diseases or infections which are transmitted through sexual intercourse
6	Reproductive health	Physical , emotional , behavioural and social well being
7	Medical termination of pregnancy (MTP)	Intentional or voluntary termination of pregnancy before full term or induced abortion
8	In vitro fertilization	Fertilization outside the body in almost similar conditions as that in the body
9	In -vivo fertilization	Fusion of gametes within the female
10	WHO	World Health Organisation
11	RCH	Reproductive and Child Health Care programmes
12	MMR	Maternal Mortality Rate
13	IMR	Infant Mortality Rate
14	IUD	Intra Uterine Devices
15	MTP	Medical Termination of Pregnancy
16	STD	Sexually Transmitted Diseases
17	VD	Venereal Diseases
18	RTI	Reproductive tract Infection
19	PID	Pelvic Inflammatory Diseases
20	ART	Assisted Reproductive Technology
21	IVF	In Vitro Fertilization / In Vivo Fertilisation
22	ET	Embryo Transfer
23	ZIFT	Zygote Intra Fallopian Transfer
24	IUT	Intra Uterine Transfer
25	GIFT	Gamete Intra Fallopian Transfer
26	ICSI	Intra Cytoplasmic Sperm Injection
27	AI	Artificial Insemination
28	IUI	Intra Uterine Insemination
29	CDRI	Central Drug Research Institute



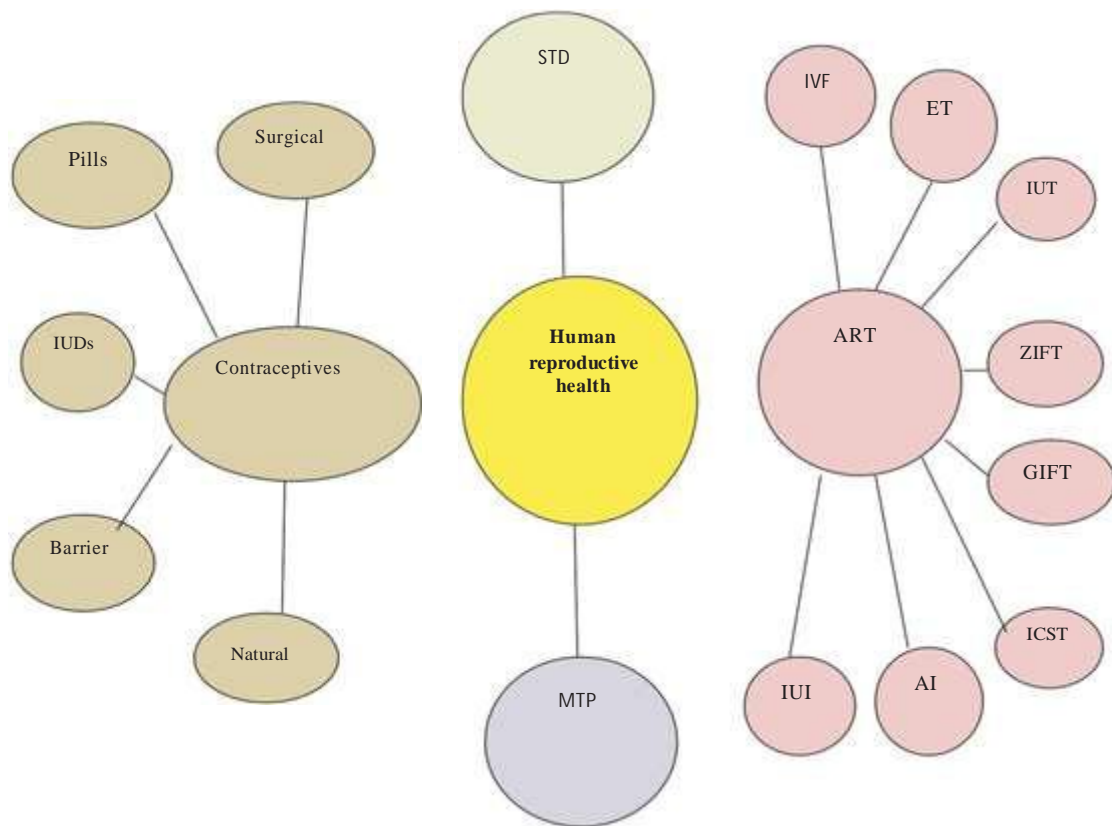
**UNIT VI CHAPTER 4: REPRODUCTIVE HEALTH
(FLOW CHART)**





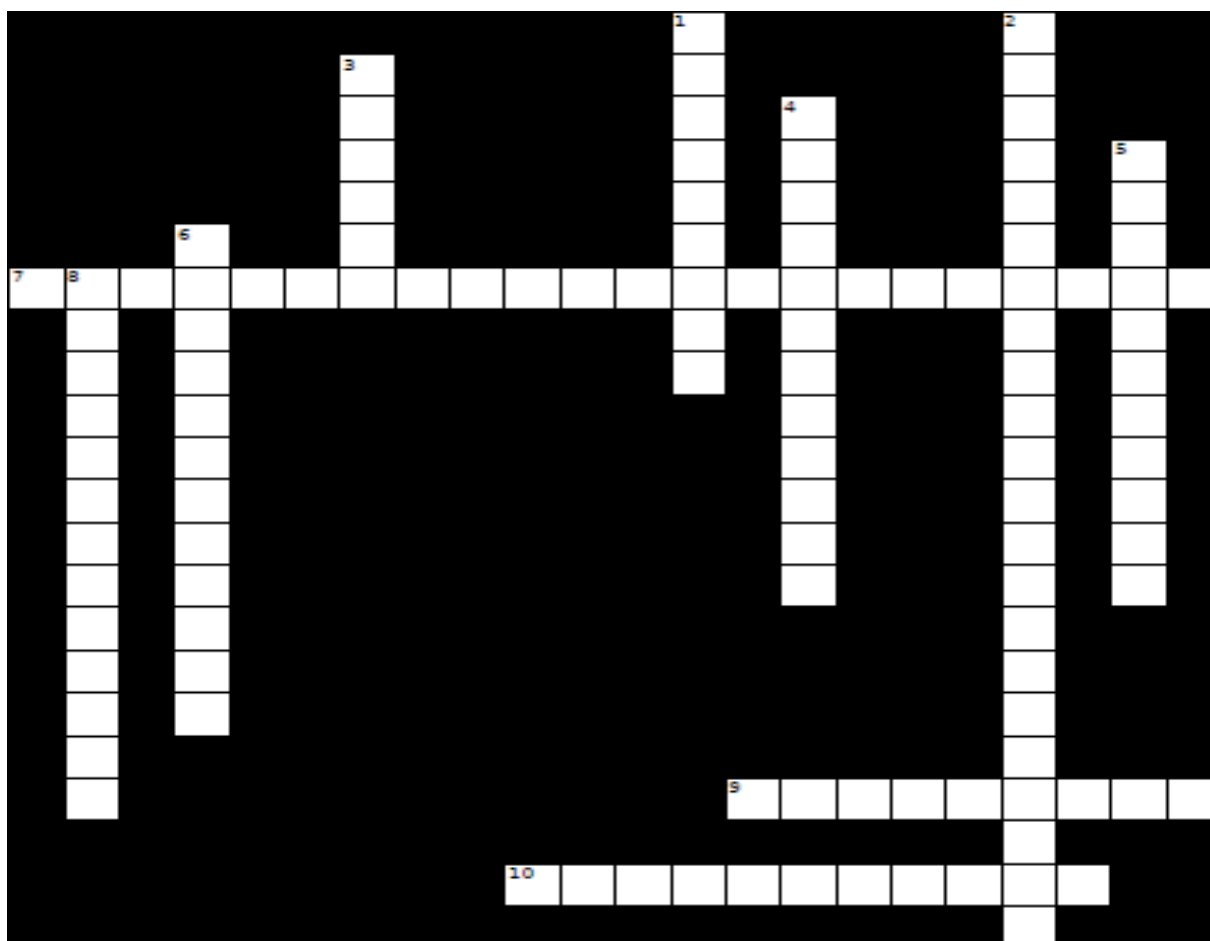


**UNIT VI CHAPTER 4: REPRODUCTIVE HEALTH
(CONCEPT MAP)**





UNIT VI CHAPTER 4: REPRODUCTIVE HEALTH
(CROSS WORD)



Across

- 7 Absence to menstruation during the period of intense lactation
- 9 A small part of the fallopian tube is removed and tied up
- 10 Non medicated IUDs

Down

- 1 Barriers for females
- 2 Fertilisation outside the body
- 3 Oral contraceptive for the females developed at CDRI
- 4 Hormone releasing IUDs
- 5 Unable to produce children
- 6 Surgical method
- 8 A foetal sex determination test based on the chromosomal pattern



**CHAPTER: 4 REPRODUCTIVE HEALTH
(QUESTION BANK)**

1. Name the technique to know the genetic disorders in the foetus.
2. What is MTP?
3. List one drawback of surgical methods of birth control.
4. Which period of pregnancy is safer for MTP?
5. What are the measures one has to take to prevent from contracting STDs?
6. Explain the technique amniocentesis .How is this technique misused?
7. Describe the three different practices under natural methods of birth control.
8. What are barrier methods of birth control? Explain.
9. Expand IUDs. Explain the various methods of IUDs.
10. What is sterilization? Explain the various methods.
11. How do oral contraceptives function? What is the advantage of Saheli?
12. What is an ideal contraceptive for women and explain its contraceptive role?
13. How do the natural, barriers, IUD's, Oral pills and Surgical methods help in Contraception? Explain.
14. What is STD? List out the various STD's. How is it transmitted? What are its symptoms? What are the complications the STD could lead to?
15. Explain the various methods of Assisted Reproductive Technologies.
16. Expand RCH, CDRI, MMR, IMR, AIDS, VD, RTI, IUT, IUI, AI, IVF, STD, MTP, IUD, ZIFT, GIFT, ART, ICSI, PID.
17. Mrs. X was blamed for being childless though the problem was due to low sperm counts in the ejaculates of her husband. Suggest a technique which could help the couple to have a child.

**CHAPTER.4 : REPRODUCTIVE HEALTH
(MARKING SCHEME)**

Q.NO.	Answer	Marks Allotted
1	Amniocentesis	1
2	Medical termination of pregnancy	1
3	Poor reversibility	1
4	First trimester	1
5	Avoid multiple partners , early detection	1x 2
6	Foetal sex determination based on chromosomal pattern in the amniotic fluid surrounding the developing embryo , female foeticide	1x 2
7	Periodic abstinence , withdrawal , lactational amenorrhoea	1x 3

BIOLOGY



8	Prevent physical meeting of sperm and egg condoms in males , diaphragms, cervical caps vaults in females , spermicidal creams , jellies foams	1 x3
9	Intra uterine devies , non- medicated , Cu releasing , hormone releasing	1 x 3
10	Surgical method , vasectomy in males- vas deferens cut / tied , tubectomy in females fallopian tube cut/ tied	1 x 3
11	Progestogen or progestogen – estrogen combination taken for 21 days , inhibit ovulation, implantation, alter the quality of cervical mucus to prevent/ retard the entry of sperms .saheli – non steroidal once a week pill	1+1+1
12	IUDs . increase phagocytosis of sperms , suppress sperm motility, fertilizing capacity of sperm , uterus unsuitable for implantation , cervix hostile to sperms.	1 x 3
13	Natural -avoiding chances of ovum sperm meeting ;barrier–prevent ovum sperm meeting , IUD – phagocytosis, pills – inhibit ovulation , implementation; surgical prevent gamete transfer	1 x 5
14	Sexually transmitted diseases VD ,RTI, Gonorrhoea, syphilis genital herpes etc. , sharing injection needles ,trans fusion of blood etc. itching, fluid discharge, slight pain, swellings. PID abortions, still births, ectopic pregnancy, infertility.	1 x 5
15	IVF , ET, Test tube baby programme , ZIFT/, IUT/ ,GIFT/, ICSI/,IUI	1 x 5
16	Reproductiveandchildhealthcareprogramme,Centraldrugresearchinstitute, Matrenal mortality rate , infant mortality rate ,Acquired immune deficiency syndrome , venereal disease,Reproductive tract infection ,Intra uterine transfer , intra uterine insemination ,Artificial insemination , in vitro fertilization , Sexually transmitted diseases , medical termination of pregnancy, Intra uterine devices ,Zygote intra fallopian transfer, gamete intra fallopian transfer, assisted reproductive technology , Intra cytoplasmic sperm injection Pelvic inflammatory diseases	Each 1
17	IVF and its detail process and importance	2+1



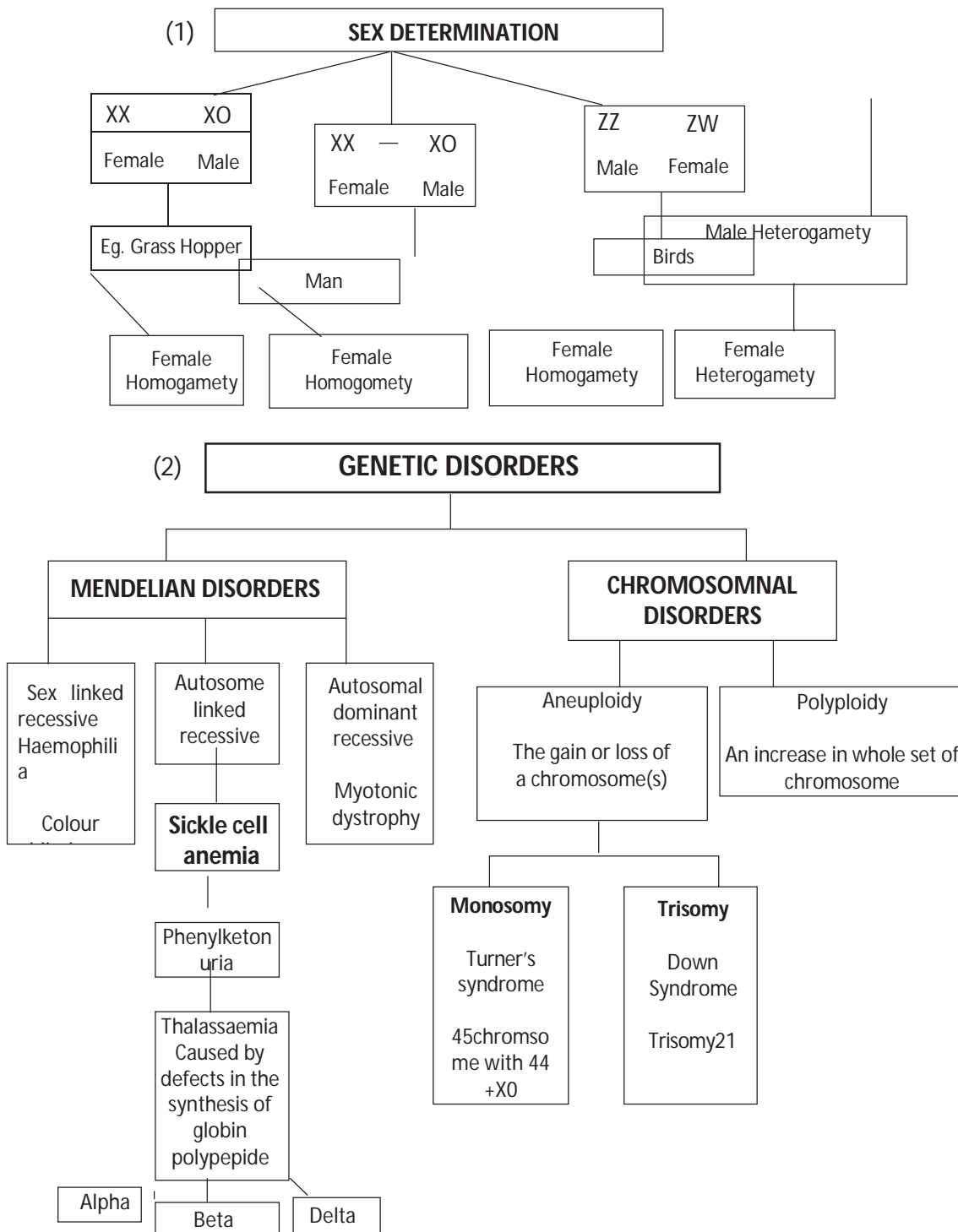
UNIT-VII – GENETICS AND EVOLUTION
CHAPTER – 5 : PRINCIPLES OF INHERITANCE AND VARIATION
(KEY POINTS)

S.No	TERM	Explanation
1.	Heredity:	It can be defined as the transmission of characters from one generation to successive generations of living organisms.
2.	Alleles:	The various forms of a gene are called alleles.
3.	Phenotype:	The external / observable characteristics of an organism constitute its phenotype.
4.	Genotype:	The genetic constitution of an organism is its genotype.
5.	Homozygote:	It is an individual organism in which the members of a pair of alleles for a
6.	Heterozygote:	It is an individual organism in which the members of a pair of alleles of a character are different.
7.	Dominant	The form of the character which is expressed in the F1 hybrid is called dominant character: character.
8.	Recessive	The form of the character which is suppressed in the presence of the dominant character: character in a hybrid is called recessive character.
9.	Monohybrid cross:	It is a cross between individuals of the same species, in which the inheritance of contrasting pairs of a single trait is considered.
10.	Dihybrid cross:	It is a cross between two individuals of the same species, in which the inheritance of contrasting pairs of two traits is considered.
11.	Glu –	glutamic acid
12.	Val-	valine



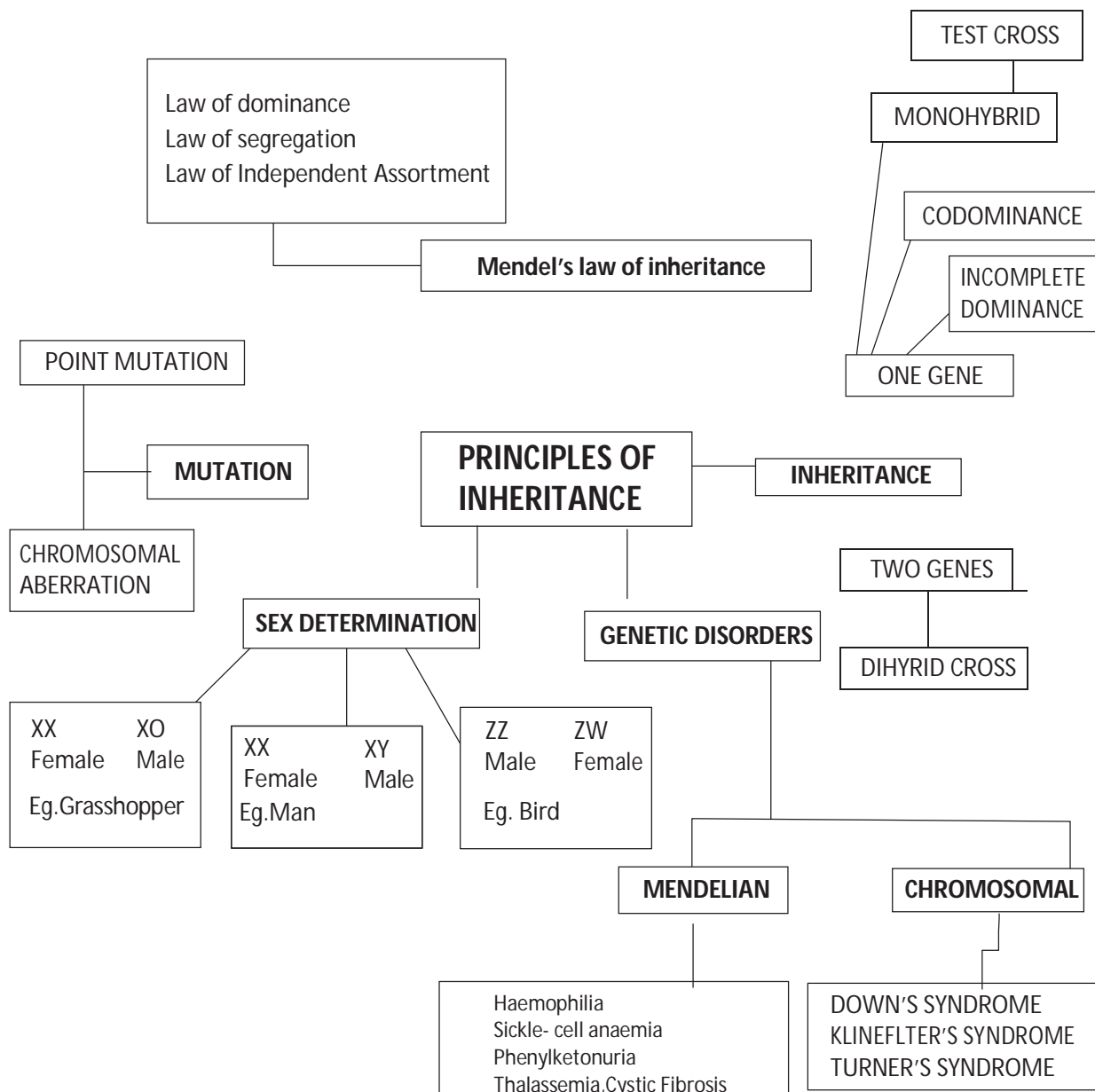
**CHAPTER – 5 : PRINCIPLES OF INHERITANCE AND VARIATION
(FLOW CHART)**

**CHAPTER – 5 : PRINCIPLES OF INHERITANCE AND VARIATION
(FLOW CHART)**



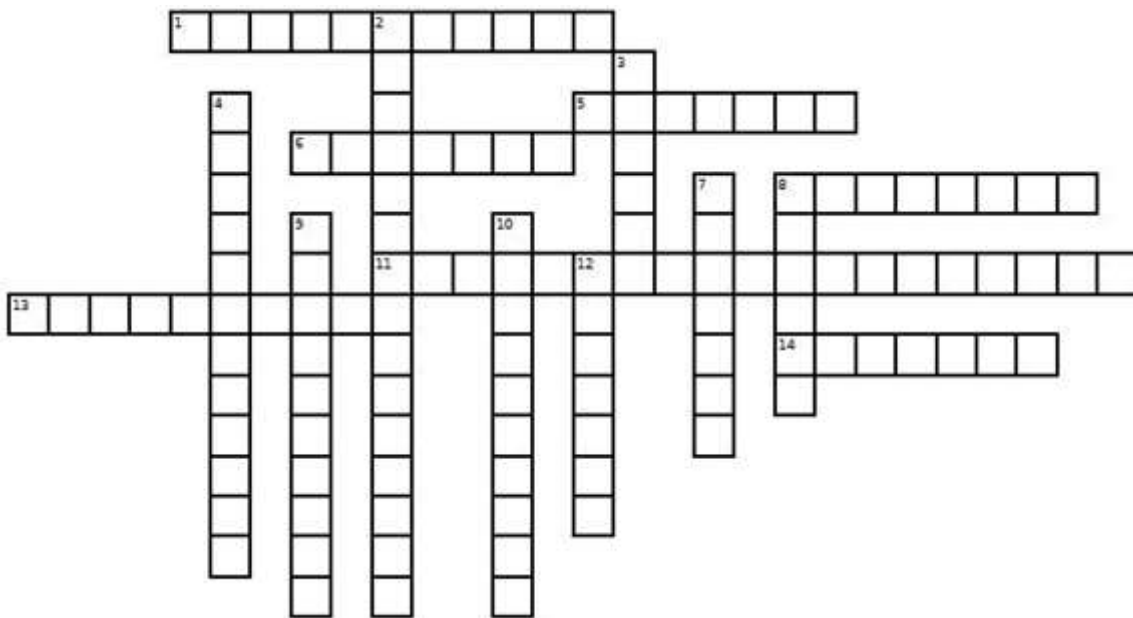


**CHAPTER – 5 : PRINCIPLES OF INHERITANCE AND VARIATION
(CONCEPT MAP)**





**CHAPTER – 5 : PRINCIPLES OF INHERITANCE AND VARIATION
(CROSS WORD)**



Down:

2. Inborn error of metabolism inherited as autosomal recessive trait
3. Which amino acid substitutes Glutamic acid in sickle cell anaemia an autosomal recessive trait disorder
4. Term used for 2 different types of gametes in terms of sex chromosome
7. Specific name of pea plant
8. Scientist who gave the experimental verification of chromosomal theory of inheritance
9. Genetic name of fruit fly
10. Term for segregation of chromatids during cell division cycle results in the gain or loss of chromosome(s)
12. The discrete unit that controls the characters and occurs in pairs

Across:

1. Sex linked recessive disease when in the clotting of blood is affected
5. Well known Indian breed of cows in Punjab
6. Who proposed the graphical representation in a genetic cross
8. Sudden change results in the alteration of DNA sequence
11. Genetic disorder due to the presence of an additional copy of X chromosomes resulting in a karyotype of 47
13. The structure in the nucleus that appeared double and divide just before each cell division
14. Genes which code for a pair of contrasting traits are also known as _____



CHAPTER – 5 : PRINCIPLES OF INHERITANCE AND VARIATION (QUESTION BANK)

1. State the difference between a gene and an allele.
2. Write the possible genotypes Mendel got when he crossed F1 Tall pea plants with a dwarf pea plant.
3. Who had proposed the chromosomal theory of inheritance?
4. Write the scientific name of the organism which T.H. Morgan used in his genetic experiments.
5. List the advantages of selecting pea plant for his experiments by Mendel
6. Briefly mention the contributions of T.H.Morgan in genetics
7. What is a point mutation, give an example
8. What is pedigree analysis, how is it useful?
9. The male fruit fly and female fowl are heterogametic, while the female fruit fly and the Male fowl are homogametic why are they termed so.
10. Define and explain testcross
11. Explain law of dominance with an example.
12. With the help of an example differentiate between incomplete dominance and co-dominance.
13. Explain the mechanism of sex determination in honeybees
14. How does the Mendelian disorder phenylketonuria occur?
15. Why did Mendel select garden pea plant for his experiments?
16. Tabulate the different types of sex determination in organisms.
17. Give the characteristic features of Turner's Syndrome.
18. What will be the genotype and phenotype of the offspring if a colour blind man marries a carrier woman?
19. Anita was happy when she gave birth to her first child. Her in-laws were dissatisfied at her not giving birth to a male child and blamed Anita. Anita tried to convince her in-laws that she had no role in the child's gender. They understood the biological reason but were yet to be satisfied. Anita's husband took up the matter and convinced the parents.
 - a) What values did Anita's husband show in the above situation?
 - b) What governs sex determination in humans? How is it different from birds?
 - c) Why can't Anita be blamed for not giving birth to a male child?



CHAPTER – 5 : PRINCIPLES OF INHERITANCE AND VARIATION (ANSWER KEY)

Q No.	HINTS	
1	Alleles are different forms of a gene	1
2	Tall and dwarf	1
3	Sutton & Boveri	1
4	Drosophila melanogaster	1
5	Bisexual, one season breeding, contrasting traits 1	
6	Experiments with Drosophila-linkage & recombination	1
7	Change of a single nitrogen base, Eg. Sickle cell anaemia	1
8	Method of analyzing inheritance of traits in humans. Study inheritance of diseases for genetic counselling	2
9	Produce dissimilar gametes-heterogametic, produce similar gametes-they are homogametic	2
10	Cross between dominant phenotype of unknown genotype with the recessive plant. Ratio 1:1 shows genotype of dominant plant as heterozygous.	2
11	When a pair of heterozygous alleles seen together, the allele which is expressed is the dominant one. Tt Tall plants produced	2
12	Neither of the heterozygous pair expressed completely Eg. Mirabilis sp. Both the alternative forms are expressed when found together Eg. blood groups.	2
13	Haplo-Diploid-unfertilised eggs become males, fertilised eggs become females.	3
14	Inborn error of metabolism-lacks enzyme for converting phenyl alanine to tyrosine. Phenyl pyruvic acid is excreted	3
15	Short life span, only 4 pairs of chromosomes, distinct male & female traits, cultured in the lab	3
16	XX female, XY male, ZZ male, ZW female, XO male, XX female	3
17	Female sterile with rudimentary ovaries, lack other sexual characters. XO	2+1
18	Man with X ^c female with one X ^c and explanation through flowchart	3
19	<p>a) Strong and determined personality with responsibility towards the family and respect for elders.</p> <p>b) Sex chromosomes. In human males it is XY and in female it is XX. In birds, male is ZZ while female is ZW</p> <div style="text-align: center;"> <p>The diagram shows two diamond-shaped flowcharts. The left one is for humans (XX-XY). The top-left vertex is labeled 'Female gametes X' and the top-right vertex is labeled 'X'. The bottom-left vertex is labeled 'X' and the bottom-right vertex is labeled 'Y'. The center of the diamond is divided into four quadrants: top-left is 'XX', top-right is 'XY', bottom-left is 'ZWXY', and bottom-right is 'XY'. The right one is for birds (ZW-ZZ). The top-left vertex is labeled 'Female gametes W' and the top-right vertex is labeled 'Z'. The bottom-left vertex is labeled 'Z' and the bottom-right vertex is labeled 'Z'. The center of the diamond is divided into four quadrants: top-left is 'ZW', top-right is 'Z', bottom-left is 'ZZ', and bottom-right is 'ZZ'.</p> </div> <p>c) Human females are homogametic i.e. produce only one type of gametes containing 22+X chromosome only. Males are heterogametic and produce two types of gametes 22+X and 22+Y. It is the type of the male gamete which determines the sex of the foetus. If X chromosome containing sperm fuses with the egg, it produces a female child whereas if Y chromosome containing sperm fuses with the egg, it produces a male child.</p>	3



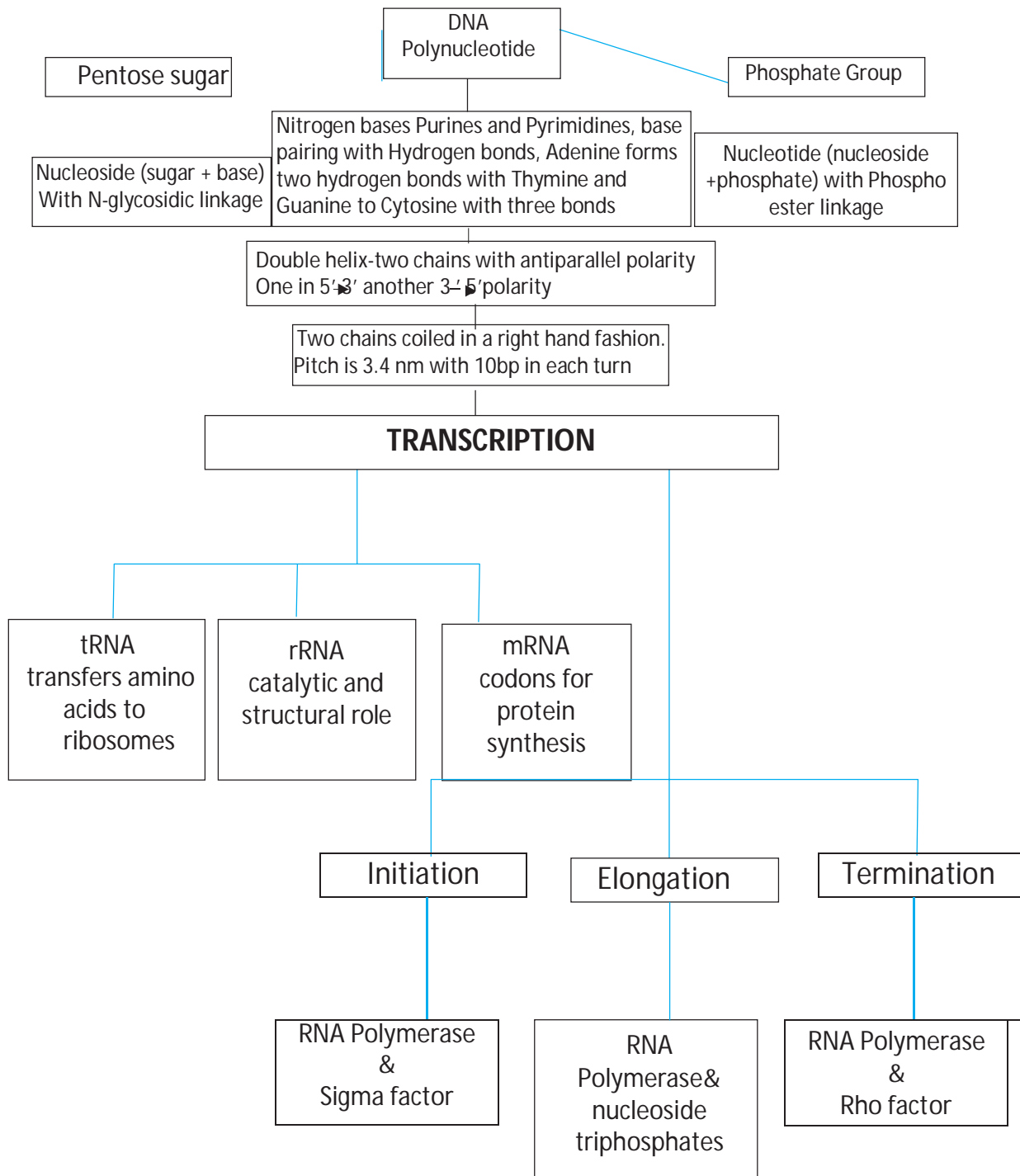
CHAPTER: 6 MOLECULAR BASIS OF INHERITANCE (KEY POINTS)

1	Transcription-	copying of genetic material from DNA to RNA
2	Purines –	adenine and guanine
3	Pyrimidine –	cytosine , thymine and uracil
4	Nucleotide –	consists pentose sugar phosphate group and nitrogenous base
5	Nucleoside –	consists of nitrogenous base and pentose sugar
6	DNA ligase -	Join the discontinuously, synthesised fragments
7	Exons –	coding sequence
8	Introns –	intervening sequence
9	Polynucleotide chain –	consists sugar and phosphate along with Nitrogenous base
10	Splicing –	introns are removed in this process
11	Capping –	an unusual nucleotide is added to 5' end of the RNA
12	Codon –	formed by 3 nitrogen bases on mRNA that codes an amino acids
13	Anticodon –	has bases complementary to the code
14	Lac operon –	A gene regulation mechanism in E.coli. conversion as per available energy source.
15	Bioinformatics –	associated to Human Genome Programme
16	Polymorphism –	variation at genetic level
17	Repetitive DNA –	small stretches of DNA
18	Satellite DNA –	forms small peaks
19	Translation –	polymerization of amino acid to form a polypeptide
20	Tailing –	adenylate residues are added to the 3' end of hnRNA
21	HGP	Human Genome Project
22	ESTs	Expressed Sequence Tags
23	BAC	Bacterial artificial chromosome
24	YAC	Yeast artificial chromosome
25	SNPs	single nucleotide polymorphism
26	VNTR	variable number of tandem repeats
27	UTR	untranslated regions
28	sRNA	soluble RNA
29	snRNA	heterogeneous nuclear RNA
30	snRNA	small nuclear RNA
31	RNA	ribonucleic acid
32	DNA	deoxyribonucleic acid
33	Proteases	protein digesting enzyme
34	Rnase	RNA digesting enzyme
35	Dnase	DNA digesting enzyme
36	NHC	Non his tone chromosome
37	EM	electron microscope



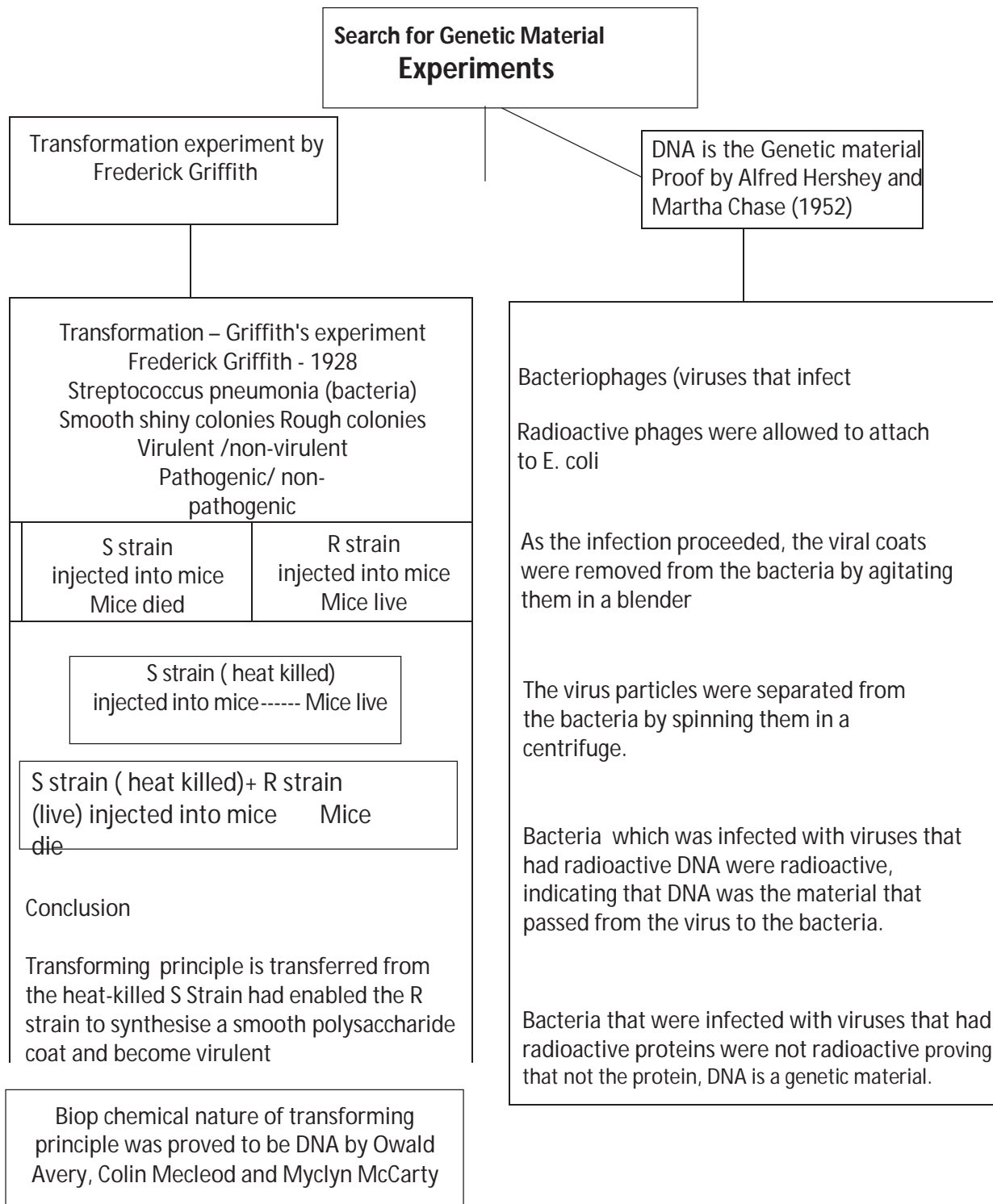
CHAPTER:6 MOLECULAR BASIS OF INHERITANCE (FLOWCHART)

1 - STRUCTURE OF DNA





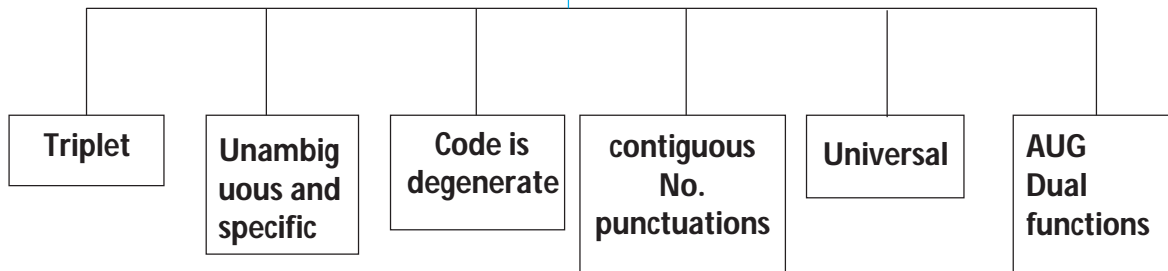
2 - SEARCH FOR GENETIC MATERIAL



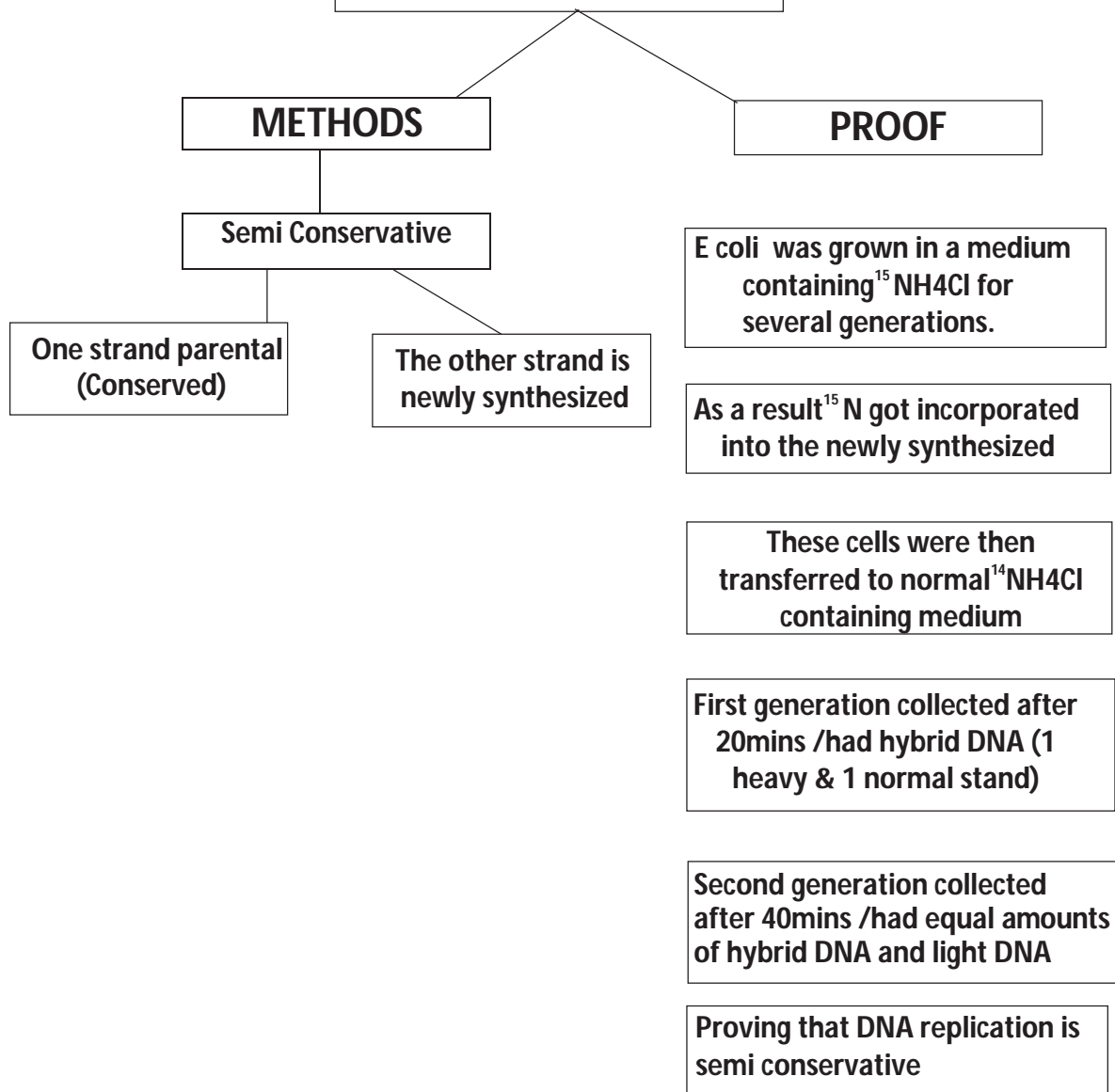


3

SALIENT FEATURES OF GENETIC CODE



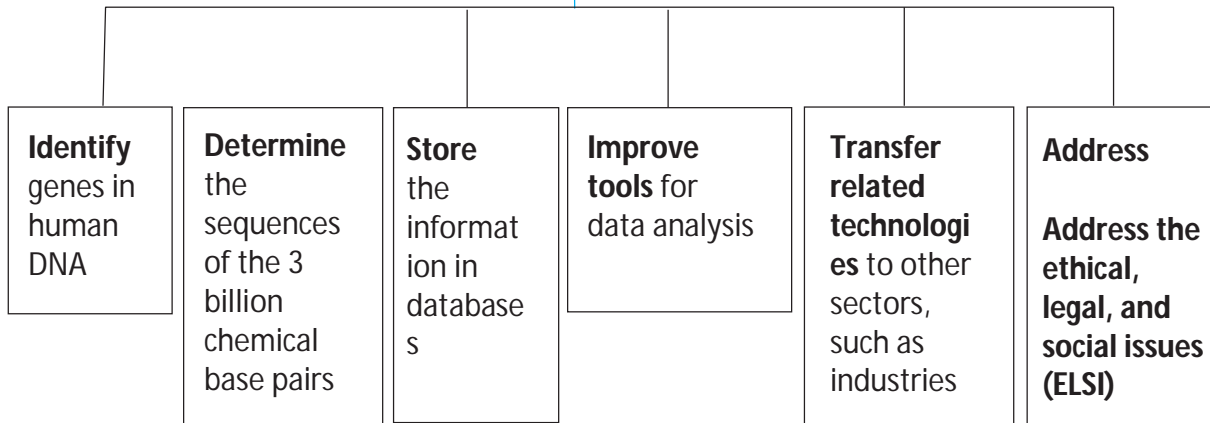
4 - DNA Replication





5

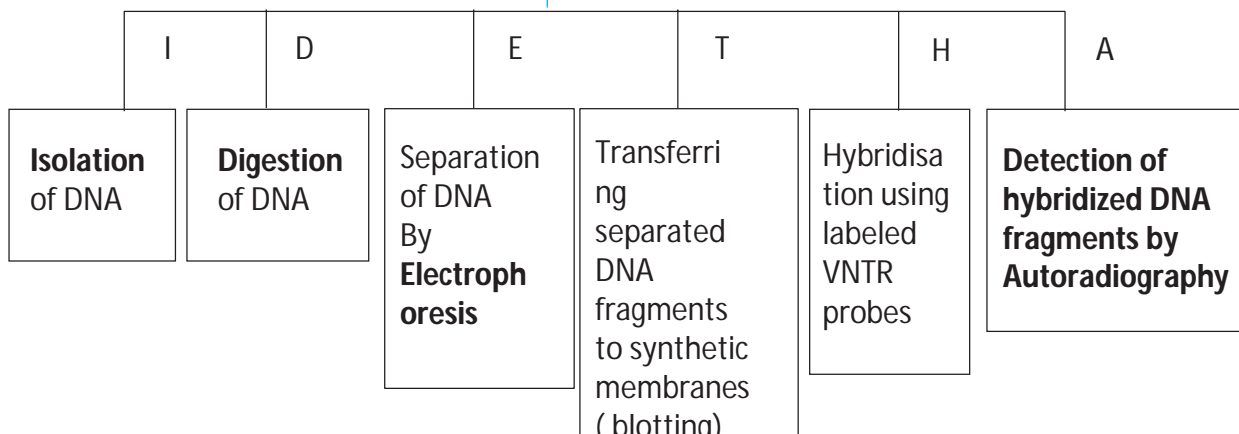
Goals of HGP



6

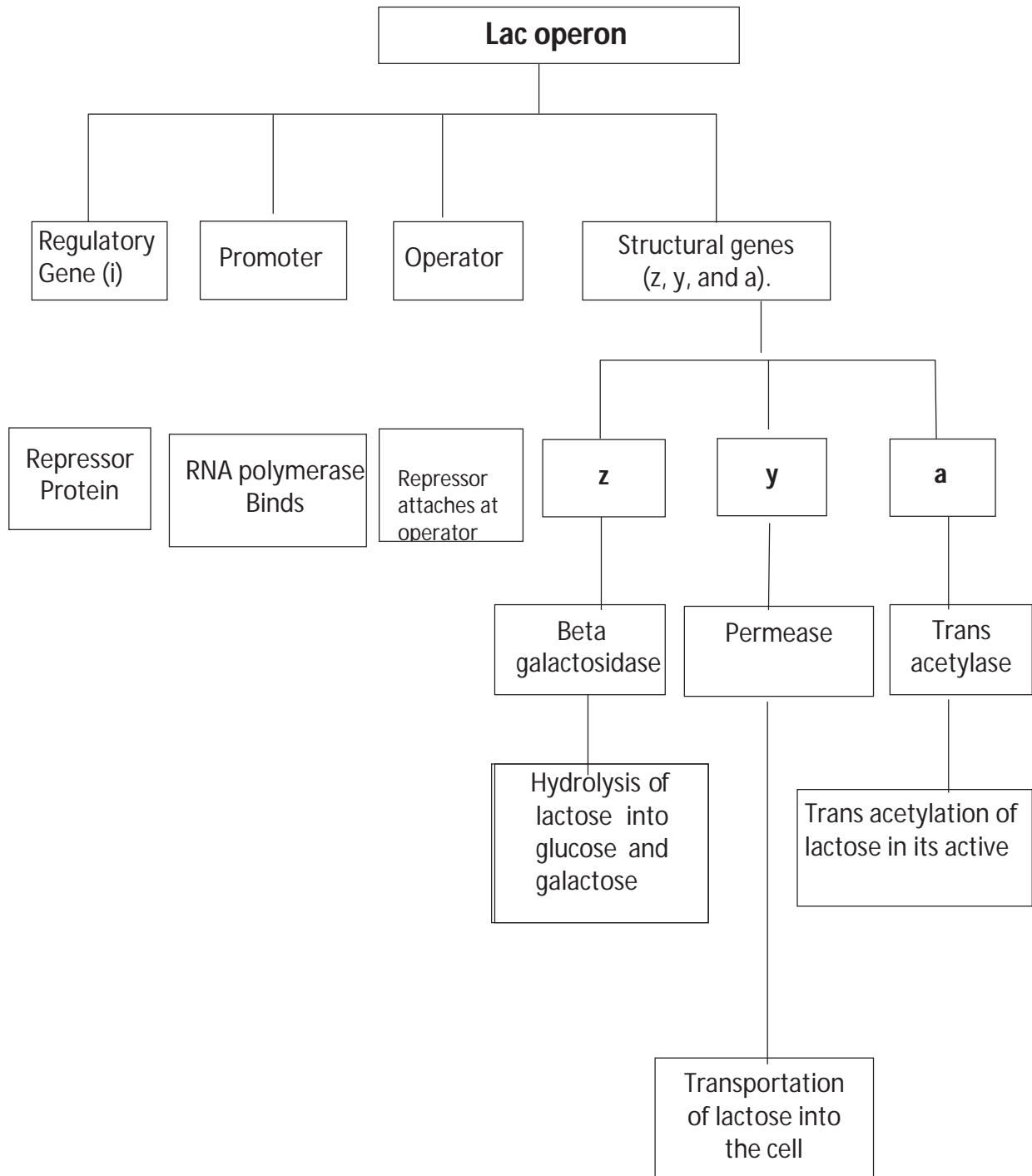
DNA Fingerprinting developed by Alec Jeffreys

Steps



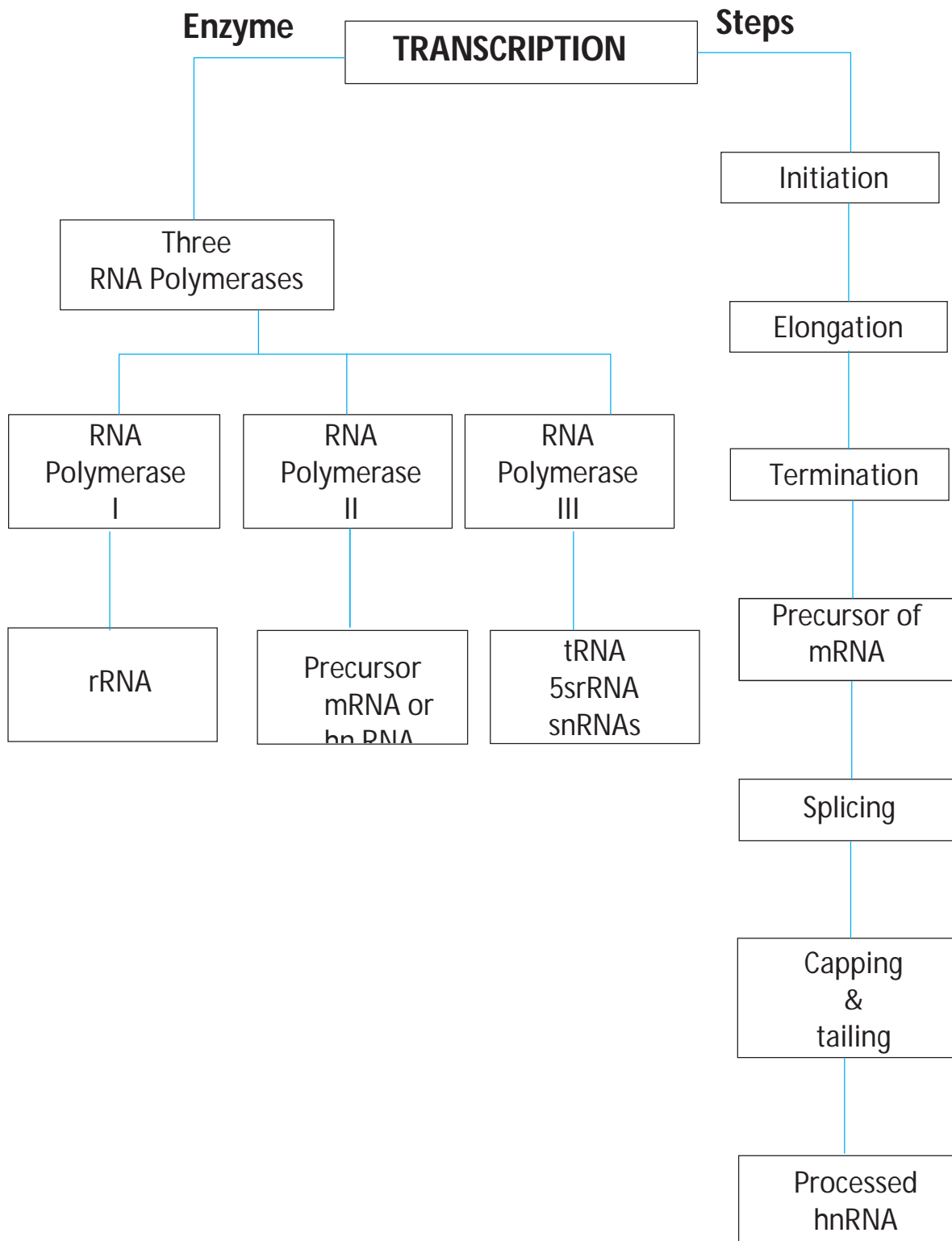


7 GENE REGULATION



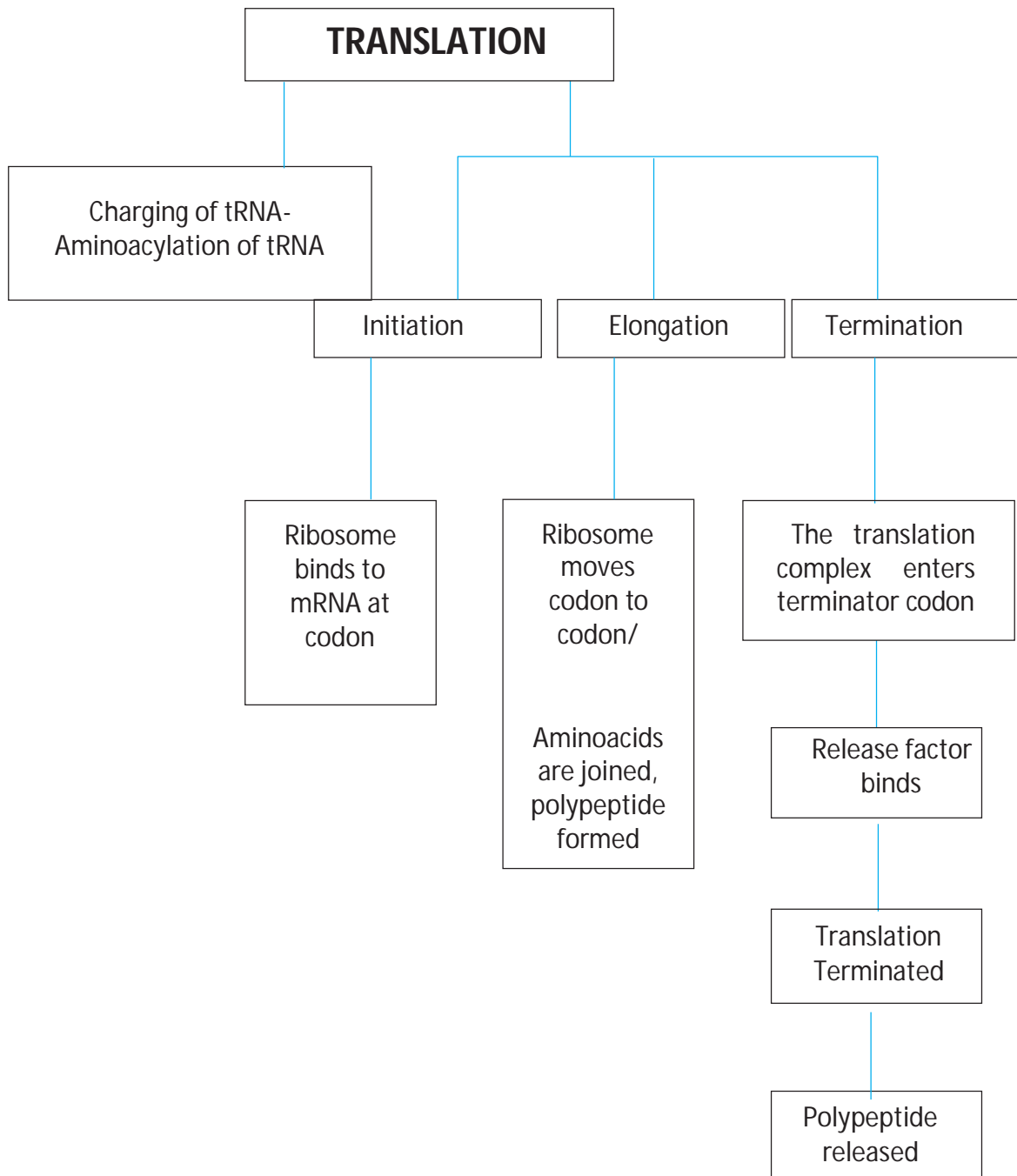


8 TRANSCRIPTION IN EUKARYOTES



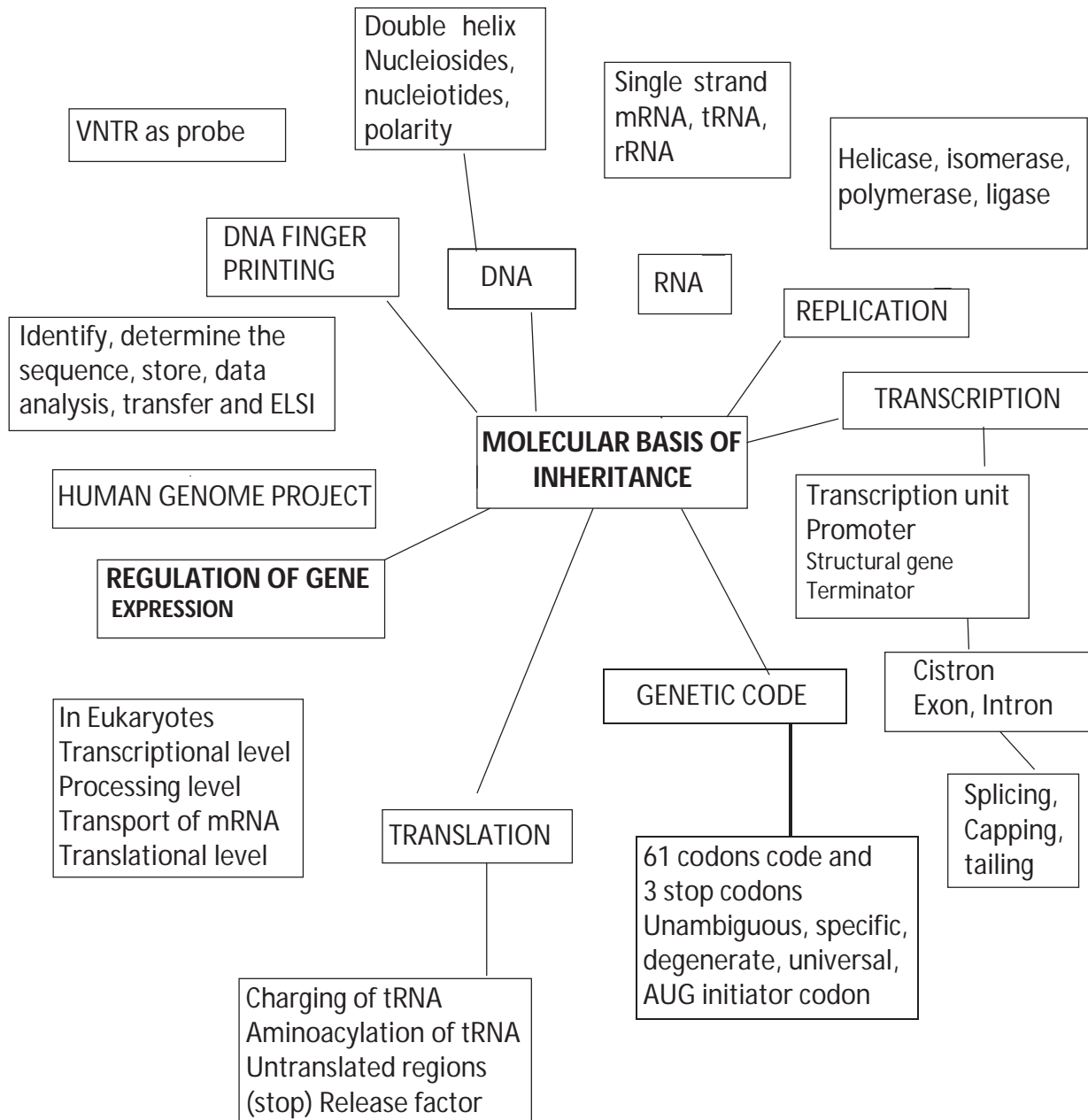


9 PROTEIN SYNTHESIS



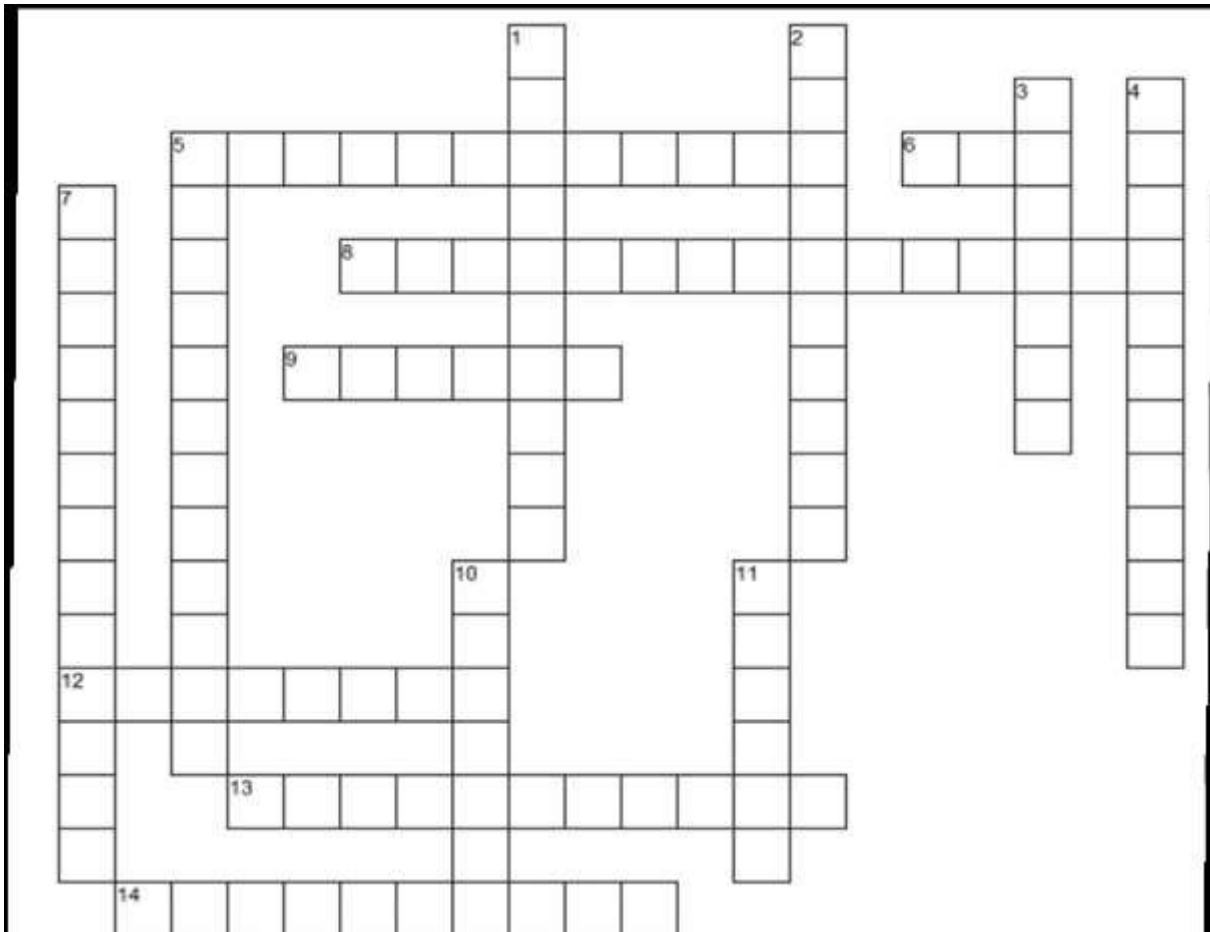


**CHAPTER : 6 MOLECULAR BASIS OF INHERITANCE
(CONCEPT MAP)**





**CHAPTER : 6 MOLECULAR BASIS OF INHERITANCE
(CROSS WORD)**



ACROSS:

5. Causative organism of pneumonia
6. An acidic substance present in nucleus
8. Chromatin densely packed and inactive
9. Helps in joining the fragments
12. A set of positively charged base proteins
13. Chromatin loosely packed and active
14. Process of removing in trans from processed RNA

DOWN:

1. Formed by N-glycosidic linkage
2. largest known human gene at 2.4 billion bases
3. Substrate of lac-operon
4. Process of protein synthesis from RNA
5. Variation at genetic level
7. Bacteria infected with viruses
10. A segment of DNA coding for polypeptide
11. Present in RNA by the place of Thymine



CHAPTER:6 MOLECULAR BASIS OF INHERITANCE (QUESTION BANK)

1. If adenine constitutes 30% of an isolated DNA fragment, then what is the expected % of the base cytosine in it?
2. How does the flow of genetic information in HIV deviate from the central dogma proposed by Francis Crick?
3. How does HIV differ from a bacteriophage?
4. What is a nucleoid?
5. Name two amino acids that provide +ve charge to histone proteins.
6. Why do RNA viruses undergo mutation and evolution faster than most of the other viruses?
7. Name the enzyme involved in the continuous replication of DNA strand. Mention the polarity of the template strand.
8. What is a cistron?
9. Which one out of Rho factor and sigma factor, acts as initiation factor during transcription in prokaryote?
10. Write the function of RNA polymerase II.
11. What is meant by hnRNA?
12. (a) Differentiate between euchromatin and heterochromatin.
(b) What is the function of non-histone chromosomal proteins?
13. Why is DNA a better genetic material when compared to RNA?
14. Answer the following questions based on Meselson and Stahl's experiment:
 - a) Write the name of the chemical substance used as a source of nitrogen in the experiment by them.
 - b) Why did the scientists synthesize the light and the heavy DNA molecules in the organism in the experiment?
 - c) How did the scientists synthesize it possible to distinguish the heavy DNA molecule from the light DNA molecule? Explain.
 - d) Write the conclusion the scientists arrived at, after completing the experiment.
15. Monocistronic structural genes in eukaryotes have interrupted coding sequences. Explain. How are they different in prokaryotes?
16. Describe the initiation process of transcription in bacteria?
17. Explain the elongation process of transcription in bacteria?
18. Describe the termination process of transcription in bacterium?
19. Explain the role of ^{35}S and ^{32}P in the experiments conducted by Hershey and Chase?
20. It is established that RNA is the first genetic material. Explain giving three reasons?
21. (a) What are the transcriptional products of RNA polymerase III?
(b) Differentiate between 'capping' and 'tailing'?
(a) Expand hnRNA.
22. DNA is the genetic material in most of the organisms, while RNA is the genetic material in a few viruses/
What are the four general/common functions performed by RNA in other organisms?
23. Write short notes on RNA polymerases of eukaryotic cells?
24. How do histones acquire positive charge?
25. Explain the role of RNA polymerase in transcription in bacteria.
26. Identifying reasons, the salient features of genetic code by studying the following nucleotide sequences of mRNA strand and the polypeptide translated from it?
27. Ratan was a known sportsman in his school. While returning home he found some unknown miscreants beating a young fellow. He tried to drive them off but by that time the fellow died of injury. The police arrested Ratan and he was put on trial. The judge being convinced by Ratan's plea, ordered for DNA fingerprinting reports.
 - a) Ratan's fingerprints on the dead body were sufficient to convict him but the judge asked for authentic proof? What values can be observed?
 - b) What is the basis of DNA fingerprinting?
 - c) Explain the steps in DNA fingerprinting.



CHAPTER 16 MOLECULAR BASIS OF INHERITANCE

(MARKING SCHEME)

Q. NO.	Value points	Marks				
1.	20%	5				
2.	HW shows reverse transcription, i.e., formation of DNA on RNA template.	1				
3.	HW has RNA as its genome, while bacteriophage has double-stranded DNA as its genome.	2				
4.	Nucleoid is the region in prokaryotic cells where DNA is held with positively-charged proteins.					
5.	Lysine and Arginine	2				
6.	The 2' OH-group in the nucleotides of RNA is a reactive group, this makes RNA labile and easily degradable.	2				
7.	DNA polymerase. Template strand has 3'→5' polarity.	2				
8.	A cistron is a segment of DNA, coding for a polypeptide.	1				
9.	Sigma factor.	1				
10.	It transcribes hnRNA, the precursor of mRNA, in eukaryotes.	1				
11.	The precursor of mRNA or the primary transcript transcribed by RNA polymerase II is called Heterogeneous nuclear RNA.	1				
12a.	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"> <p>Heterochromatin</p> <ul style="list-style-type: none"> - These are the regions where chromatin is highly packed. - It stains darker. It is transcriptionally less active or inert. </td> </tr> <tr> <td colspan="2"> <p>(b). non-histone chromosomal proteins are involved in the packaging of chromatin fibres at the higher levels.</p> </td> </tr> </table>		<p>Heterochromatin</p> <ul style="list-style-type: none"> - These are the regions where chromatin is highly packed. - It stains darker. It is transcriptionally less active or inert. 	<p>(b). non-histone chromosomal proteins are involved in the packaging of chromatin fibres at the higher levels.</p>		2
	<p>Heterochromatin</p> <ul style="list-style-type: none"> - These are the regions where chromatin is highly packed. - It stains darker. It is transcriptionally less active or inert. 					
<p>(b). non-histone chromosomal proteins are involved in the packaging of chromatin fibres at the higher levels.</p>						
13.	<p>DNA is a better genetic material for the following reasons:</p> <p>(i) The genetic material should be stable and should not change with age or change in physiology; this stability is given to DNA by its</p> <p>(ii) Double stranded nature,</p> <p>(iii) Presence of thymine.</p> <p>(iv) Because the 2'-OH group of RNA nucleotides is a reactive group that makes RNA labile and easily degradable.</p> <p>(v) RNA (23S RNA) is also catalytic, i.e., it is reactive.</p>	2				
14.	<p>(a) H³⁵Cl (ammonium chloride).</p> <p>(b) It was done to show that after one generation of Escherichia coli with 15N-DNA, in medium of 14 N, the DNA was of intermediate density between the light and heavy DNAs. It shows that of the two strands, only one strand is synthesised newly, using the 14N-nitrogen source in the medium.</p> <p>(c) The heavy and light DNA molecules can be distinguished by centrifugation in a caesium chloride (CsCl) density gradient; the 15N-DNA was heavier than 14N-DNA and the hybrid 15N-14N-DNA was intermediate between the two.</p> <p>(d) They concluded that DNA replication is semi-conservative, i.e., of the two strands of DNA, one is the parental strand while the other is synthesised new.</p>	2				

BIOLOGY



15	<p>In eukaryotes, the hnRNA (primary transcript of mRNA) has coding sequences, called exons as well as non-coding sequences, called introns, i.e., the information is split - It undergoes a process, called splicing, in which the introns are removed and the exons are joined together in a particular manner; to form the functional mRNA.</p> <p>- In prokaryotes, the mRNA is polycistronic, i.e., codes for more than one polypeptide.</p> <p>- The information is continuous and no splicing is required.</p>	2		
16	<p>Initiation process of transcription in bacteria</p> <p>- The RNA polymerase binds transiently to an initiation factor (sigma σ-factor) and binds to a specific sequence on the DNA, called promoter, to initiate transcription.</p> <p>- The DNA strand with 3'→5' polarity acts as the template.</p>	2		
17	<p>Elongation process of Transcription in bacteria</p> <p>- After binding to the promoter, the RNA polymerase facilitates the opening of the DNA.</p> <p>- It uses nucleoside triphosphates as substrate and polymerises the nucleotides in a template-dependent fashion following complementarity of bases in 5'→3' direction</p> <p>The process continues till the RNA polymerase reaches the terminator region on the DNA strand.</p>	2		
18	<p>Once the RNA polymerase reaches the terminator sequences of the DNA, it binds transiently to the terminator to the termination factor (rho ρ)</p> <p>- The RNA strand synthesised falls off, followed by the RNA polymerase, i.e. termination has occurred.</p>	2		
19	<p>- The viruses/ bacteriophages grown on radioactive Sulphur (^{35}S) contained radio active proteins but not radioactive DNA, because DNA does not contain Sulphur.</p> <p>- When these viruses were allowed to infect bacteria, the bacteria did not contain radioactivity, because proteins did not enter the bacteria; hence protein is not the genetic material.</p> <p>- The viruses grown on radioactive phosphorus (^{32}P) contained radioactive DNA, because DNA contains phosphorus and not proteins.</p> <p>- When these viruses were allowed to infect the bacteria, the bacteria were radioactive, indicating that DNA is the genetic material that has passed from the virus into bacteria.</p>	3		
20	<p>RNA is the first genetic material because:</p> <p>(i) RNA can directly code for the synthesis of proteins and hence can easily express its character; it is the genetic material in many viruses.</p> <p>(ii) RNA can also act as a catalyst; there are some important biochemical reactions in living systems that are catalysed by RNAs and not proteins.</p> <p>Many essential life processes like splicing, translation, etc. have evolved around RNA.</p>	3		
21	<p>(a) RNA polymerase III transcribes rRNA, 5S rRNA and SnRNA, i.e., small nuclear RNA</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> <p>capping</p> <p>It is the process of addition of methyl guanosine triphosphate to the 5' end of hnRNA after splicing.</p> </td> <td style="width: 50%; padding: 5px;"> <p>tailing</p> <p>It is the process of addition of adenylate residues to the 3' end of hnRNA after splicing.</p> </td> </tr> </table> <p>(b) Heterogeneous nuclear ribonucleic acid (hnRNA)</p>	<p>capping</p> <p>It is the process of addition of methyl guanosine triphosphate to the 5' end of hnRNA after splicing.</p>	<p>tailing</p> <p>It is the process of addition of adenylate residues to the 3' end of hnRNA after splicing.</p>	3
<p>capping</p> <p>It is the process of addition of methyl guanosine triphosphate to the 5' end of hnRNA after splicing.</p>	<p>tailing</p> <p>It is the process of addition of adenylate residues to the 3' end of hnRNA after splicing.</p>			



22	<p>Functions of RNA</p> <ul style="list-style-type: none"> - It functions as a messenger. - It is an adapter. - It is a structural component of ribosome. - It also acts as a catalyst. 	5
23	<ul style="list-style-type: none"> - In eukaryotes, there are three RNA-polymerases. - RNA-polymerase I catalyses transcription of r RNAs (28 S, 18 S and 5.8 S). - RNA-polymerase II catalyses transcription of precursor of mRNA; it is called hnRNA. - RNA-polymerase III catalyses tRNA, 5srRNA and hnRNA. 	5
24	<ul style="list-style-type: none"> - A protein's charge depends on the abundance of amino acid residues with charged side chains. - Histones are rich in basic amino acids, lysine's and arginine's, which carry positive charges in their side chains; hence histones are positively charged. 	5
25	<ul style="list-style-type: none"> - A single DNA dependent RNA polymerase catalyses the formation of mRNA, tRNA and rRNA in bacteria. - The enzyme is capable of catalysing only the elongation step of transcription. - It combines transiently in the initiation as sigma factor and binds to the promoter and initiates transcription. 	5
	<ul style="list-style-type: none"> - It somehow facilitates the opening of the DNA helix and catalyses the polymerisation of ribonucleoside triphosphates in a template-dependent fashion, i.e., elongation. - When it reaches the terminator sequence, the enzyme associates transiently with the termination or rho (ρ) factor and terminates transcription, the RNA and the enzyme fall off the template. 	
26	<p>Properties of genetic code:</p> <ul style="list-style-type: none"> - AUG is the initiation codon and codes for methionine; methionine is the first amino acid in the given polypeptide. - Genetic code is unambiguous and specific, i.e., each codon codes only for one particular amino acid. - Genetic code is degenerate, i.e., more than one codon code for one amino acid. - Each codon is a triplet, i.e., made of three nucleotides e.g., AUG, UUU, etc. - UAG does not code for any amino acid, it is a termination codon. 	5
27	<p>Ans-a) The judge showed wisdom and intention to search for the truth.</p> <p>Ans-b)</p> <ol style="list-style-type: none"> 1. DNA fingerprinting involves identifying differences in some specific regions in DNA sequence called as repetitive DNA. 2. Depending on base composition (%T rich or %C rich), length of segment, and number of repetitive units, the repetitive DNA is classified into many categories, (micro-satellites, mini-satellites etc). 3. These sequences normally do not code for any proteins, but they form a large portion of human genome. These sequences show high degree of polymorphism and form the basis of DNA fingerprinting. <p>Ans-c) (i) Isolation of DNA, (ii) digestion of DNA by restriction endonucleases, (iii) separation of DNA fragments by electrophoresis, (iv) transferring (blotting) of separated DNA fragments to synthetic membranes, such as nitrocellulose or nylon, (v) hybridisation using labelled VNTR probe, and (vi) detection of hybridised DNA fragments by autoradiography.</p>	1+1+2



Chapter:7 Evolution (KEY POINTS)

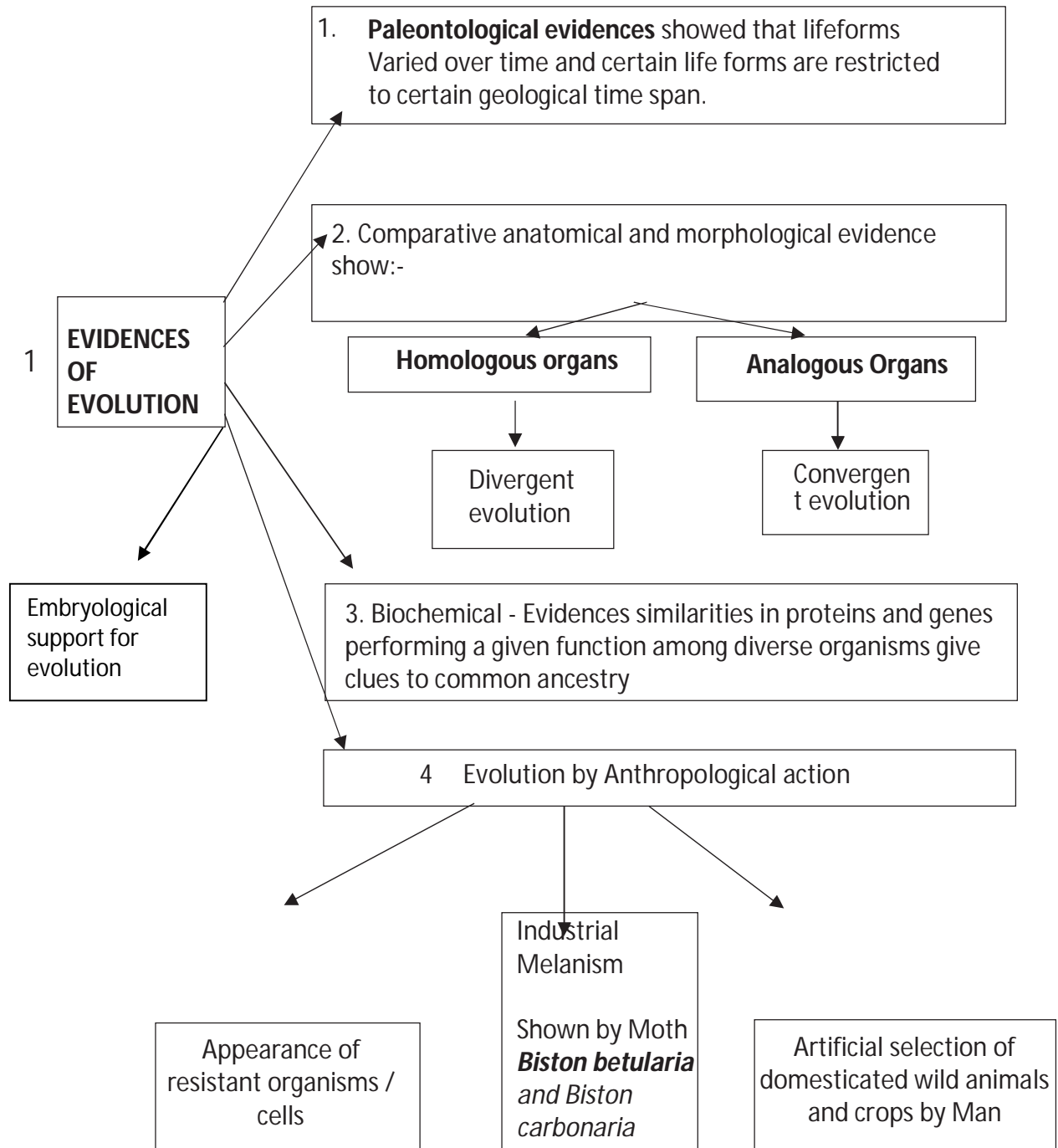
1	Homologous	Organs with similar origin and structure (SOS)but differ in appearance and function(DAF) Eg. Forelimbs of whale, bats, cheeta, horse
2	Divergent Evolution	Due to different needs some structures developed differently
3	Analogous	Organs with similar appearance and function (SAF)but differ in origin and structure (DOS) Eg. Wings of butterfly and bat
4	Convergent Evolution	Similar adaptive features in different groups of organisms but towards the same function.
5	Biogenesis	Life originates from pre-existing life
6	Adaptive Radiation	Evolution starting from a single point and radiating in different directions
7	Fossil	Preserved remains/imprints of plants and animals that lived millions of years ago
8	Paleontology	Systemic and scientific study of fossils
9	Saltation	Biological term for single step large mutation in a single leap/saltus.
10	Speciation	Process of evolving / formation of new species from the existing one
11	Differential reproduction	Different reproductive rate to the different individuals in a population
12	Biogeography	Study of distribution of various organisms in different parts of the earth
13	Founder effect	Changes in the allelic frequencies in a new population due to migration of members
14	Genetic drift	Changes occurring in gene frequencies by chance
15	Gene flow / Gene migration	When individual migrate to another place or population, new genes / alleles are added to new population and are lost from the old population in turn changing the frequencies when gene migration occurs many a times.
16	Stabilising natural selection	Large number of individuals acquire mean character value
17	Directional	Large number of individuals acquire value other than mean value
18	Disruptive	Large number of individuals acquire peripheral character value at both ends of the distribution curve

Origin of Life

Scientist	Year	Theory/Experiment	Conclusion
Lemaitre	1927	Big Bang theory	The universe expanded from explosion of a primordial, hot substance
Oparin and Haldane	1924 – 1929	Chemical evolution preceded organic evolution	Simple organic molecules originated from inorganic precursors.
Stanley Miller and Urey	1952	Synthesis of biomolecules by creation of similar conditions as primitive atmosphere on laboratory scale	Amino acids were synthesized from ammonia, methane and carbon dioxide inside specialized apparatus

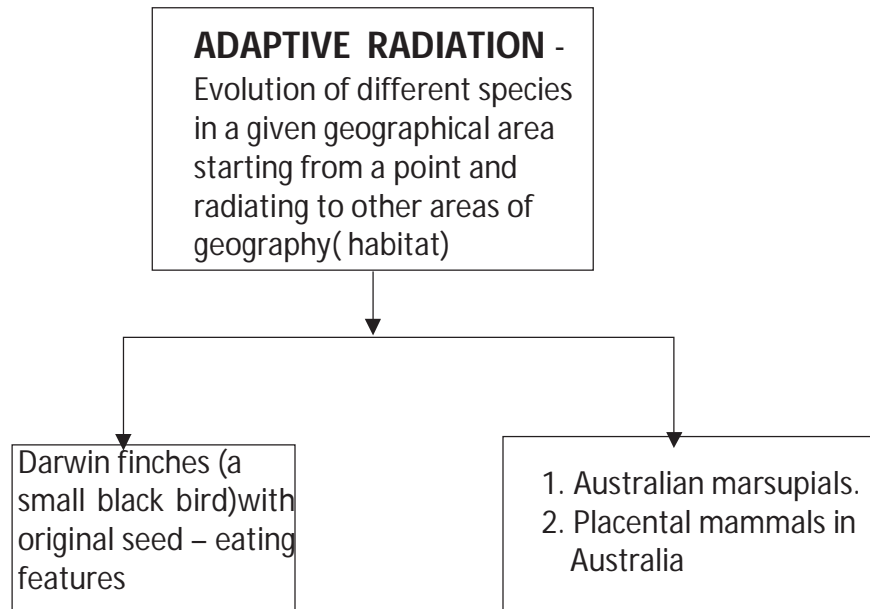


**CHAPTER 7 EVOLUTION
(FLOW CHART)**

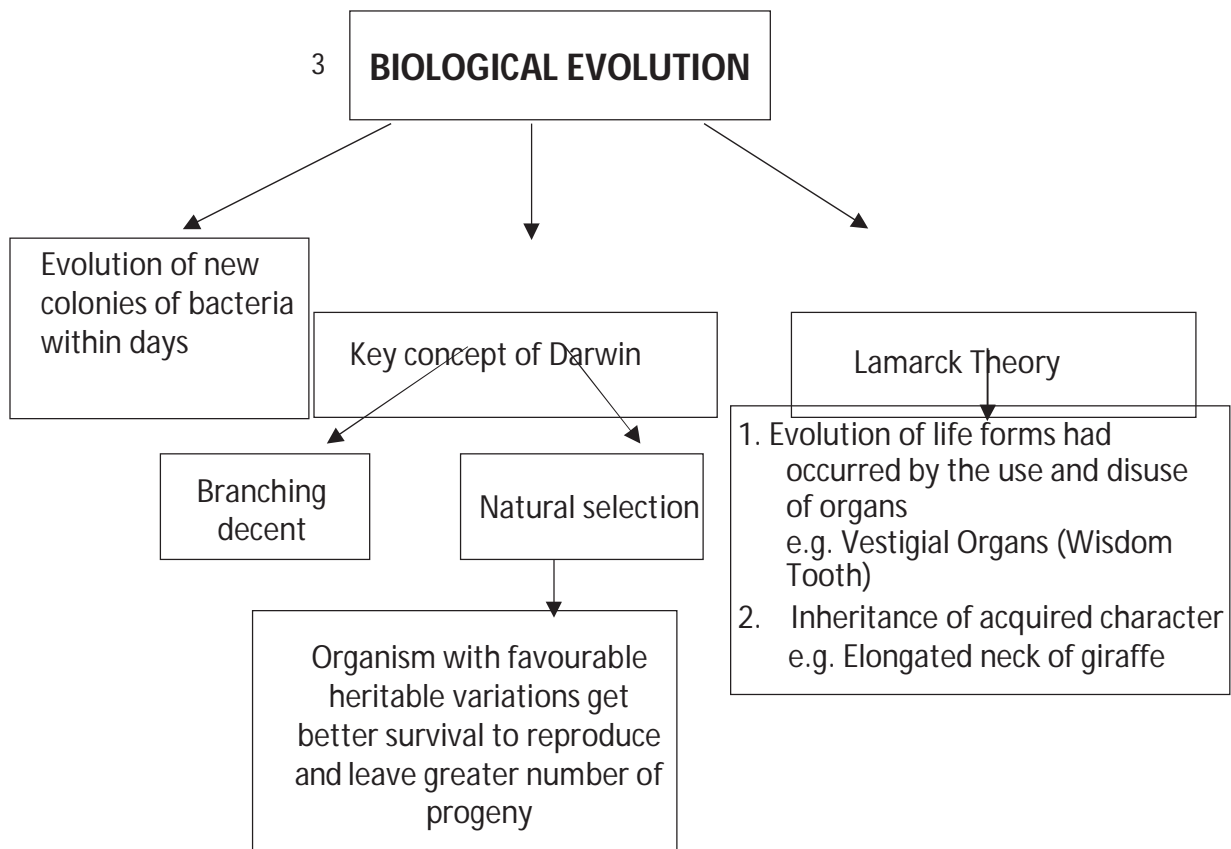




2 ADAPTIVE RADIATION



3 BIOLOGICAL EVOLUTION





4 **MECHANISM OF EVOLUTION**

Hugo deVries

- 1. Mutation causes evolution but not minor variation
- 2. Mutations are Random and directionless
- 3. Single step mutation cause speciation(Saltation)

Darwin

- 1. Minor variation causes evolution
- 2. Variations are small, gradual and directional

HARDY- WEINBERG CONTRIBUTION

Principle

Allele frequencies within a population are stable and remain constant from generation to generation $p^2 + 2pq + q^2 = 1$

Factors affecting Hardy Weinberg Principle

Gene Migration /Gene flow

Genetic drift

Mutation

Recombination

Natural Selection

Stabilising

Directional

Disruptive



5

Brief account of Evolution

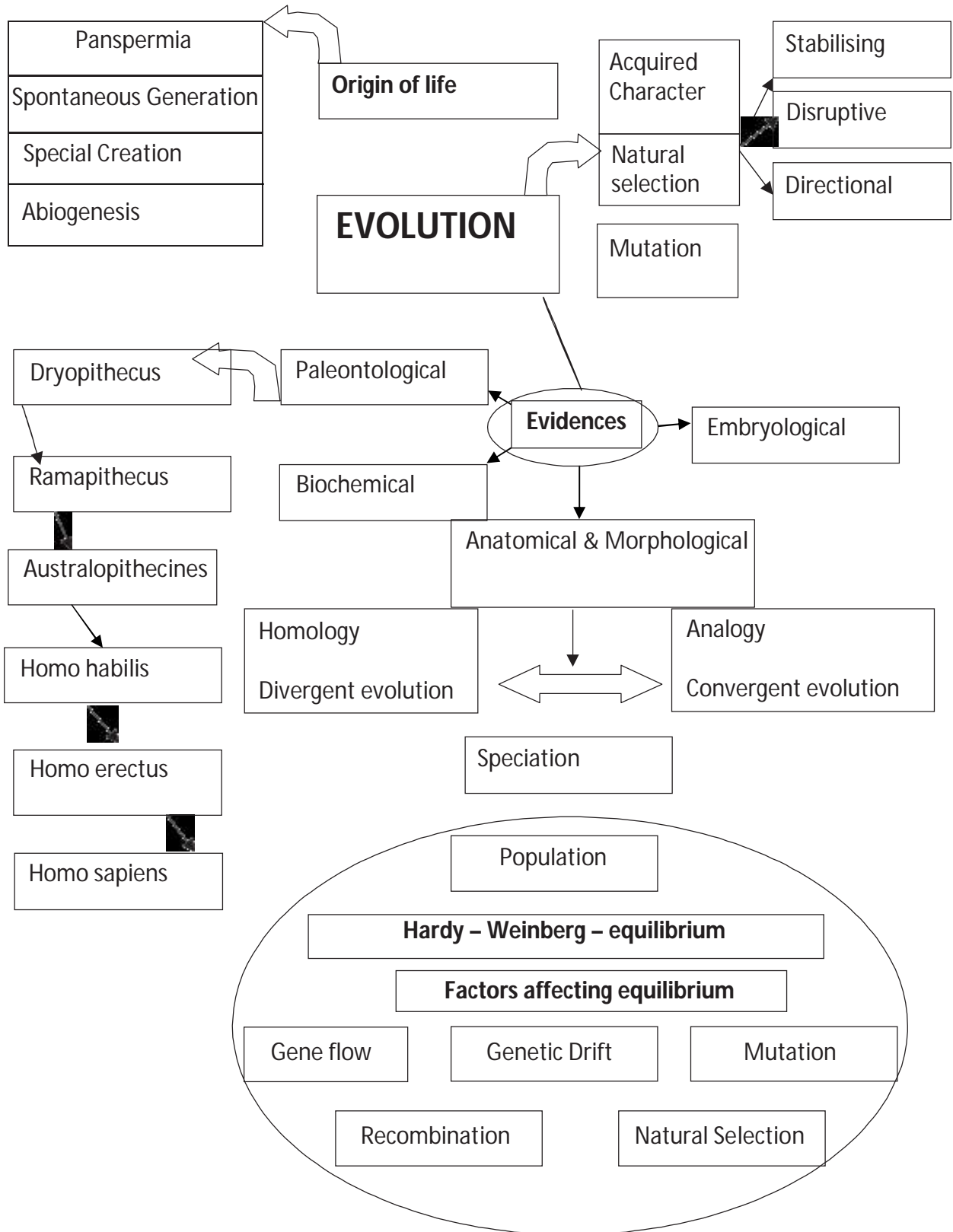
Time	Organism
3 billion years ago	First non cellular form of life
2000 million years ago	First cellular forms of life appeared
500 million years ago	Invertebrate formed
320 million years ago	Sea weeds and plants exists
350 million years ago	Fishes with stout and strong fins could move on land and go back to water - Coelacanth called lobefins – evolved into the first amphibian

HUMAN EVOLUTION

DRYOPITHECUS	More ape like	15mya
RAMAPITHECUS	Man like	15 mya
AUSTRALOPITHECINES	Hunted with stone weapons, ate fruit	2 mya
HOMO HABILIS	Did not eat meat , 650 -800cc brain capacity	1.4 mya
HOMO ERECTUS	Ate meat ,900cc	1.5 mya
NEANDERTHAL MAN	Used hides to protect their body , buried their dead,1400cc	1,00,000 -40,000 years
HOMO SAPIENS	Modern man	75,000 -10,000 years

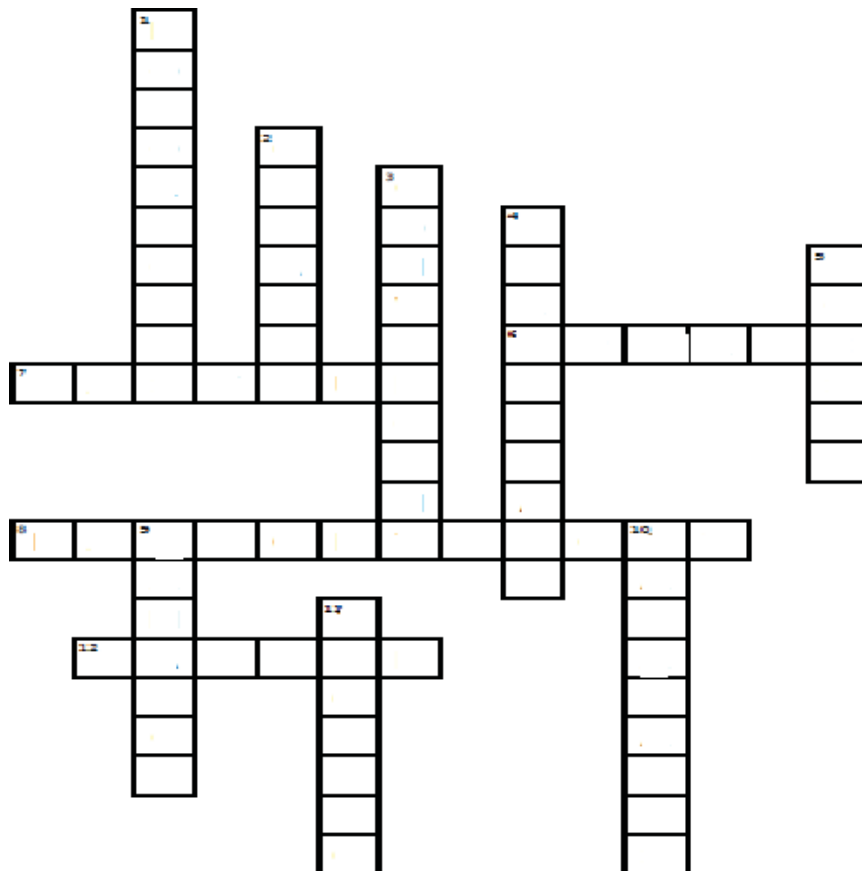


CHAPTER - 7 - EVOLUTION (CONCEPT MAP)





**CHAPTER - 7 - EVOLUTION
(CROSS WORD)**



Down:

1. organs that have same structure and origin.
2. well known example for use and disuse of organ.
3. type of evolution shown by analogous structure.
4. well known organism of Australia for adaptive radiation.
5. dead remain of plant.
9. French naturalist gave use and disuse of organ.
10. island where existed Darwin finches.
11. huge explosion unimaginable in physical terms.

Across:

6. units of life thought by Greek thinkers.
7. demonstrated that life comes only from Pre-existing life
8. study of fossils.
12. used the word fittest of individual in an environment.



CHAPTER - 7 - EVOLUTION (QUESTION BANK)

1 Mark Questions

- Identify the examples of convergent evolution from the following:
 - Flippers of penguins and dolphins.
 - Eyes of octopus and mammals
 - Vertebrate brains
- What did Louis Pasteur's experiment on 'killed yeast' demonstrate? Name the theory that got disproved on the basis of his experiment.
- Coelacanth* was caught in 1938 in South Africa. Why is it very significant in the evolutionary history of vertebrates?
- List the two characteristics of mutation that help in explaining evolution according to De Vries.
- Why are lichens regarded as pollution indicators?
- Pick out the ancestral line of Angiosperms from the list given below: Conifers, Seedferns, Cycads, Ferns.
- Mention the type of evolution that has brought the similarity as seen in potato tuber and sweet potato.

2 Marks Questions

- List the two main propositions of Oparin and Haldane
- How does paleontological evidence support evolution of organisms on Earth?
- What does the comparison between the eyes of Octopus and those of mammals say about their ancestry and evolution?
- Categorise the following pairs of examples as convergent or divergent evolutions:
 - Eyes of octopus and mammals.
 - Wings of butterfly and birds.
 - Tuber of sweet potatoes and potato.
 - Thorns in bougainvillea and tendrils in cucurbits.
- How do Darwin's finches illustrate adaptive radiation?
- How does fitness of a population help in evolution?
- How is genetic drift different from gene migration? Explain.

3 Marks Questions

- State the theory of biogenesis. How does Miller's experiment support this theory?
- Evolution is the change of gene frequencies in a population in response to changes in environment in the time scale of years and not centuries. Justify the statement with reference to DDT. How does the theory of Hugo de Vries support this?
- How did Darwin's theory of natural selection explain the appearance of new forms on the earth?

5 Marks Question

- How does Hardy Weinberg equation explain the genetic equilibrium?
 - Describe how this equilibrium gets disturbed which may lead to founder effect.

BIOLOGY



**CHAPTER - 7 - EVOLUTION
(ANSWER KEY)**

Q. No.	Value Points	Marks	
1	(a), and (b)	1	
2	Life arise from preexisting life, Theory of spontaneous generation was disproved.		
3	- Coelacanth has evolved into the first amphibians; they are fish with stout and strong fins that could move on land and go back to water. - They were thought to be extinct.	1	
4	Mutations are: Random, Directionless	1	
5	Since, lichens do not grow in polluted areas, they are regarded as pollution indicators.	1	
6	Seed ferns.	1	
7	Sweet potato tubers and potato tubers are analogous structures, evolved for the same function; analogous structures results from convergent evolution.	1	
1	The first form of life could have come from, pre-existing non-living organic molecules like RNA, proteins, etc. Formation of life was preceded by chemical evolution that resulted in the formation of diverse organic molecules from inorganic constituents.	2	
2	Paleontology is the study of fossils. It indicates The geological time period in which the organisms existed. The life forms varied over time and certain life forms are restricted to certain geological time span. That new forms of life have appeared at different times in the history of earth.	2	
3	Eyes of octopus and those of mammals are analogous structures, which have resulted from convergent evolution. They have not evolved from common ancestors.	2	
4	(a) Convergent evolution. (b) Divergent evolution. (c) Convergent evolution. (b) Divergent evolution.	2	
5	Adaptive radiation is the process of evolution of different species in a given geographical area starting from a point and literally radiating to other geographical areas. Darwin's finches were the small black birds, which Darwin observed in Galapagos Islands. Living in isolation for long, new kinds of finches must have evolved, which could survive in the new habitats.	2	
6	Fitness, according to Darwin, refers ultimately only to reproductive fitness. Those who are better fit in an environment would outbreed others and leave more progeny than others. They will survive better and are selected by nature to reproduce and increase their population size.	2	
7	Genetic drift Random changes in the allele frequencies of a population, occurring only by chance, constitute genetic drift.	Gene flow If refers to the change in allelic frequencies of a given population, when individuals migrate into the population or from the population.	2

BIOLOGY



1	<p>Theory of chemical evolution or a biogenesis was proposed by Oparin and Haldane. It states that the first form of life could have come from pre-existing non-living organic molecules like RNA's etc., and that formation of life was preceded by chemical evolution, i.e. Formation of diverse organic molecules from inorganic constituents.</p>	3
	<p>Miller's experiment:</p> <ul style="list-style-type: none"> - He created conditions similar to the primitive earth in the laboratory. - Electric discharge was produced in a closed flask, contain in methane, hydrogen, ammonia, and water vapor. - The temperature was kept at 800°C - After a week, he observed formation of amino acids. - Such molecules must have reacted among themselves to form giant, self-replicating molecules, and the first form of life 	
2.	<p>As the environment changes the organism which are better adapted to the changed environment could survive better and reproduce.</p> <ul style="list-style-type: none"> - When DDT was used, initially most of the mosquitoes died, but a few survived. - These few mosquitoes reproduce and their offsprings were also resistant to DDT. - Today, the population of mosquitoes mostly contains DDT resistance mosquitoes. - The DDT resistant mosquitoes have evolved in a timescale of years or months and not centuries. - So, evolution is not a directed process but stochastic process based on chance events. - According to Huxley, evolution occurs due to mutations. Large differences arising suddenly in a population. - According to him large, single-step mutation, called saltation, must have been the cause of DDT-resistance in mosquitoes. 	3
3	<p>Darwin's theory of Natural selection:</p> <p>Any population has built in variation for every character. Individuals with those characters which enable them to survive better would outbreed the others, who are less adapted.</p> <p>Fitness, according to Darwin's is reproductive fitness, i.e., individuals who are better fit in an environment leaves more progeny than others.</p> <p>These progenies now comes to possess more fit individuals, i.e., nature selects the better fit individuals and over a long period of time, through a number of generations, the population slowly becomes modified into a different form, or a species, which is called evolution</p>	3
1	<p>a) Hardy-Weinberg Principle: It states that the allele frequencies in a population are stable and remain constant for generation to generation; it is called genetic equilibrium. The sum total of all the allelic frequencies is one.</p> <p>(b) Genetic drift:</p> <ul style="list-style-type: none"> - Genetic drift refers to the changes in allele frequencies that occur only by chance events. - Sometimes the changes in allele frequency is so different in the new sample of population, that they become a different species, - The originally drifted population becomes the founder and such an effect is called founder effect. 	5



UNIT VIII - BIOLOGY IN HUMAN WELFARE
CHAPTER: 8 HUMAN HEALTH & DISEASES
(KEY POINTS)

S.No.	Term	Explanation
1	PMNL	Polymorpho-Nuclear Leukocytes
2	CMI	Cell Mediated Immunity
3	ELISA	Enzyme Linked Immunosorbent Assay
4	MALT	Mucosal Associated Lymphoid Tissue
5	SCID	Severe Combined Immuno Deficiency
6	NACO	National AIDS Control Organisation
7	MRI	Magnetic Resonance Imaging
8	HLA	Human Leukocyte Antigen
9	Carcinogens	Cancer causing agents. e.g., gamma rays, UV rays, dyes and lead.
10	Immunity	Resistance to infection or antigen
11	Immuno Suppressant`	The chemical which suppress the immune response to antigen.
12	Interferon	The glycoproteins produced by our body cells in response to a viral infection
13	Incubation Period	The time period between infection and the appearance of symptoms.
14	Metastasis	The property in which the cancer cells spread to different sites through blood and develop secondary tumours.
15	Oncogene	Gene which causes cancer.
16	Retrovirus	A virus having RNA as genetic material and forms DNA by reverse transcription and then replicate e.g., Human Immunodeficiency Virus (HIV).
17	Syndrome	Group of symptoms.
18	Vaccination:	Inoculation of a vaccine to stimulate production of antibodies and provide immunity for one or more disease.

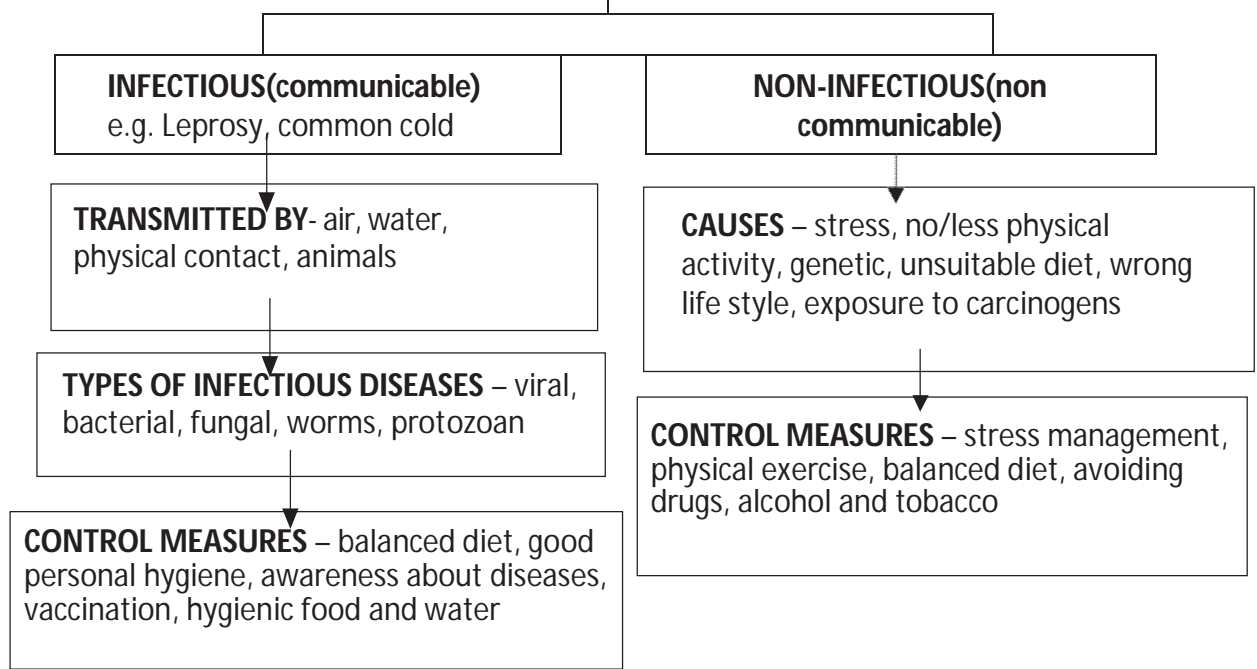


**CHAPTER 8
HUMAN HEALTH AND DISEASES
(FLOW CHART)**

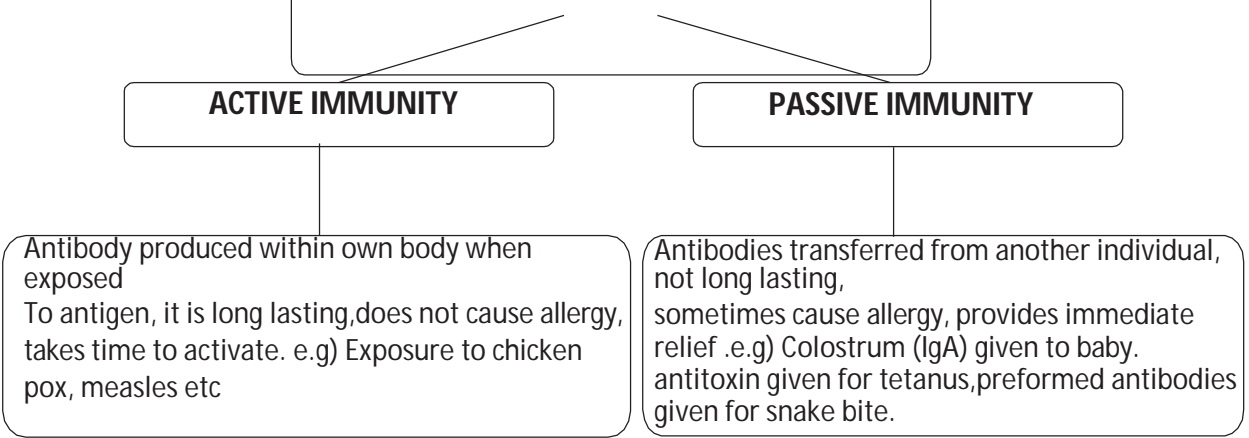
**1 HEALTH (Physical, mental, social well being)
2. FACTORS AFFECTING HEALTH**



3 TYPES OF DISEASES



4 TYPES OF ACQUIRED IMMUNITY





5

TYPES OF IMMUNE RESPONSES

Humoral immunity

Response by antibodies produced by B cell. found in Blood/lymph

IgA IgM IgE ,IgG are the types of antibody

--Antibody It has 2 small light chains & 2 long heavy chains(H₂L₂)

Cell mediated

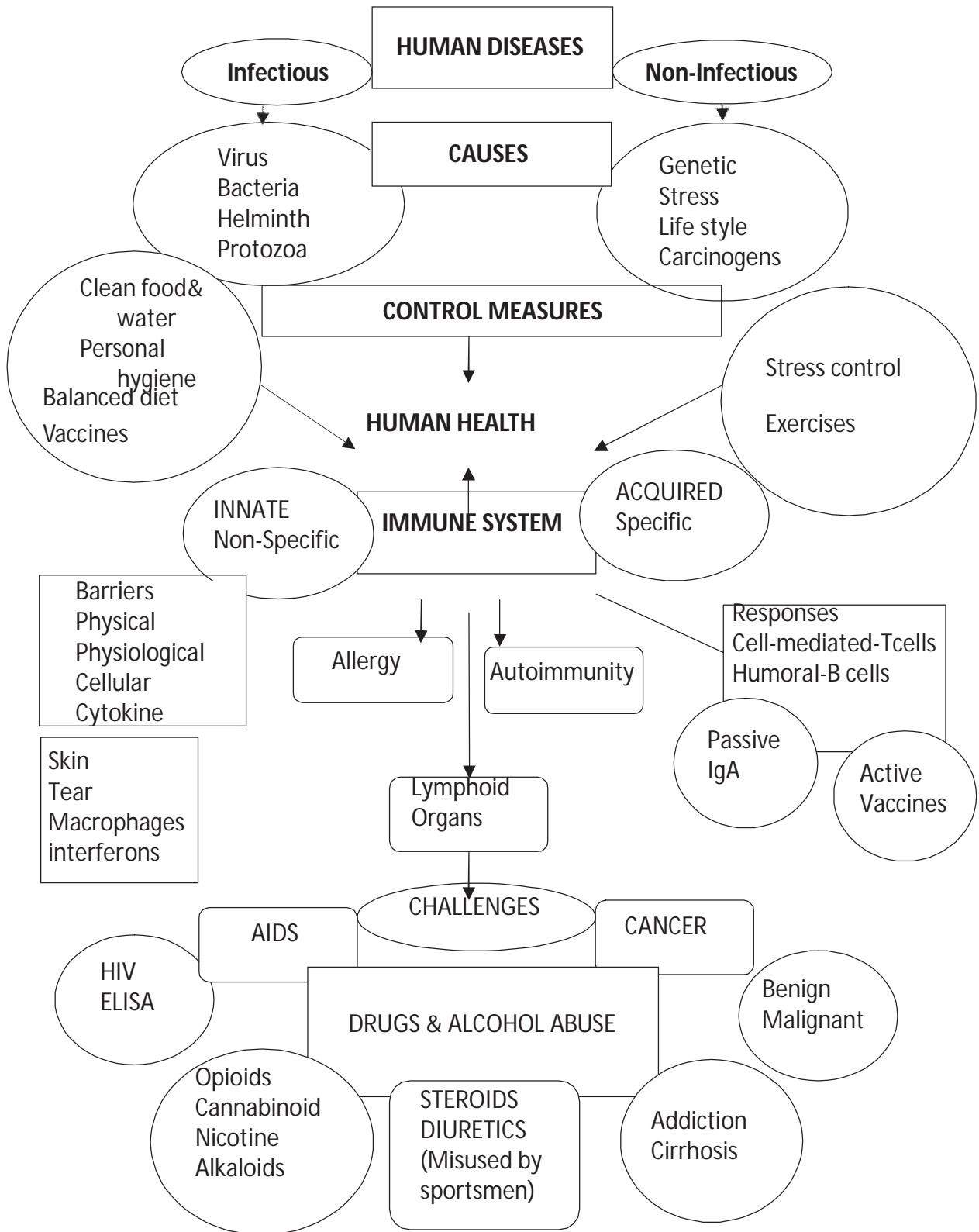
Response produced by

T-lymphocyte Role in organ transplantation



BIOLOGY

CHAPTER 8
HUMAN HEALTH AND DISEASES
(CONCEPT MAP)

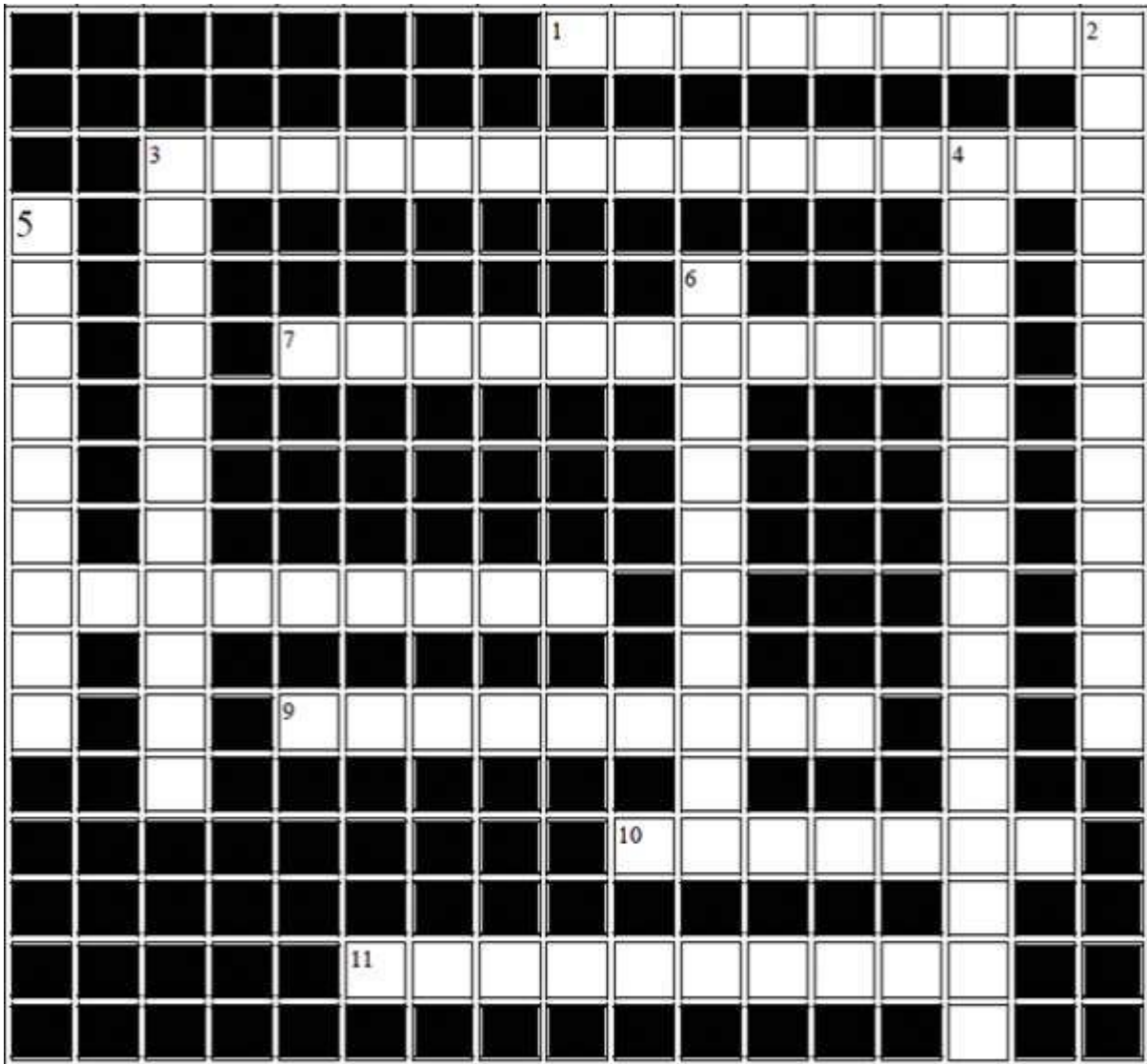


BIOLOGY



Name of the drug	Source	Part of the plant	Mode of intake	Effect	Ex.
Opioids	<i>Papaver somniferum</i>	Latex	Snorting/injection	Binds with opioid receptors in the CNS & GI tract <ul style="list-style-type: none"> • Depressant – slows body function 	Diacetyl morphine- Heroin(smack)
Cannabinoids	<i>Cannabis sativa</i>	Inflorescence, flower tops, resins, leaves	Inhalation/orally	<ul style="list-style-type: none"> • Affects cardiovascular system • Binds with receptors in the brain 	Marijuana Hashish
Coca Alkaloid	<i>Erythroxylum coca</i>		snorting	<ul style="list-style-type: none"> • Stimulates CNS • Sense of euphoria /increased energy • Interferes with transport of neurotransmitter -dopamine • Excess- cause hallucinations 	Coke/crack
Barbiturates, amphetamines, benzodiazepines, morphine				<ul style="list-style-type: none"> • Cope up with mental illness like depression ,insomnia 	
Nicotine /alkaloid	<i>Tobacco</i>	leaves	Smoking, chewing	<ul style="list-style-type: none"> • Stimulates adrenal gland to release adrenaline and nor-adrenaline • Raises BP and heart rate • Increases risk of cancer of throat, lung, etc • Bronchitis, emphysema, CHD, • CO content in blood increases and reduces haembound oxygen • Addictive 	

CHAPTER 8- HUMAN HEALTH AND DISEASES
(CROSS WORD)



Across

Down

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Typhoid test 3. typhoid is caused by 7. phagocytose 8. AIDS test 9. natural passive immunity 10. ascariasis is caused by 11. filariasis is caused by | <ol style="list-style-type: none"> 2. ringworm is caused by 3. Infective stage of malaria parasite 4. malaria is caused by 5. amoebiasis is caused by 6. cold is caused by |
|---|---|



**CHAPTER 8- HUMAN HEALTH AND DISEASES
(QUESTION BANK)**

1. Name the diagnostic test which confirms typhoid.
2. Name the two major groups of cells required to attain specific immunity.
3. You have heard of many incidences of Chickungunya in our country. Name the vector of the disease.
4. Breast fed babies are more immune to diseases than the bottle fed babies. Why?
5. Name the pathogen which causes malignant malaria.
6. Which micro organism is used to produce hepatitis B Vaccine?
7. What is the reason of shivering in malarial patient?
8. Where are B-cells and T-cells formed? How do they differ from each other?
9. Given below are the pathogens and the diseases caused by them. Which out of these pairs is not correct matching pair and why?
 (a) *Wuchereria* .Filariasis
 (b) *Microsporum* .Ringworm
 (c) *Salmonella* . Common Cold
 (d) *Plasmodium* .Malaria
10. What would happen to the immune system, if thymus gland is removed from the body of a person?
11. Lymph nodes are secondary lymphoid organs. Describe the role of lymph nodes in our immune response.
12. What Is the role of histamine in inflammatory response? Name few drugs which reduce the symptoms of allergy.
13. What are Cannabinoids? From which plant Cannabinoids are obtained? Which part of the body is affected by consuming these substances?
14. Mention any three causes of drug abuse. Suggest some measures for the prevention and control of drug abuse.
15. A person shows unwelcome immunogenic reactions while exposed to certain substances.
 (a) Name this condition.
 (b) What common term is given to the substances responsible for this condition?
 (c) Name the cells and the chemical substances released which cause such reactions.
16. What is innate immunity? List the four types of barriers which protect the body from the entry of the foreign agents.
17. Fill the blanks 1,2,3,4,5,6 in the given table.

Name of disease	Causative organism	Symptoms
- Pneumonia	<i>Streptococcus</i>	(1)
-. Typhoid	(2)	High fever, weakness, headache, stomach pain
(3)	<i>Rhinoviruses</i>	Nasal Congestion and discharge ,sore throat, cough, headache
Ascariasis	<i>Ascaris</i>	(4)

BIOLOGY



<i>Ringworm</i>	(5)	<i>Dry, Scaly lesions on various body parts, Intense itching, redness.</i>
(6)	<i>Entamoeba histolytica</i>	<i>Constipation, cramps, abdominal pain, Stools with excess mucous</i>

18. Answer the following with respect to Cancer.
- How does a cancerous cell differ from a normal cell
 - Benign tumour is less dangerous than malignant tumour. Why?
 - Describe causes of cancer.
 - Mention two methods of treatment of the disease.
19. The pathogen of a disease depends on RBCs of human for growth and reproduction. The person with this pathogen suffers with chill and high fever.
- Identify the disease.
 - Name the pathogen.
 - What is the cause of fever?
 - Represent the life cycle of the pathogen diagrammatically.
20. The immune system of a person is suppressed. He was found positive for a pathogen in the diagnostic test ELISA.
- Name the disease, the patient is suffering from.
 - Which pathogen is identified by ELISA test?
 - Which cells of the body are attacked by the pathogen?
 - Suggest preventive measure of the infection.
21. Municipal corporation has deputed personnel to check for mosquito in your school.
- Which are the places they should check for mosquitoes & their larvae?
 - Name two diseases which are spread by mosquitoes and their larvae?

BIOLOGY



**CHAPTER 8 -HUMAN HEALTH AND DISEASES
(ANSWER KEY)**

s.no	Value points	Marks
1	Widal test	1
2	B-lymphocytes and T-lymphocytes	1
3	<i>Aedes</i> mosquitoes	1
4	The mother's milk consists of antibodies (Ig A) such antibodies are not available to bottle fed babies	1
5	<i>Plasmodium falciparum</i>	1
6	Yeast	1
7	After sporozoite infection, when RBC ruptures, a toxic substance haemozoin is released which cause chilling and high fever.	1
8	B-cells and T-cells are formed in bone marrow. B-cells produce antibodies but T cells do not produce antibodies but help B-cells to produce them	1+1=2
9	- <i>Salmonella</i> :Common cold is not a matching pair.	1+1=2
10	T-lymphocytes develop and mature in thymus gland, Immune system will become weak on removal of thymus gland	1+1=2
11	Lymph nodes provide the sites for interaction of lymphocytes with the antigen. When the microorganisms enter the lymph nodes, lymphocytes present there are activated and cause the immune response.	1+1=2
12	Histamine acts as allergy-mediator which cause blood vessels to dilate. It is released by mast cells. Antihistamine steroids and adrenaline quickly reduce the symptoms of allergy.	1+1=2
13	Cannabinoids are a group of chemicals which interact with Cannabinoid receptors present principally in the brain. Cannabinoids are obtained from the inflorescences of the plant <i>Cannabis sativa</i> . The substances affect the cardiovascular system adversely	1+1+1=3
14	Reasons to attract towards drug abuse: Curiosity, peer pressure, escape from frustration and failure, family problems, false belief of enhanced performance. Preventive measures: Avoid undue peer pressure Education and Counseling Seeking help from parents and peers. Looking for danger signs Seeking professional and medical help	1+2=3

BIOLOGY



15	(a) Allergy (b) Allergens (c) Mast Cells. Histamine, Serotonin	1+1+1=3
16	Innate Immunity is non-specific type of defense that is present at the time of birth. (i) Physical Barriers: Skin, mucous-coated epithelium or respiratory, digestive and urino genital tract. (ii) Physiological Barriers: Acidity of Stomach, lysozyme in saliva, tears, sweat. (iii) Cellular Barrier: Macrophages, neutrophils, monocytes and natural killer lymphocytes.(iv) Cytokine Barriers: Interferons produced by Viral infected cells, protect the non-infected cells from further Viral infection	1+ (4x1/2)=2
17	i) Alveoli filled with fluid, reduced breathing, fever, chills, cough and headache. (ii) <i>Salmonella typhi</i> (iii) Common Cold(iv) Internal bleeding, muscular pain, anaemia, fever and blockage of the intestinal passage.(v) Microsporum species/Trichophyton species/Epidermophyton Species.(vi) Amoebiasis/amoebic dysentery.	6x1/2=3
18	(a) In normal cells, growth and differentiation is highly controlled and regulated (contact inhibition). The cancerous cells have lost the property of contact inhibition, hence continue to divide giving rise to masses of cells(tumors). (b) The benign tumor remains confined in the organ affected as it is enclosed in a connective tissue sheath and does not enter the metastatic stage.(c) Cancer may be caused due to carcinogens which are physical(radiations), chemicals (Nicotine, Aflatoxin, Cadmium oxide, Asbestos) and biological (viral oncogens)(d) Surgery, radiotherapy, Chemotherapy	2+1+1+1=5
19	(a) Malaria(b) Different species of Plasmodium viz P. vivax, P. Malariae and P.falciparum.(c) Malaria is caused by the toxins (haemozoin) produced in the human body by the malarial parasite. This toxin is released by the rupturing of RBCs. (d) Life cycle of Plasmodium	1+1+1+2=5
20	(i) AIDS (Acquired Immuno Deficiency Syndrome) (ii) HIV (Human Immunodeficiency Virus) (iii) Helper T-cells, macrophages, B-lymphocytes. (iv) Preventive measures: (a) People should be educated about AIDS transmission. (b) Disposable needles and syringes should be used (c) Sexual habits should be changed immediately (d) High-risk groups should be discouraged from donating blood. (e) Routine screening may be done	1+1+1+2=5
21	i) Places like water tanks, flower pots, stagnant water. ii)Dengue, malaria, filariasis, chikungunya	1+2=3

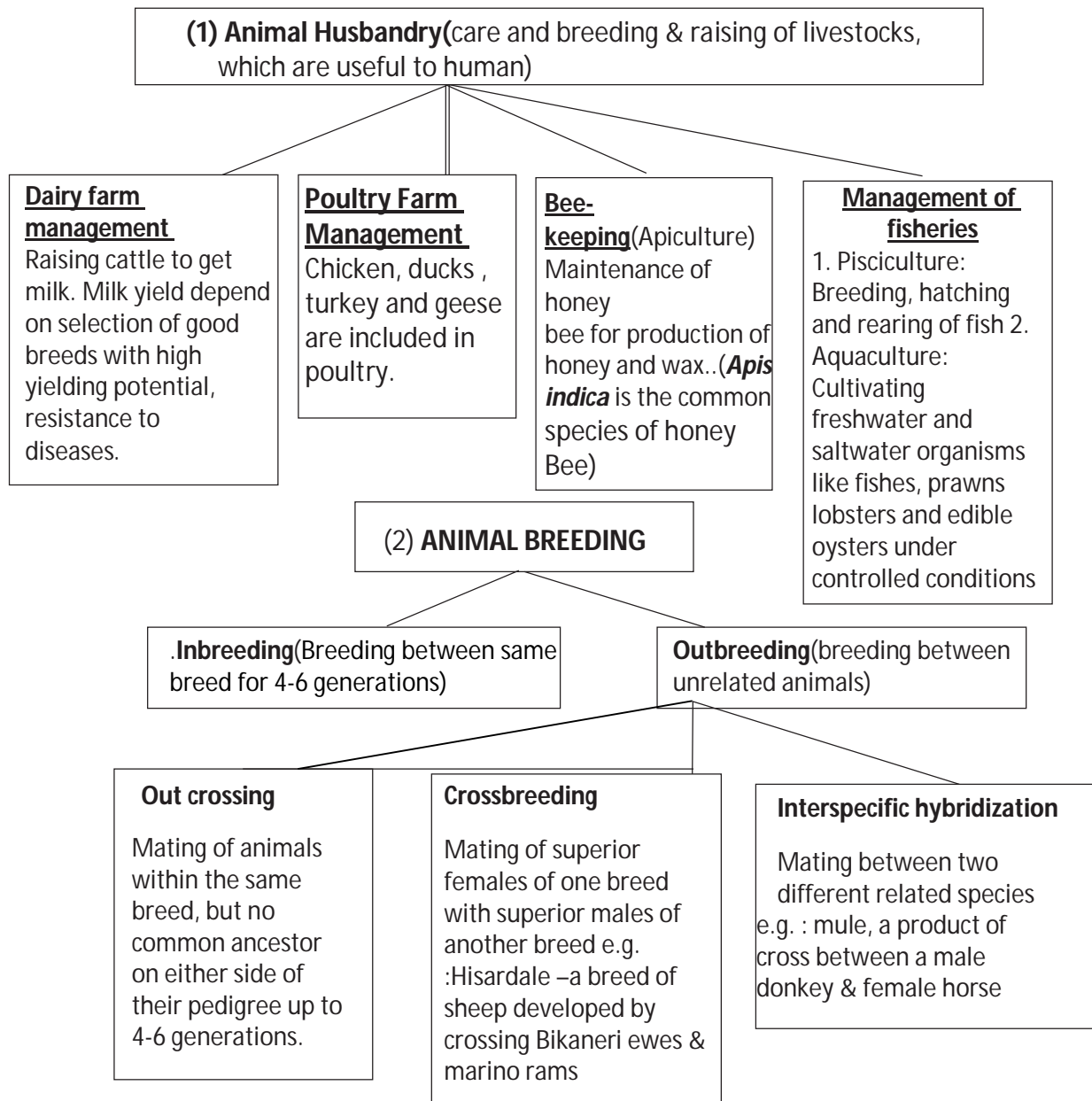


UNIT VIII-BIOLOGY IN HUMAN WELFARE
CHAPTER: 9 - STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION (KEY POINTS)

S.No.	Term	Explanation
1	ET	Embryo Transfer
2	IARI	Indian Agricultural Research Institute
3	IRRI	International Rice Research Institute
4	ICAR	Indian Council of Agriculture Research
5	MOET	Multiple Ovulation Embryo Transfer
6	NDRI	National Dairy Research Institute
7	Apiculture	Rearing of honeybees for the production of honey, bee wax
8	Explant	A part of plant used for tissue culture
9	Germplasm Collection	The entire collection having all the diverse alleles for all the genes in the given organism.
10	Totipotency	The ability to generate a whole plant from any cell/explant.
11	Breed	Group of animals similar in most of the characters and related in descent
12	Green revolution	Crop production
13	White revolution	Milk production
14	Blue revolution	Fish production
15	SCP	Single cell protein
16	Micro propagation	Method of production of many plants through tissue culture
17	Inbreeding	Breeding between animals of same breed



**CHAPTER: 9 - STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION
(FLOW CHART)**





(3) CONTROLLED ANIMAL BREEDING

Artificial insemination: semen of superior male is collected and injected into the reproductive tract of selected female by breeder.

MOET- Multiple ovulation embryo transfer. (Technique for herd improvement by successful production of hybrid) Done in cattle, sheep, rabbits, buffalo, mare etc.

(4) PLANT BREEDING

Plant breeding for disease resistance

i) Viral - Tobacco mosaic, turnip mosaic
 (ii) Bacterial - Black rot of crucifers, Blight of rice
 (iii) Fungal - Rust of wheat, red rot of sugarcane, late blight of potato.

1. Conventional breeding
 screening germplasm for resistance to diseases, (e.g. Parbhanikranti (b hindi) resistant to yellow mosaic virus

2. Mutational breeding
 inducing mutation Artificially through chemicals or radiations , e.g. mung bean resistant to yellow mosaic virus and powdery mildew

Plant breeding for resistance to Insect pests. Hairy leaves, Solid stem, Smooth leaved & nectarless. High aspartic acid, low nitrogen and sugar content

(5) OTHER PLANT BREEDING METHODS

Bio fortification- Breeding crops with higher levels of proteins, vitamins and minerals
 eg. Maize twice the amount of lysine and tryptophan, . Atlas 66 wheat with high protein content
 Iron fortified rice, Vit- A enriched carrots , spinach, pumpkin , Vit-C enriched bitter gourd , tomato, iron & calcium rich spinach, protein enriched beans , peas.

SCP (Single cell protein)-
 e.g- Spirulina , (algae)
Methylophilus methylotrophus (bacterium)

Tissue culture- /Micropropagation
 . Regeneration of whole plant from explant in culture medium (sucrose as carbon source, inorganic salts, vitamins, amino acids, auxin, cytokinin

Somatic hybridization-
 Fusion of protoplast Of somatic cells of two different species. eg. Pomato is obtained by somatic hybridisation of potato and tomato

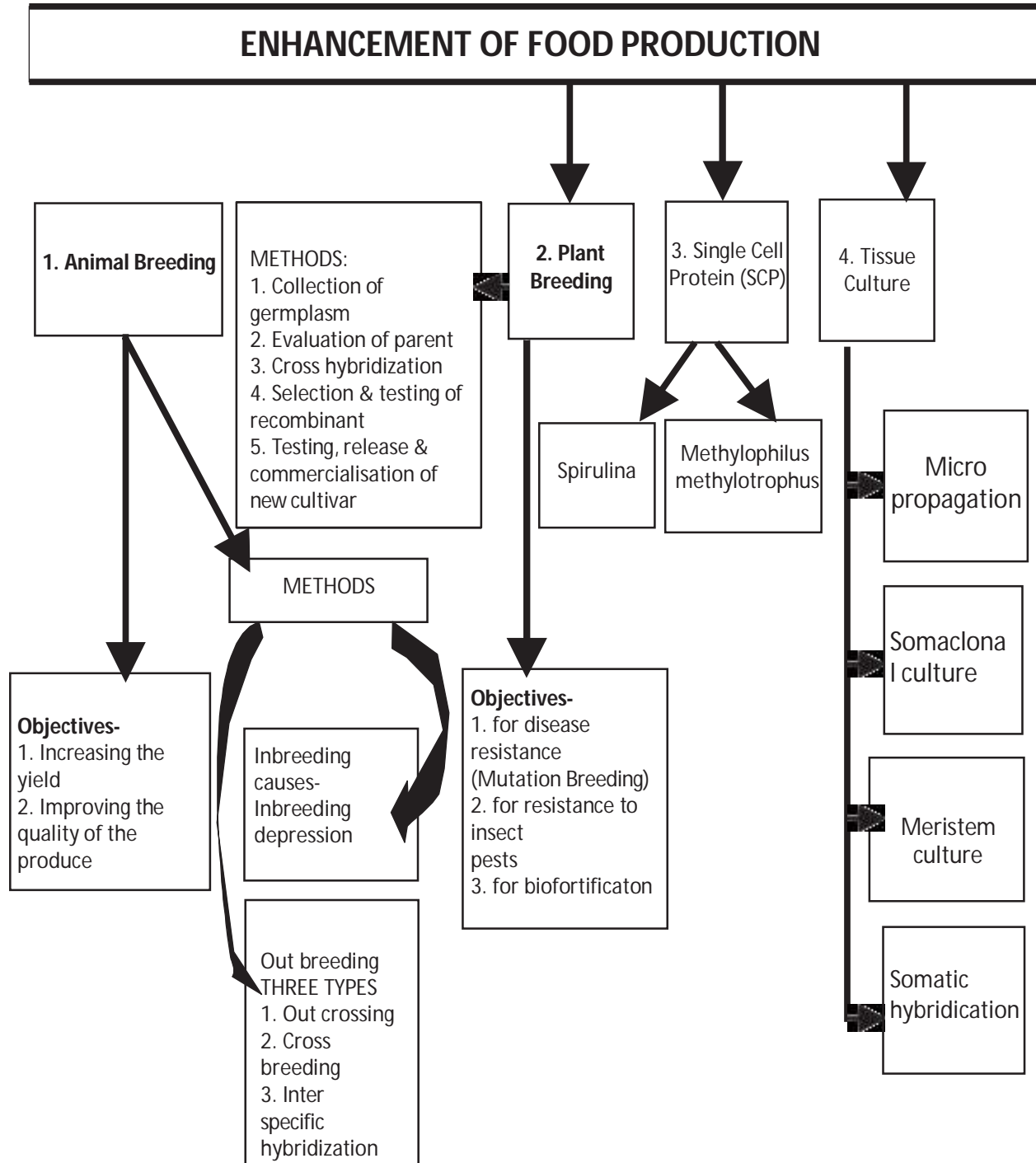
BIOLOGY



S No.	Variety	Resistance to Disease/pest	
1	<i>Pusa swarnim (Karan rai) Brassica</i>	White rust.	
2	<i>Pusa shubhra</i> <i>Pusa snowball K 1(cauliflower)</i>	Black rot and curl blight black rot	
3	<i>Pusa Komal(cowpea)</i>	Bacterial blight	
4.	<i>Pusa sadabahar(chilli)</i>	CMV, TMV, leaf curl	
5	<i>Pusa Gaurav(rapeseed mustard)</i>	Aphids	
6.	<i>Pusa Sem 2</i> <i>Pusa Sem 3(flat bean)</i>	Fruit borer, jassids, aphids	
7.	<i>Pusa Sawani</i> <i>Pusa A-4(ladys finger)</i>	Shoot & fruit borer.	
8.	<i>Himgiri(wheat)</i>	Leaf & stripe rust, hillbunt	
BIOFORTIFIED			
9.	<i>Atlas 66-(wheat)</i>	High protein content	
10	<i>Maize</i>	Twice the amount of lysine , tryptophan	
11.	<i>Carrot, spinach, pumpkin</i>	Vitamin A enriched	
12.	<i>Bitter gourd, mustard , tomato, bathua</i>	Vitamin C enriched	
13.	<i>Spinach, bathua</i>	Iron & calcium enriched	
14.	<i>Broad, lablab, French beans & garden peas</i>	Protein enriched	

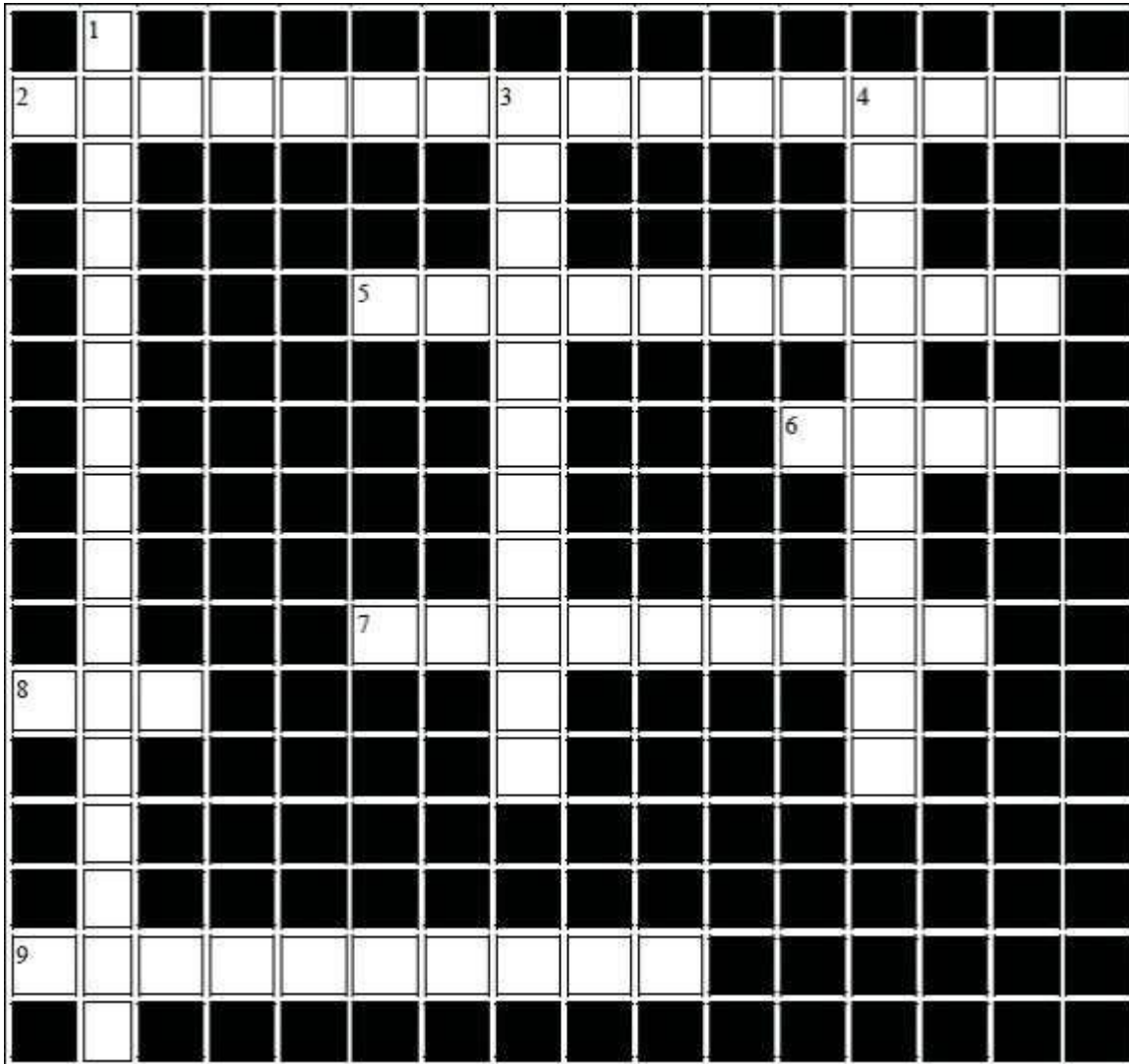


**CHAPTER: 9 -STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION
(CONCEPT MAP)**





**CHAPTER: 9 - STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION
(CROSS WORD)**



Across

- 2. method of producing thousands of plants through tissue culture
- 5. breeding between animals of same breed
- 6. technique to improve herd size
- 7. a microbe rich in SCP
- 8. alternative sources of proteins for human nutrition
- 9. plants which have genetically identical to parent

Down

- 1. breeding crops with high level nutrients
- 3. breeding of unrelated animals
- 4. the capacity to generate a whole plant from any cell



CHAPTER:9 STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION (QUESTION BANK)

- Why is inbreeding necessary in animal husbandry?
- Name two fungal diseases of Crop plants.
- Which product of Apiculture is used in cosmetics and polishes?
- Semi-dwarf varieties of a crop plant were derived from IR-8. Name that crop.
- Write two qualities of *Saccharum officinarum* (Sugarcane) grown in South India.
- A new breed of sheep was developed in Punjab by crossing two different breeds of Sheep. Name the two breeds which were crossed and the new breed developed.
- Study the table given below and fill in the blanks marked A, B, C and D

CROP	VARIETY	Resistant to diseases
Wheat	Himgiri	(A)
Brassica	(B)	White rust
(C)	Pusa Komal	Bacterial blight
Chilli	(D)	Chilly mosaic Virus, Tobacco mosaic Virus and leaf curl

- Why are proteins synthesized from *Spirulina* called Single celled Proteins? What is the significance of such a protein?
- Differentiate between inbreeding and out breeding in animals.
- Explain the process of Somatic hybridisation.
- What is micropropagation? Why are plants produced by this technique called somaclones? Name any two food plants which are produced on commercial scale using this method.
- What is mutation? Explain the significance of mutation in plant breeding. Give an example of a disease resistant variety of cultivated plant induced by mutation.
- How can we improve the success rate of fertilisation during artificial insemination in animal husbandry programmes?
- Biofortification is the most practical means to improve public health. Justify the statement with examples.
- What is meant by germplasm Collection? Describe its significance in plant breeding programmes.
- To which product, following products are related (a) Blue revolution (b) white revolution (c) Green revolution
- Does apiculture offer multiple advantages to farmers? List its advantages, if it is located near a place of commercial flower cultivation. Name the most common species of bee which is reared in India.
- What is somatic hybridisation? Describe the various steps in producing somatic hybrids from protoplasts. Mention any two uses of somatic hybridisation.



**CHAPTER:9 STRATEGIES FOR ENHANCEMENT IN FOODPRODUCTION
(ANSWER KEY)**

Q.No	Value points	Marks
1	Inbreeding increases homozygosity	1
2	Brown rust of wheat, Smut of wheat, red rot of Sugar cane, Late blight of potato	1
3	Beewax	1
4	Paddy crop (rice)	1
5	Thicker stem and higher sugar content	1
6	By crossing Bikaneri ewes and Marino rams, the new breed Hisardale was developed	1+1=2
7	A. Leaf and Stripe rust, hillbunt. B. Pusa swarnim (Karanrai). C. Cowpea D. Pusa Sadabahar	4x1/2=2
8	The protein rich food produced by microbes is called as single celled protein (SCP) Spirulina is a microorganism which has more protein. It is a quick method of protein production because the growth rate of microbes is enormous. Hence, it provides a protein rich diet for human beings	1+1=2
9	When breeding is between animals of the same breed, it is called inbreeding, while cross between different breeds is called out breeding	1+1=2
10	(i) Isolation of protoplast of Tomato cell and Potato cell. (ii) Somatic hybridisation. (iii) Pomato (iv) Somatic hybrid	4x1/2=2
11	*The method of producing many plants through tissue culture is called micropropagation. *The plants produced through micro propagation will be genetically identical to the original plant from which they were grown, hence are called soma clones. *Tomato, banana, apple are produced on commercial scale using this method	3x1=2
12	Mutation : Sudden inheritable change in the characters of an organism due to change in the sequence of bases in the gene(s). Mutation results in a new character or trait, not found in the parental type. It can also be induced by using mutagens like gamma radiations. Such plant materials are used as such or used for breeding new	3
13	The Multiple Ovulation Embryo Transfer (MOET) technology can improve the success rate of fertilisation. In the procedure, a cow is given hormonal treatment (FSH), so that more than one ova/eggs (6-8) are produced per cycle. After mating or artificial insemination the embryos at 8-32 celled stage, are transferred to different surrogate mother cows. This technology has been successfully used for cattle sheep, rabbit, mares and buffaloes.	1+2=3

BIOLOGY



14	<p>Biofortification is the plant breeding programme designed to increase Vitamins, minerals, higher proteins and healthier fat content in crops. This programme improves the quality of food products. It is required to prevent hidden hunger. Some of the examples of fortified crops are:</p> <p>(i) New hybrid of maize : has twice the amount of amino acid lysine and tryptophan.</p> <p>(ii) Wheat : Atlas 66, having a high protein content.</p> <p>(iii) Rice : 5 times iron than the normal amount. IARI Delhi has released several crops which are rich in vitamins and minerals. Consumption of such biofortified food will improve the public health.</p>	1+1+1=3
15	<p>The entire collection having all the diverse alleles for all genes of crop plant is called germ plasm collection. In plant breeding programmes, the germplasm provides the entire set of genes and alleles, and the characteristics which they express. The plant breeders select the most favourable characters of a particular gene and manipulate it and transfer it to a desirable parent.</p>	1+2=3
16	<p>(a) Fish production (b) Milk production (c) Crop production</p>	1+1+1=3
17	<p>Apiculture or Bee-Keeping is the maintenance of hives of honeybees for the production of honey. Apiculture is beneficial for farmers in many ways. Honey bee also produces bee wax which is used in industries, such as in preparation of cosmetics and polishes of various kinds. If Bee keeping is practiced in any area the commercial flowers are cultivated, it will be beneficial in the following ways.</p> <p>(i) Bees are pollinators of many crop species including flowering crops such as sunflower.</p> <p>(ii) It improves the honey yield, because honeybees collect the nectar from flowers for making honey.</p> <p>Apis indica is the most common species which is reared in India</p>	1+2+1+1=5
18	<p>Somatic Hybridisation : The process of fusing protoplasts of Somatic cells of different varieties or species of plants to produce a hybrid.</p> <p>Steps :</p> <p>(i) Removal of cell wall of fusing cells by digestion with a combination of pectinase and cellulase to form protoplasts.</p> <p>(ii) Fusion between protoplasts of selected parents is induced by the use of polyethylene glycol(PEG).</p> <p>(iii) The resulted product is cultured on a suitable medium to regenerate cell walls.</p> <p>(iv) The cells obtained begin to divide to produce plantlets called somatic hybrids.</p>	1+2+2=5

BIOLOGY



	<p>Uses/Applications :</p> <ul style="list-style-type: none">(i) Somaclonal variations can be created(ii) Lines or varieties/species of plants which can not be sexually hybridised, they can be hybridised.	
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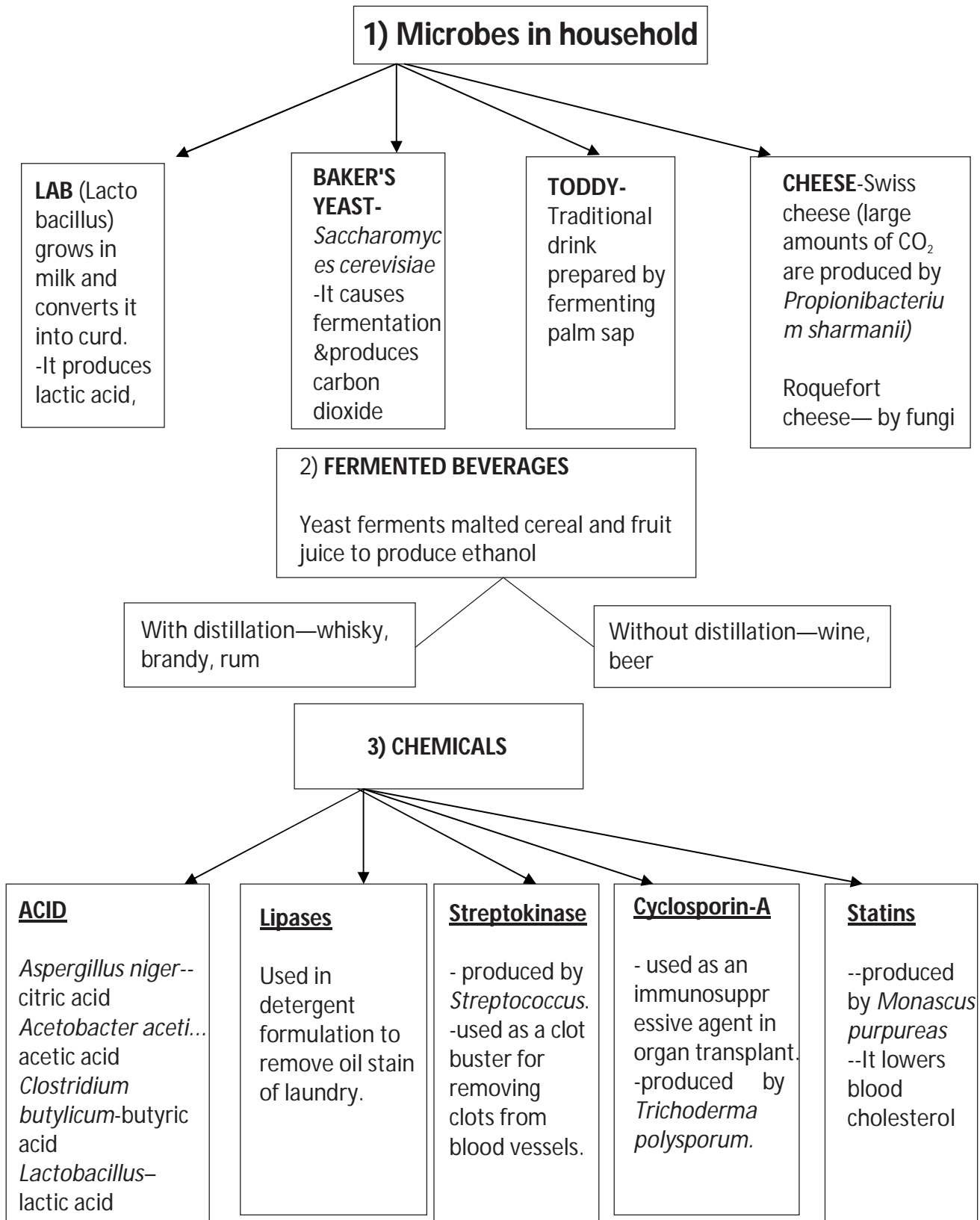


**CHAPTER: 10 MICROBES IN HUMAN WELFARE
(KEY POINTS)**

S.No.	Term	Explanation
1	BOD	Biochemical Oxygen Demand
2	GAP	Ganga Action Plan
3	YAP	Yamuna Action Plan
4	KVIC	Khadi and Village Industries Commission
5	LAB	Lactic Acid Bacteria
6	Baculovirus	Pathogens that attack insects and other arthropods
7	Effluent	The product of primary treatment of sewage.
8	Fermentors	A very large vessel where microbes are grown on an industrial scale.
9	Flocs	mass of mesh like structure formed by Bacteria and fungi.
10	Prions.	The proteinaceous infectious agent.
11	Methanogens -	Bacteria producing methane.
12	STPs	Sewage Treatment Plants
13	IARI	Indian Agricultural Research Institute
14	IPM	Integrated Pest Management



**CHAPTER: 10 MICROBES IN HUMAN WELFARE
(FLOW CHART)**

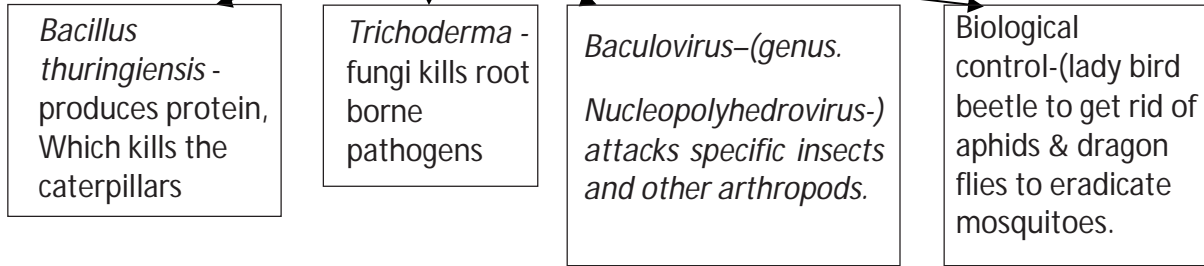


BIOLOGY



4) **ANTIBIOTICS (Penicillin)** -It is produced by *Penicillium notatum*

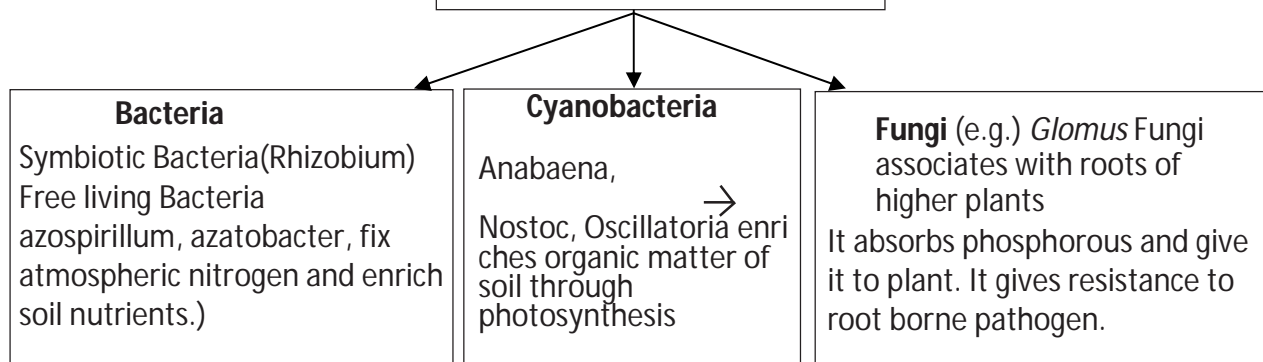
5) Microbes to control pests and diseases



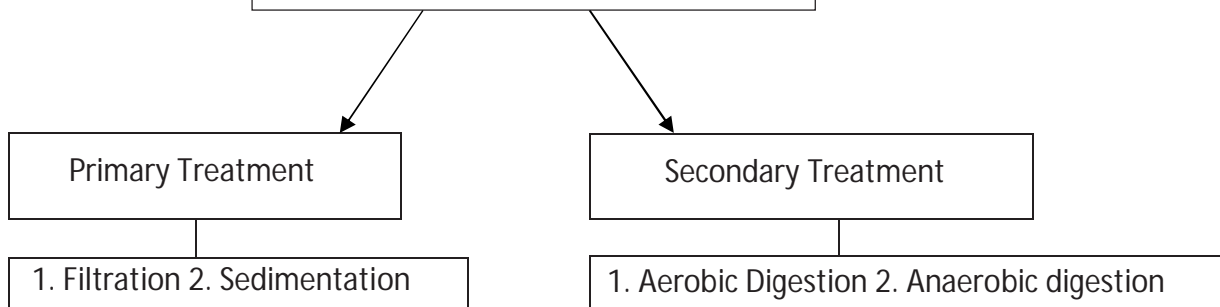
6) Microbes -- production of Bio-Gas

methanogens (e.g.) Methanobacterium.
Act on cellular material to produce methane, seen in anaerobic sludge digesters, rumen of cattle, flooded rice field & in cattle dung.

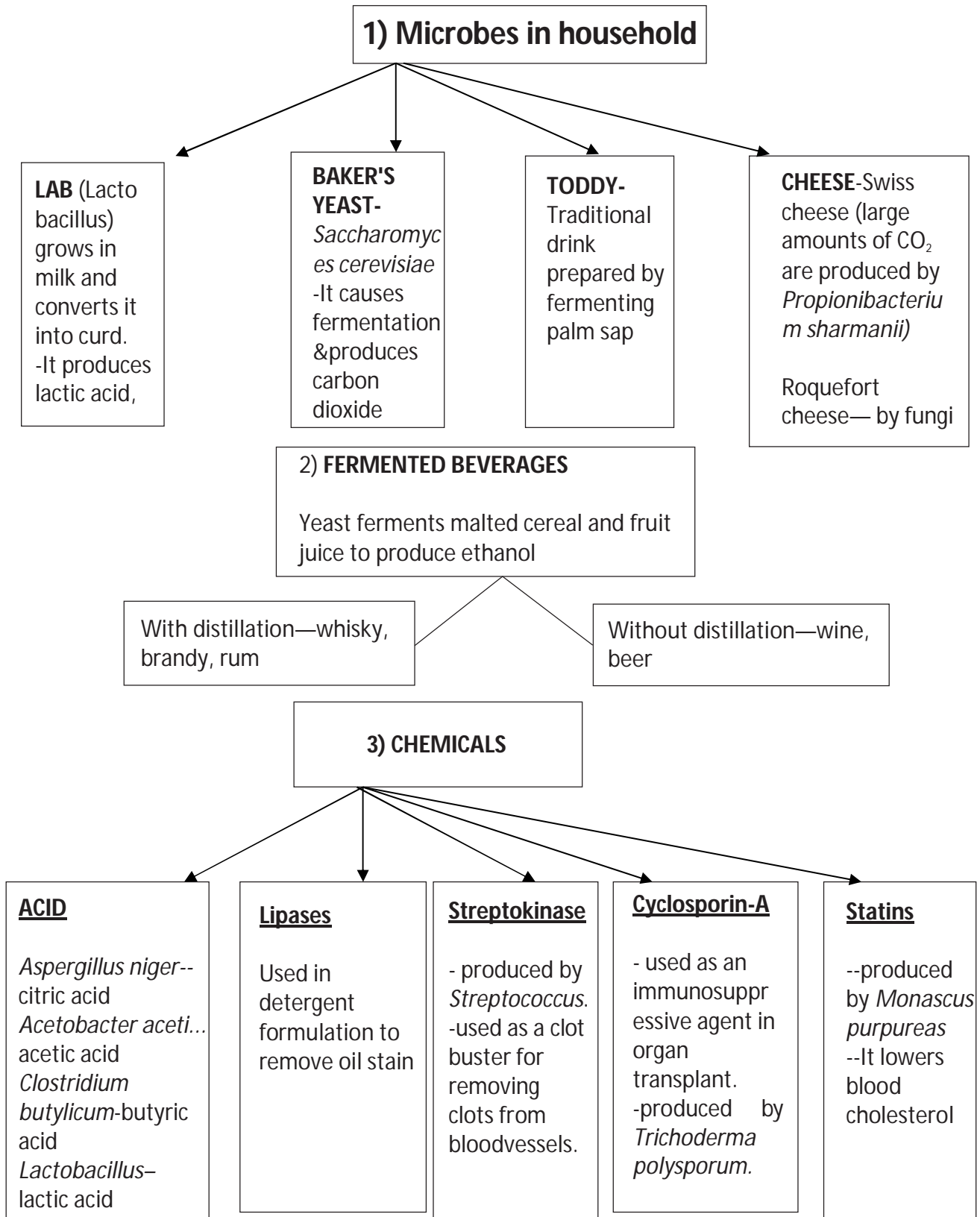
7) Microbes as bio fertilizers



8) Microbes used in sewage treatment



**CHAPTER: 10 MICROBES IN HUMAN WELFARE
(FLOW CHART)**

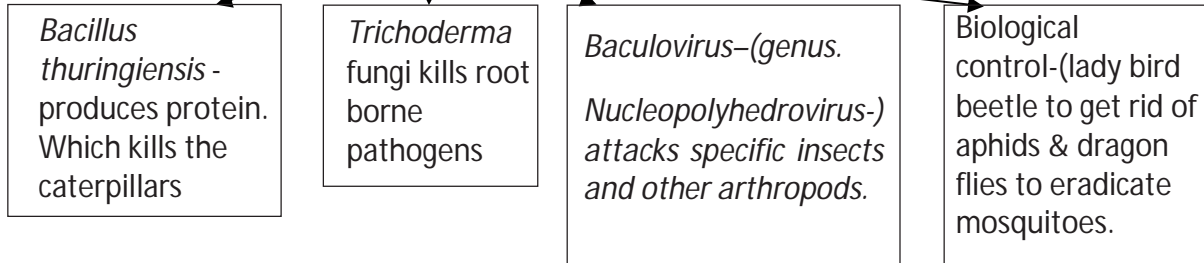


BIOLOGY



4) **ANTIBIOTICS (Penicillin)** -It is produced by *Penicillium notatum*

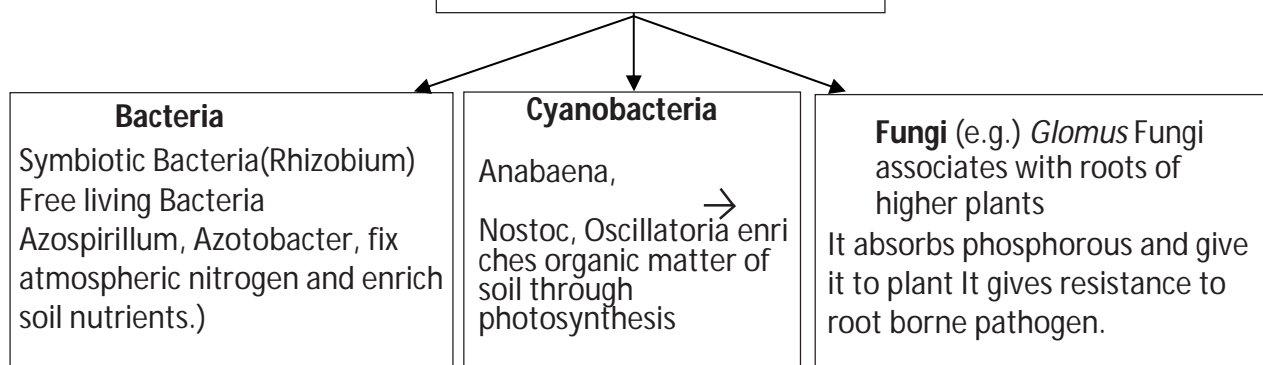
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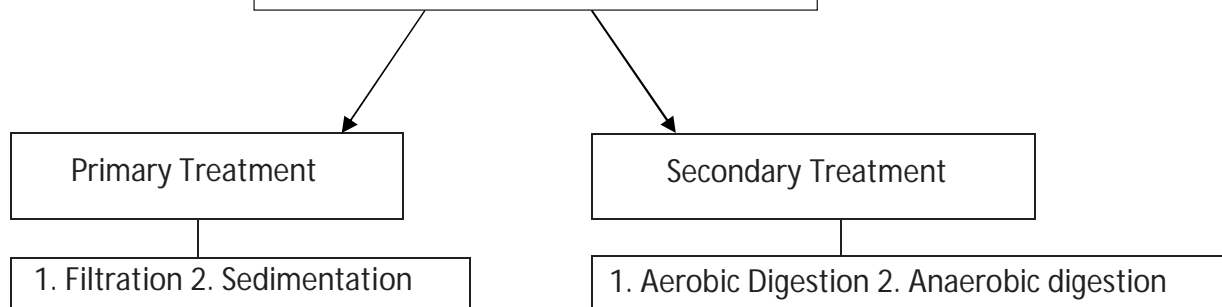
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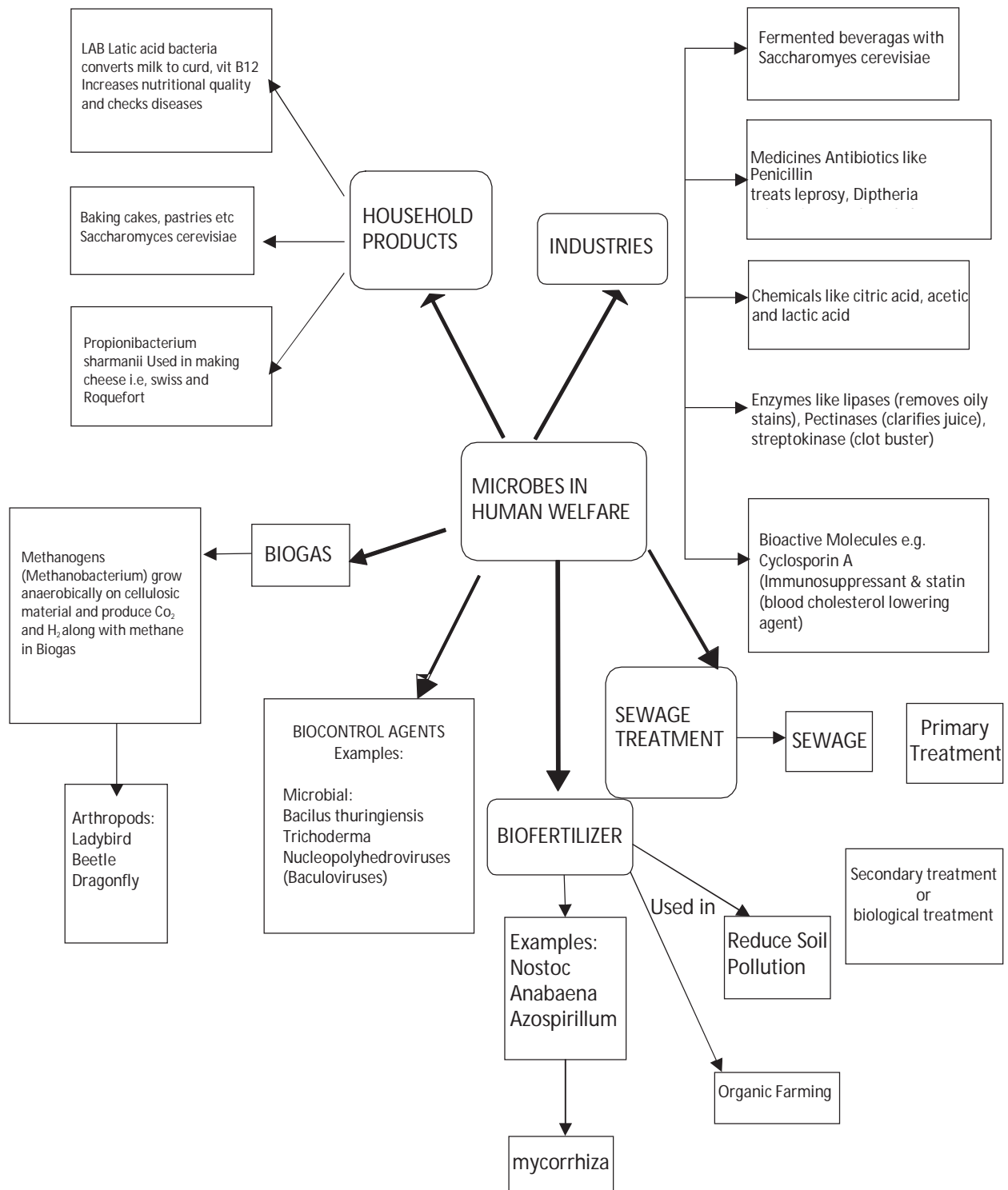


8) Microbes used in sewage treatment



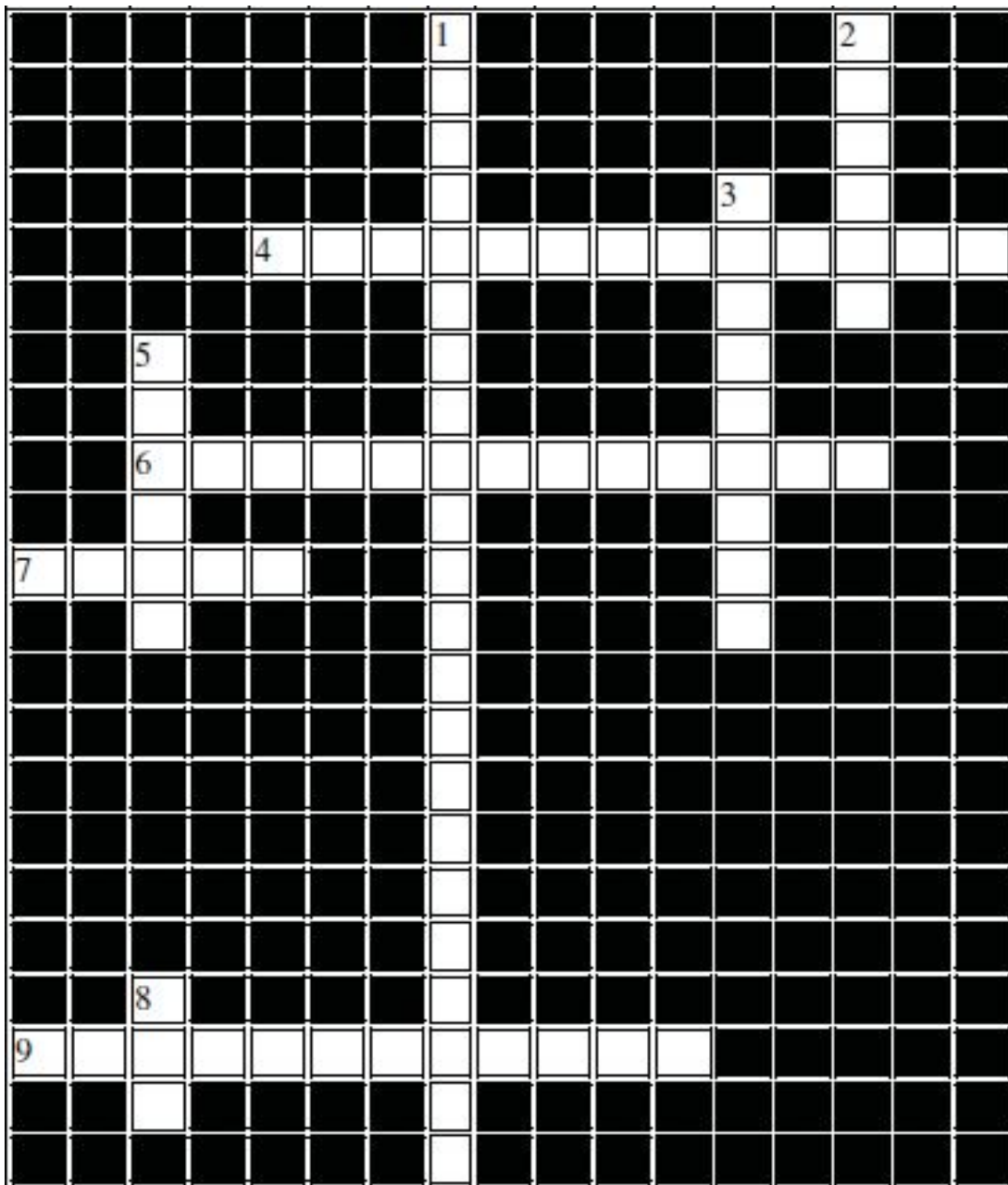


**CHAPTER: 10 MICROBES IN HUMAN WELFARE
(CONCEPT MAP)**





CHAPTER: 10 MICROBES IN HUMAN WELFARE
(CROSS WORD)



Across

Down

- 4. produced by trichoderma polysporum
- 6. Clot buster
- 7. mass of bacteria and fungal filaments
- 9. free living biofertilisers

- 1. first biological pesticide
- 2. proteinaceous infecting agent
- 3. to clarify bottled fruit juices
- 5. biofertiliser
- 8. impurity of waste water



CHAPTER: 10 MICROBES IN HUMAN WELFARE (QUESTION BANK)

1. How does a small amount of curd added to fresh milk convert it into curd? Mention a nutritional quality that gets added to the curd.
2. Why is secondary treatment of water in sewage treatment plant called biological treatment?
3. An antibiotic called Wonder Drug was used to treat the wounded soldiers of America during World War-II. Name the drug and the scientist who discovered it.
4. You have observed that fruit juice in bottles bought from the market is clearer as compared to those made at home. Give reason.
5. Alexander Fleming discovered. Penicillin, but its full potential as an effective antibiotic was established by other scientists. Name the two scientists.
6. Name the plant whose sap is used in making Toddy. Mention the process involved in it.
7. Name two alcoholic drinks produced in each of the following ways. (i) by distillation and(ii) without distillation.
8. Lactic Acid Bacteria(LAB)is commonly used in the conversion of milk into curd. Mention any two other functions of LAB that are useful to humans.
9. How do mycorrhizae function as biofertilisers? Explain with example.
10. Cyanobacteria(Nostoc,Anabaena)are used as biofertilisers in certain crop fields. Name such one crop. Also, mention the names of two other microorganisms which perform the same function.
11. Which Ministry of Govt. of India had initiated Ganga Action Plan and Yamuna Action Plan? What are the objectives of these plans?

12. Fill in the blanks spaces a, b, c, d, e, and f given in the following table

S. No.	Name of Organism	Commercial Product	Application
1	<i>Penicillium notatum</i>	Penicillin	(a)
2	(b)	Lactic acid	Making Curd
3	<i>Streptococcus</i>	Clot buster enzyme	(c)
4	<i>Trichoderma polysporum</i>	(d)	Immuno suppressive agent
5	<i>Saccharomyces cerevisiae</i>	Ethanol	(e)
6	(f)	Swiss cheese	Food Product

13. What is biochemical oxygen demand (BOD) test? At what stage of Sewage treatment this test is performed? BOD level of three samples of water labelled as A, B and C are 30 mg/ L, 10mg/Land 500 mg/L respectively. Which sample of water is most polluted?

BIOLOGY



14. What are biofertilisers? A farmer is advised to add a culture of bacterium in the soil before sowing the crop. Name the bacterium in the culture. How is this bacterium useful to the crop?
15. What are statins? Name the microorganism that produces this substance. How is it medically important?
16. How does primary sludge differ from activated sludge? What type of changes in the sludge is carried out in anaerobic sludge digester? Give the composition of biogas produced in the waste treatment plant.



**CHAPTER: 10 MICROBES IN HUMAN WELFARE
(ANSWER KEY)**

Q.No	Value points	Marks
1	A large number of lactic acid bacteria are found in small amount of curd which multiply and convert the milk into curd by producing the lactic acid, The nutritional quality improves by increasing Vitamin B12	1
2	In this treatment Organic wastes of sewage water are decomposed by certain microorganisms in presence of water	1
3	Penicillin, Alexander Fleming	1
4	Bottle juices are clarified by the use of pectinase and proteases	1
5	Ernest chain and Howard Florey	1
6	Palm tree, by fermentation	1
7	(i) Whisky, brandy, rum_ by distillation (ii) Wine, beer _ without distillation	1+1=2
8	(i) LAB in human intestine synthesizes VitaminB12. (ii) LAB in human stomach checks the growth of harmful microbes	1+1=2
9	Mycorrhiza are fungi associated with the roots of plants. Many members of genus Glomus form mycorrhiza. These fungal symbiont absorbs water and minerals like phosphorus from the soil and provide them to the plant.	4x1/2=4
10	Paddy (Rice Crop), Rhizobium and Azotobacter	1+1=2
11	The Ministry of Environment and Forests. The objective of Ganga Action Plan and Yamuna Action Plan is to save these rivers from pollution. It was proposed to build a large number of sewage treatment plants. So that only treated sewage may be discharged into these rivers	1+1+1=3
12	a) to kill disease causing bacteria (b) Lactobacillus (c) remove clots from blood vessels (d) Cyclosporin A (e) Beverage (f) <i>Propionibacterium sharmanii</i>	6x1/2=3
13	The BOD test measures the rate of uptake of oxygen by microorganisms in a sample of water. Biological treatment or Secondary treatment Sample € is most polluted because it has highest BOD level among the three samples of water.	1+1+1=3

BIOLOGY



14	<p>Biofertilisers are organisms that enrich the nutrient quality of the soil. Azotobacter/Azospirillum (free living) This bacterium fixes atmospheric nitrogen into organic forms, which is used by the plants as nutrient.</p>	1+1+1=3
15	<p>Statins are cholesterol reducing agents. They are produced by <i>Monascus purpureus</i> (Yeast) They act by Competitively inhibiting the enzymes responsible for synthesis of cholesterol and are used as blood cholesterol lowering agents.</p>	1/2+1/2+ 1+1+=3
16	<p>Primary sludge is all solids like soil, small pebbles that settle down in settling tank during primary treatment of sewage. Activated sludge is the sediment of bacterial flocs, in settling tank during biological treatment. Flocs are masses of bacteria held together by slime and fungal filaments. A part of activated sludge is used as inoculum in aeration tank and remaining is passed into a large tank called anaerobic sludge digester. In this tank, other kind of bacteria which grow anaerobically, digest the bacteria, fungi and biomass in the sludge. Biogas that produced in Sewage treatment plant is a mixture of methane, hydrogen and Carbon dioxide</p>	2+1+2=5



**CHAPTER:11 BIO TECHNOLOGY PRINCIPLES & PROCESSES
(KEY POINT)**

S.No	Term	Explanation
1	rDNA	Recombinant DNA
2	Gene cloning	DNA technology used to produce multiple, exact copies of a single gene to obtain enough material for further study
3	Gene transfer	Incorporation of new DNA into an organism's cells, usually by a vector.
4	Genetic Engineering	Altering the genetic material of cells or organisms to enable them to make new Substances or perform new functions
5	ori	The specific sequence of bases in a DNA which initiates replication.
6	Restriction enzymes	They are molecular scissors capable of cutting DNA at specific site. These are enzymes present in bacteria which prevent the multiplication of bacteriophages in their cells.
7	Plasmid	Autonomously replicating extra chromosomal circular DNA molecules, distinct from the normal bacterial genome and non essential for cell survival under non selective conditions. Some plasmids are capable of integrating into the host genome. A number of artificially constructed plasmids are used as cloning vectors.
8	Cloning Vectors	Vectors that introduce foreign DNA into host cells, where the DNA can be reproduced in large quantities. Examples are plasmids, cosmids, and yeast artificial chromosomes, and bacterial artificial chromosomes.
9	Endonuclease	Protein that recognizes specific, short nucleotide sequences and cuts DNA at those sites within the molecule.
10	Nucleases	Enzymes that are specific to digest nucleic acids.
11	Exo nucleases	An enzyme that cleaves nucleotides sequentially from free ends of a linear Nucleic acid substrate.
12	Palindromic sequences	The sequence of base pairs that reads the same on both the strands when read in the same orientation (ie 5' to 3' in both the strands)
13	Gel Electrophoresis	A method of separating large molecules (such as DNA fragments or

BIOLOGY



		proteins) from a mixture of similar molecules. An electric current is passed through a medium containing the mixture, and each kind of molecule travels through the medium at different rate, depending on its electrical charge and size. Agarose and acrylamide gels are the media commonly used for electrophoresis of proteins and nucleic acids.
14	Elution	The extraction of separated fragments of DNA from the electrophoresis gel
15	Autoradiography	A technique that uses X-Ray film to visualize radioactively labeled molecules or fragments of molecules, used in analyzing length and number of DNA fragments after they are separated by gel electrophoresis.
16	Transformation	In this procedure bacterial cells take up DNA from the surrounding environment and get transformed.
17	Selectable markers	A gene or other identifiable portion of DNA whose inheritance can be followed and used in the process of selection of transformed cells from non transformed ones
18	Insertional Inactivation	The process by which a gene encoding a protein is inactivated by the insertion of a foreign DNA within the coding sequence of the protein
19	Ti Plasmid	Tumour inducing Plasmid in <i>Agrobacterium</i> sp. causing tumour in plant cells.
20	Tumour	Uncontrolled growth of cells in the body of plants or animals.
21	Microinjection	The process of introducing rDNA into animal cells using a micropipette
22	Biolistics/gene gun	A direct gene transfer method for delivering foreign genes into any tissues and cells or even seedlings. * The foreign DNA is coated or precipitated onto the surface of minute gold or tungsten particles * It is bombarded or shot on to the target tissue or cells using the gene gun.
23	Embryonic stem(ES)cells	An embryonic cell having totipotency that can replicate indefinitely, transform into other types of cells, and serve as a continuous source of new cells. These cells are derived from inner cell mass of the blastocyst or the 4-8 cell stage of embryo

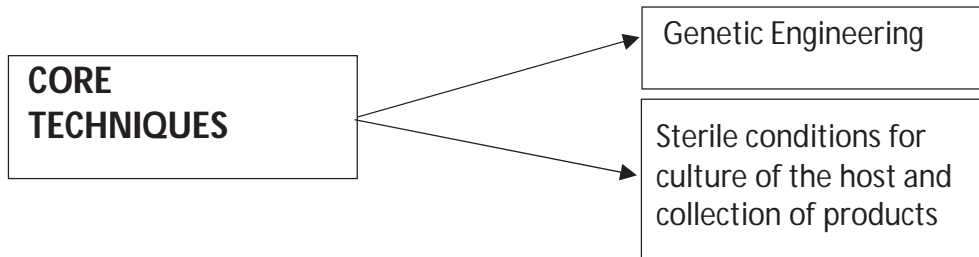
24	Lysozyme	The enzyme that digests the cell wall of bacteria	
25	Cellulase	The enzyme that digests cellulose of plant cell walls	
26	Chitinase	The enzyme that can digest cell walls of fungi which contains chitin.	
27	Polymerase Chain Reaction (PCR)	Polymerase Chain Reaction where DNA can be amplified in a short time to produce multiple copies of DNA (can be made in vitro)	
28	Recombinant protein	Protein encoding gene expressed in a heterologous host	
29	Bioreactors	Are vessels in which raw materials are Biologically converted into specific products using microbial, plant or animal cells	
30	Downstream Processing	The process of formulation, separation and purification of rDNA products made in Bioreactors.	
31	Spooling	The method of separating DNA precipitates in chilled ethanol, after its isolation from the other cell contents	
32	Disarmed pathogens	Some bacteria or viruses, which are used to transfer recombinant DNA carrying the gene of interest to the host cells.	
33	Retrovirus	RNA virus containing reverse transcriptase and can be used to transfer the gene of interest into the host chromosome.	
34	Ligases	Enzymes that can join fragments of DNA.	
35	Vector	A molecule, capable of replication in a host organism, into which a gene is inserted to construct a recombinant DNA molecule.	
36	Competent Host Cell	A cell which has been chemically treated to take up rDNA from its surroundings through pores in its cell wall.	
37	Amplification	An increase in the number of copies of a specific DNA fragment; can be in vivo or in vitro.	
38	Sticky ends	Single stranded overhanging ends of DNA formed by the restriction enzymes cutting the strands of DNA at specific palindromic sequences.	
39	Denaturation	Double stranded DNA is separated by applying high temperature of 95°C.	
40	Annealing	Primers bind to the 3' ends of the separated DNA strands	
41	Extension	DNA polymerase extends the primers by adding complementary nucleotides. Taq polymerase is used here.	
42	Taq Polymerase	DNA polymerase obtained from bacteria <i>Thermus aquaticus</i>	



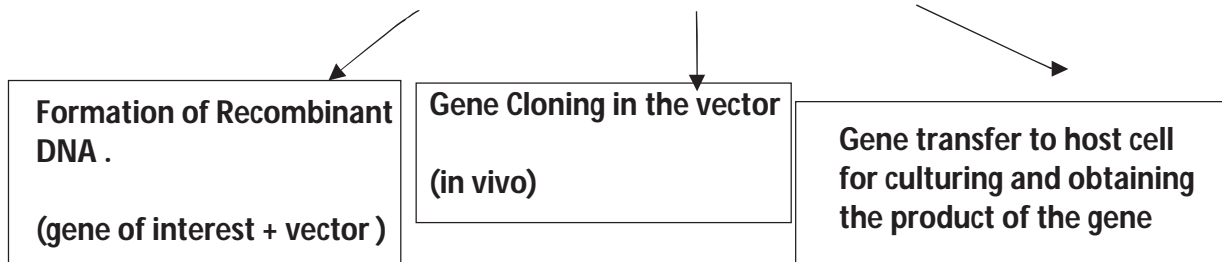


**CHAPTER : 11 BIO TECHNOLOGY PRINCIPLES & PROCESSES
(FLOW CHART)**

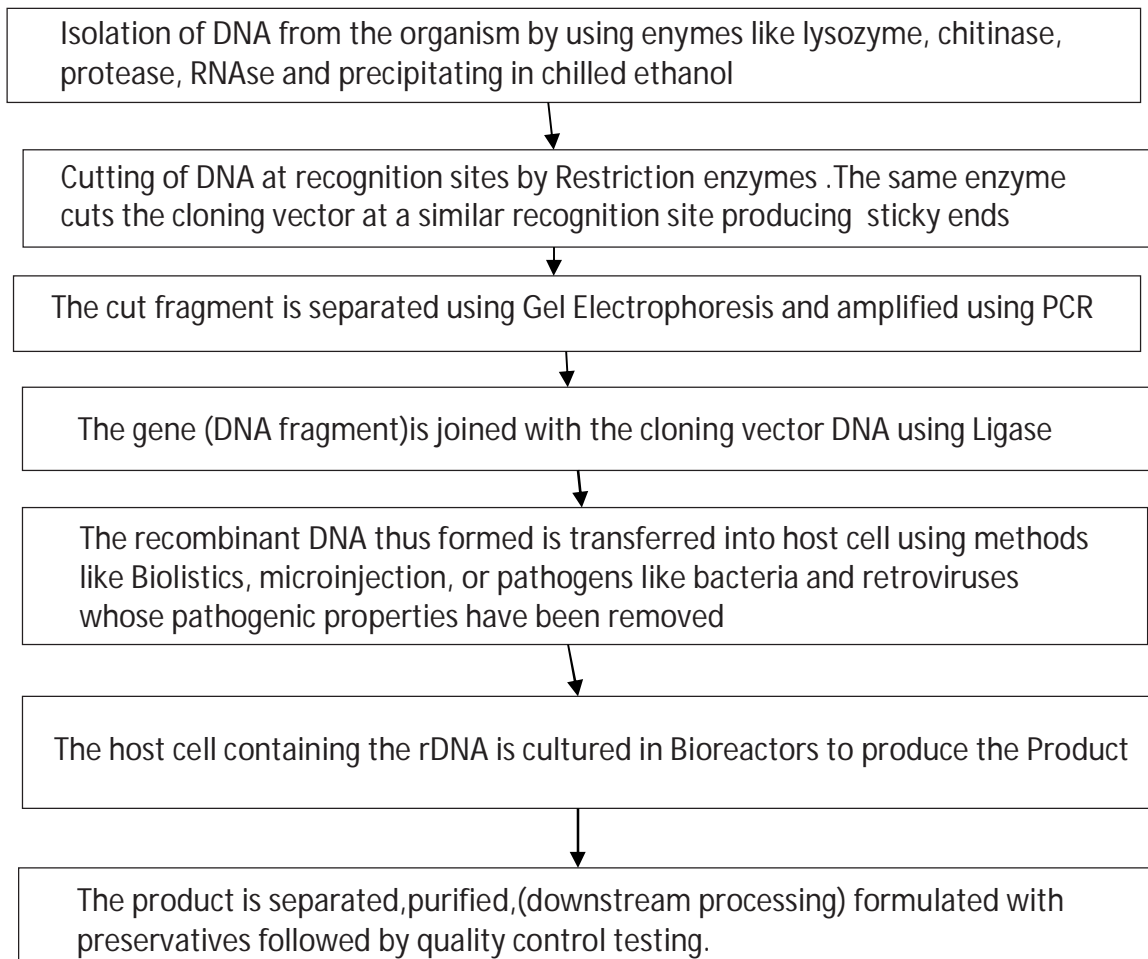
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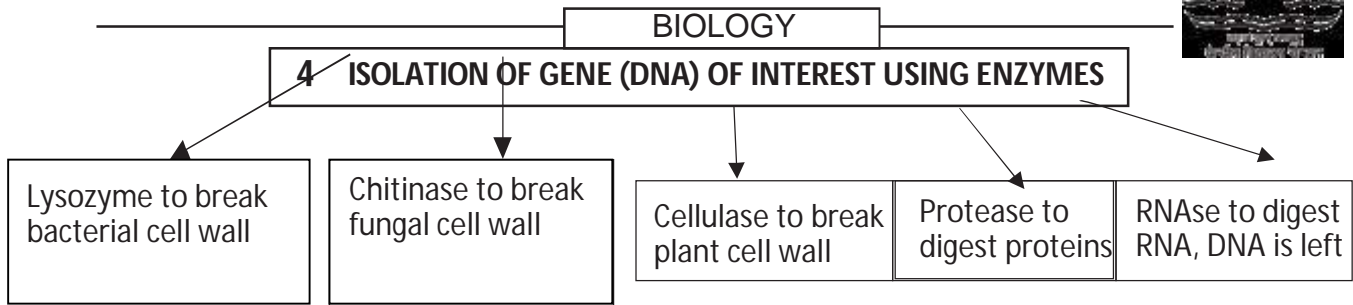


2 RECOMBINANT DNA TECHNOLOGY



3 STEPS IN CREATION OF rDNA

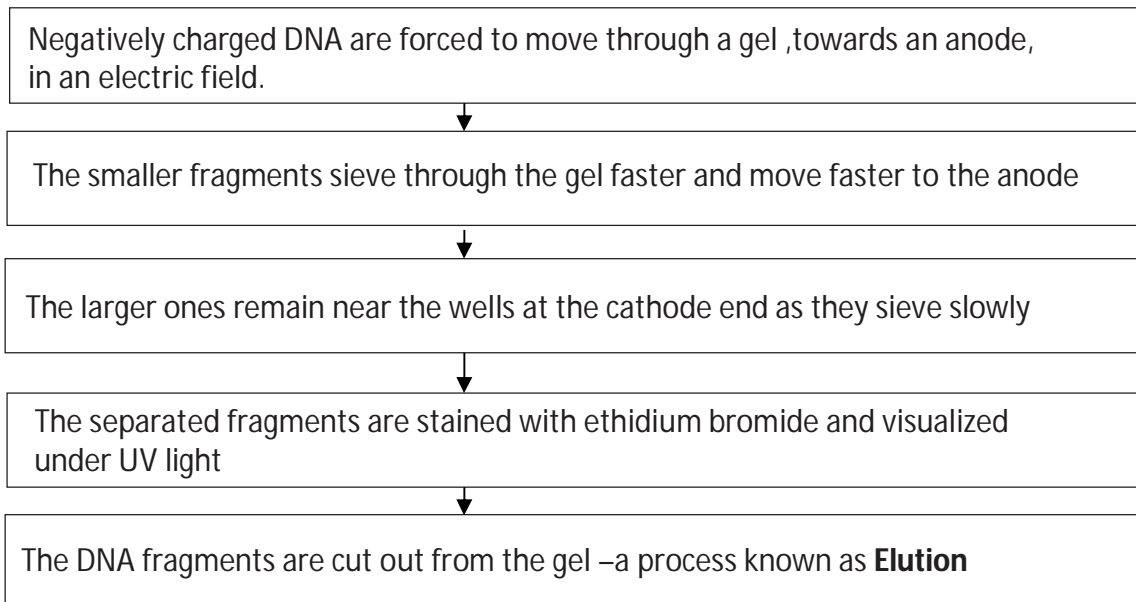




5 Characteristics of Restriction Enzymes:



6 Gel Electrophoresis:



7 PCR: POLYMERASECHAIN

Denaturation of DNA (separation of DNA into single strands)by applying high temperature upto 95° C

Annealing: Two sets of Primers (short stretches of RNA) attach to the single stranded DNA at complementary sites.

Taq Polymerase

Extension: The primers extend by addition of nucleotides in the presence of thermostable DNA polymerase complementary to the DNA strand .The Primers are removed.

Repeat: This cycle gets repeated 30 times and the DNA fragment gets amplified about 1 billion times



BIOLOGY

8

Methods of gene transfer

Vectorless method

Vector method

Direct method –Direct uptake of DNA after treatment with Ca ions incubation in ice and heat shock treatment -bacteria

Biolistics – Plant cells

Microinjection – Animal cell

Bacteriophages, plasmid for Bacteria, Disarmed pathogen- Agrobacterium for plants, retrovirus for animals

10

CHARACTERISTICS OF CLONING VECTORS:

ORI - The sequence on DNA where replication starts. It should be capable of supporting several replications to make many copies

RECOGNITION SITES: for action of different restriction enzymes where the gene of interest can be inserted

MARKER GENES – the presence of these genes in the host will help in selecting the host cell which has the gene from the cells which do not carry the genes. The rDNA carrying cells called transformants can be selected and separated from the non transformants.

11 BIOREACTORS: PRODUCE RECOMBINANT PROTEIN USING RAW MATERIALS AND LIVING CELLS/ENZYMES

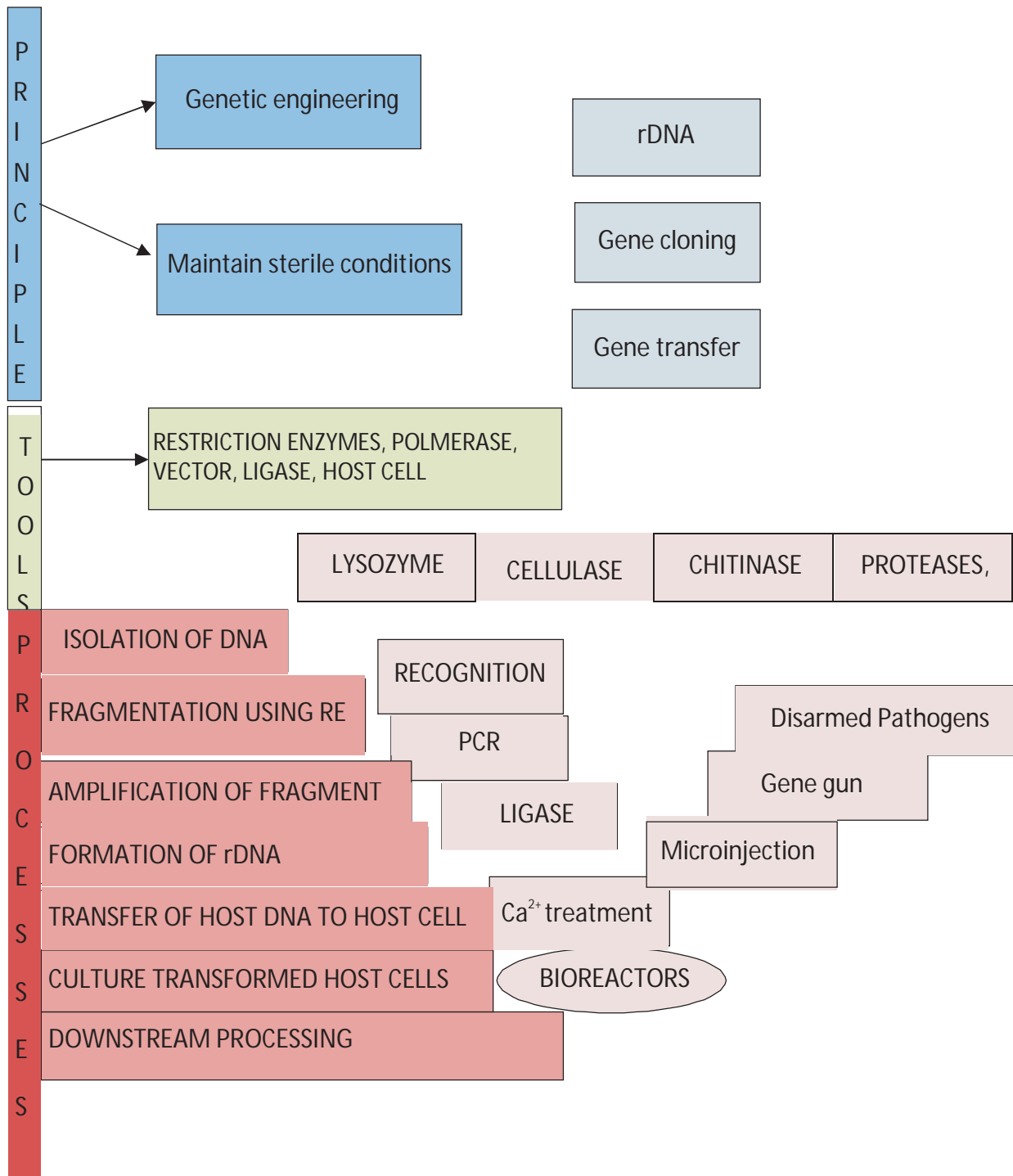
SPARGED STIR TANK
STERILE AIR
BUBBLES
SPARGED

SIMPLE STIRRED TANK
HAS CURVED BASE BETTER
MIXING
STIRRER
OXYGEN DELIVERY SYSTEM
FOAM CONTROL
TEMPERATURE CONTROL
PH CONTROL
SAMPLING PORTS

DOWNSTREAM PROCESSING +QUALITY CONTROL TESTING before the product is made commercially available.

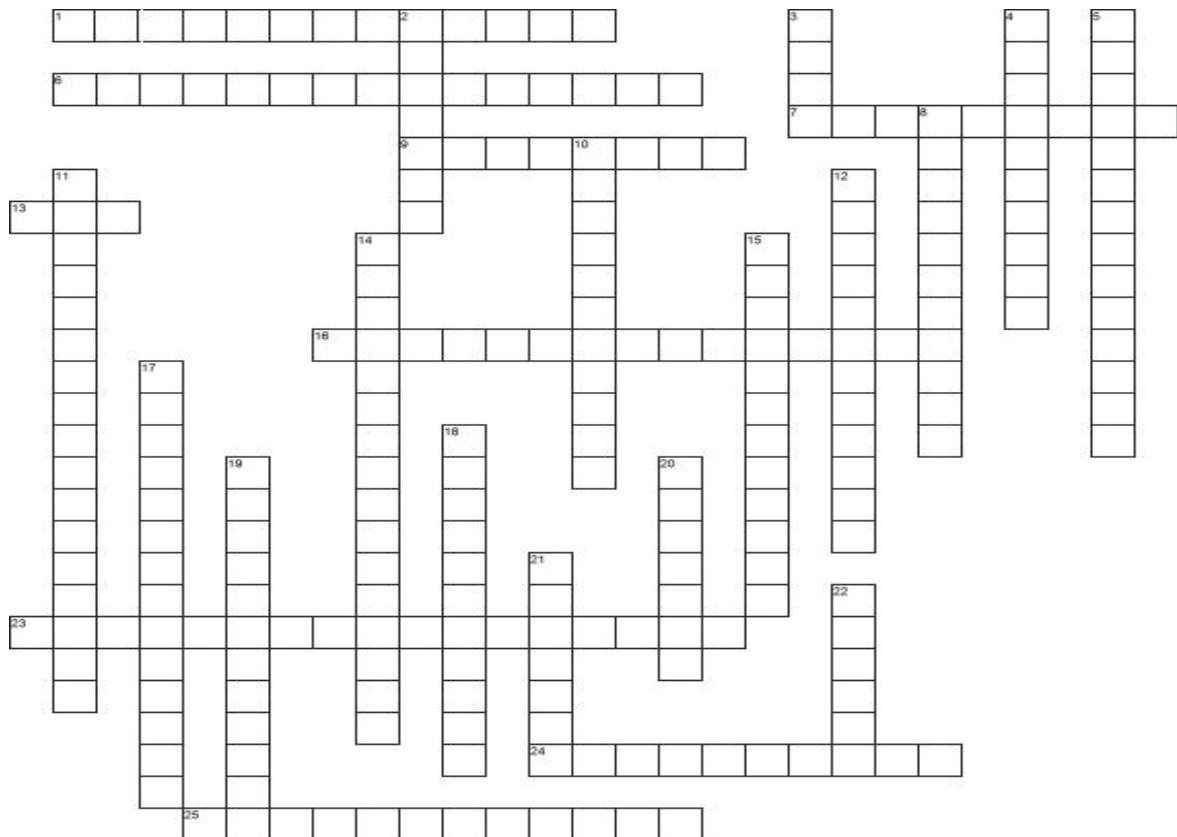


**CHAPTER : 11 BIO TECHNOLOGY PRINCIPLES & PROCESSES
(CONCEPT MAP)**





**CHAPTER : 11 BIO TECHNOLOGY PRINCIPLES & PROCESSES
(CROSS WORD)**



ACROSS

- | | |
|--|--|
| <p>1 Viruses infecting Bactria</p> <p>6 Sequence of genes present in the Bacteria to defend against bacteriophage. There may be more than one restriction sites added to vector depending on the need.</p> <p>7 The process in which Two sets of Primers are added which bind to the 3' end of each separated strand, Primers act as initiators of replication.</p> <p>9 Separated band of DNA (gel electrophoresis) are cut out from agarose gel & extracted from the gel piece.</p> <p>13 It codes for the protein; involved in the replication of the plasmid.</p> <p>16 Sequences of vector recognised by restriction enzymes</p> <p>23 Restriction endonuclease</p> <p>24 Every endonuclease after recognising the palindromic sequence in the DNA, binds to it, cuts the opposite strands of DNA in the sugar-Phosphate backbone, a little away from the centre of the palindrome sites but between the same bases on both stretches at the end of each strand called single stranded overhanging stretches at the end of each strand called</p> <p>25 Restriction enzymes cut DNA at specific portion within the DNA.</p> | <p>3 DNA formed by combining DNAs from 2 different organisms</p> <p>4 Cells are bombarded with high velocity micro particles of gold or tungsten coated with DNA</p> <p>5 DNA molecules that can carry a foreign DNA A segment & replicate inside the host cell.</p> <p>8 Restriction enzyme cuts the DNA from the ends.</p> <p>10 inactivation Due to the addition of alien DNA the coding sequence of an enzyme like α-galactosidase loses its property of converting X-gal/substrate -metabolising to produce blue colour. Its due to inactivation.</p> <p>11 Restriction endonuclease the Enzyme galactosidase.</p> <p>12 Viruses infecting Bactria.</p> <p>14 Helps to select the host cell which contain the rDNA or plasmid with specific gene</p> <p>15 Bacteria which has taken the vector with alien DNA</p> <p>17 Recombinant DNA is directly injected into the nucleus through microinjection.</p> <p>18 Are vessels of large volumes (100-1000 litres) in which raw materials are biologically converted into specific products</p> <p>19 The double stranded DNA is split by applying high temperature</p> <p>20 Small chemically synthesised oligonucleotides of about 10-18 nucleotides that are complimentary to a region of template DNA.</p> <p>21 Hybrid vectors derived from plasmids which contain cossite of phage.</p> <p>22 in replicating a chromosome there is a specific DNA sequence called, which is responsible for initiating replication.</p> |
|--|--|



CHAPTER : 11 BIO TECHNOLOGY PRINCIPLES & PROCESSES (QUESTION BANK)

1. What are the two core techniques that enabled the birth of Biotechnology?
2. How does genetic engineering help in overcoming the limitations of traditional hybridization procedures used in plants & animals?
3. How does the stickiness of cut ends of DNA help?
4. How can an alien piece of DNA made to multiply in a host cell?
5. What are the 'molecular scissors' in rDNA technology. What are they used for in rDNA technology?
6. List the major techniques in Genetic Engineering? Who was the first to construct an rDNA?
7. What are the three basic steps in genetically modifying an organism?
8. What are recognition sequences often do nucleases? Name the five key tools in rDNA technology.
9. What are nucleases. What are the two types?
10. Show diagrammatically how end nucleases work?(3)
11. How can the fragments of DNA be separated? Explain
12. Explain the features required for a cloning vector(3)
13. How can the cloning vector pBR322 be used in separating the transform ants and recombinants? .Explain(3)
14. How is Agra bacterium tumifaciens used in rDNA technology. Explain ii)What and how are other pathogens are used for the purpose ?State two other methods by which host organism can be transformed?
15. Sequentially state the process you would adopt for getting a recombinant protein?(5)

CHAPTER : 11 BIO TECHNOLOGY PRINCIPLES & PROCESSES (ANSWER KEY)

Q.No	HINTS	Marks
1	Genetic Engineering & Maintenance of sterile ambience	$\frac{1}{2}+\frac{1}{2}$
2	It allows use to isolate & introduce only the desirable gene/genes without Introducing the undesirable genes	1
3	Makes the joining easy ; Complimentary	1
4	Linked to ori of the host genome	1
5	Restriction enzymes, DNA at specific sites	$\frac{1}{2}+\frac{1}{2}$
6	Creation of rDNA, gene cloning ,gene transfer, Stanley Cohen & Boyer	$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$
7	Identification of desirable DNA, introduction into host, maintenance and then transfer to its progeny	$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$
8	The sequence at which DNA is cut by a Restriction Endonuclease polymerases, ligase, vector, host	$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$
9	Enzymes that act on nucleic acids, Endonucleases ,Exnucleases	$1+\frac{1}{2}+\frac{1}{2}$
10	Fig 11.1	$1+1+1$
11	Gel electrophoresis-Explain Agarose gel	$1+1+1$
12	ori, cloning sites, selectable markers	$1+1+1$
13	Tetracycline site can be cut ,to insert the desired insert ,the recombinants will lose resistance to tetracycline the transform ants will have resistance to both tetracycline and ampicillin	$1+1+1$
14	Used as vector ,by modifying tumour inducing Ti plasmid, it is not pathogenic, transforms the host plant cell Retrovirus, disarmed	$1+1+1$ $1+1$
15	Isolation of DNA(enzymes used),cutting the DNA, separation of fragments , PCR, introducing into host cell, obtaining gene product in the Bioreactor, downstream processing	$1+1+1+1+1$

CHAPTER : 12 BIO TECHNOLOGY & ITS APPLICATION
(KEY POINTS)

S.N	Term	Explanation
1	Green Revolution	The increased production of food production by use of improved varieties of crops, better agricultural practices and use of Agrochemicals
2	GMO	Genetically Modified Organisms-organisms in which the genes are manipulated or foreign gene introduced into it
3	Bt	<i>Bacillus thuringiensis</i> , a bacterium producing an insecticidal protein.
4	Bt Cotton	Cotton plant with Bt gene thereby made resistant to Bollworm insects
5	Insecticidal protein	Protein toxin that kills insect pests
6	<i>cry</i> gene	Gene coding for insecticidal toxin
7	RNA interference	Process which interferes with the translation of mRNA of the parasite in the host plant/cell
8	ds RNA	Double stranded RNA formed to prevent the translation of the mRNA of the parasite DNA in the host cell
9	C peptide	The peptide which is part of the Pro-insulin and removed before maturation of Insulin
10	Transgenic animals	Animals with manipulated genes or a foreign gene that can be expressed are called as transgenic animals
11	GEAC	Genetic Engineering Approval Committee –checks the validity and safety of GM research and GM organisms
12	Biopiracy	Unauthorised use of Bioresources of one nation by another company or organization without proper compensation being given
13	Gene therapy	The procedure by which a genetic disorder is treated by introduction of a functional gene in the body through cultured cells carrying the functional gene in children or embryo.
14	ADA	Adenosine Deaminase –an enzyme required for the functioning of the immune system.

BIOLOGY



15	cDNA	DNA which is made complementary to the mRNA
16	α -1-antitrypsin	Human protein (made from transgenic animals)used in the treatment of Emphysema
17	ELISA	Enzyme Linked Immuno Sorbent Assay-a test based on detection of antibody produced against the pathogen using specific antigen- antibody reaction used It is used for diagnosis of diseases like AIDS.
18	<i>Agrobacterium</i> vectors	The bacterium <i>Agra bacterium tumifaciens</i> (used in transferring rDNA to plant cells)has the natural ability to transfer genes to plant cells.
19	Indian Patents Bill	A Bill passed by the Indian Parliament which takes issues such as terms for patent ,research and development initiatives etc.
20	<i>Meloidegyne incognitia</i>	The nematode that affects roots of tobacco plants and reduce their yield, RNA interference is used against the nematode to protect tobacco plants.
21	<i>cryIAb</i>	Gene coding for protein that controls corn borer.
22	<i>cryIAc and cryIIAb</i>	Genes coding for protein that controls Bollworm insects



BIOLOGY

**CHAPTER : 12 BIO TECHNOLOGY & ITS APPLICATION
(FLOW CHART)**

AGRICULTURE

MEDICINE

TRANSGENIC ANIMALS

1 AGRICULTURE :APPLICATIONS

CREATE GM CROPS RESISTANT TO PEST (Bt COTTON, BRINJAL, SOYA)

GM CROPS TO REDUCE POST HARVEST LOSS (FLAVR SAVR TOMATO)

GM CROPS TOLERANT TO COLD, SALINITY, WATER SCARCITY

GM CROPS CAPABLE OF USING MINERALS EFFICIENTLY

GM CROPS ENRICHED WITH NUTRIENTS (BIOFORTIFIED)

2 METHODS TO PRODUCE PEST RESISTANT PLANTS:

CROPS WITH Bt GENE INSERTED IN ITS CELLS

RNA INTERFERENCE (TOBACCO RESISTANT TO NEMATODE)

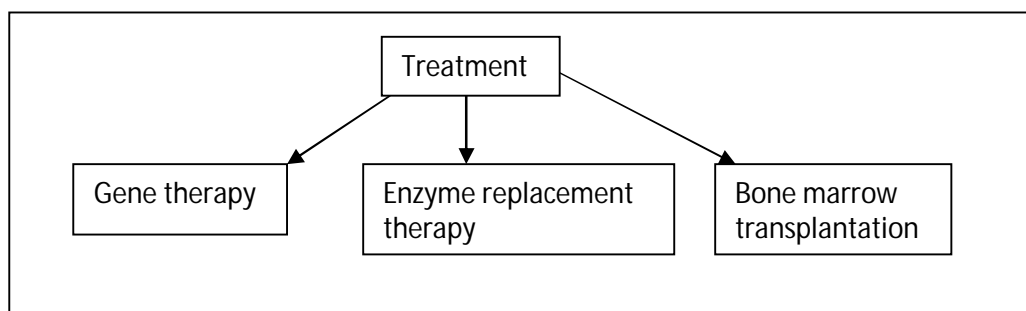
3 APPLICATIONS IN MEDICINE: FORMATION OF INSULIN BY r DNA TECHNOLOGY

Gene for A peptide introduced into E Coli plasmid to produce A peptide

Gene for B peptide introduced into another batch of E. Coli plasmid to produce B peptide

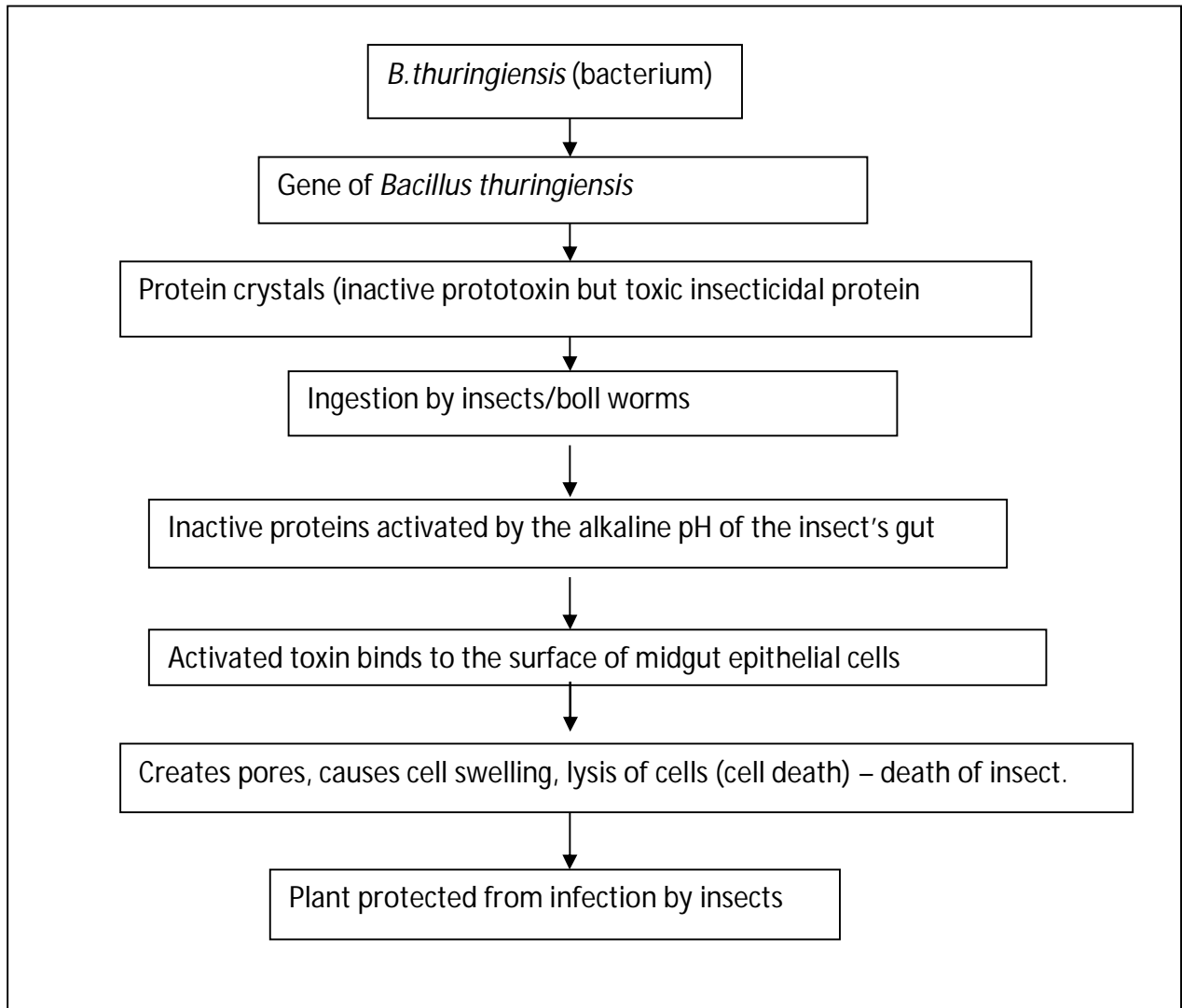
The two peptide chains are joined by creating disulphide bonds to form mature Insulin

4 TREATMENT : FOR ADA DEFICIENCY



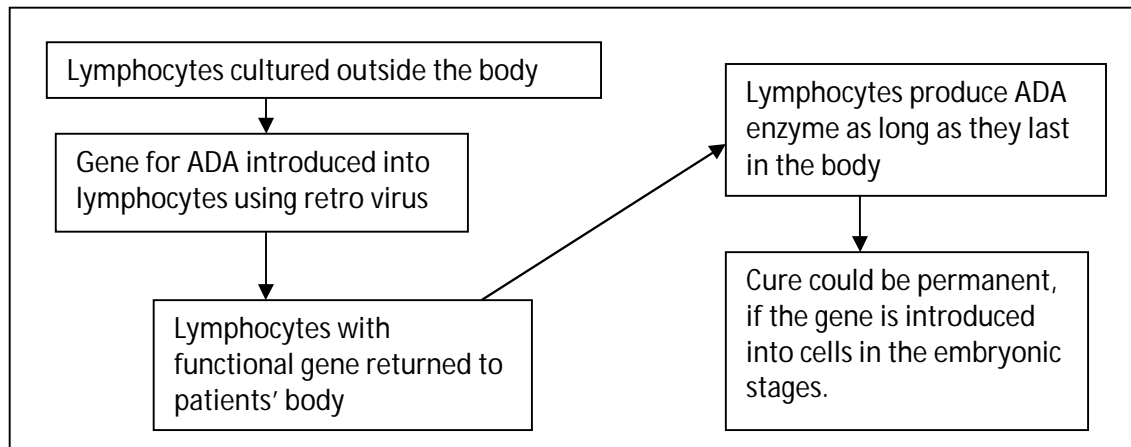


Bt cotton plants

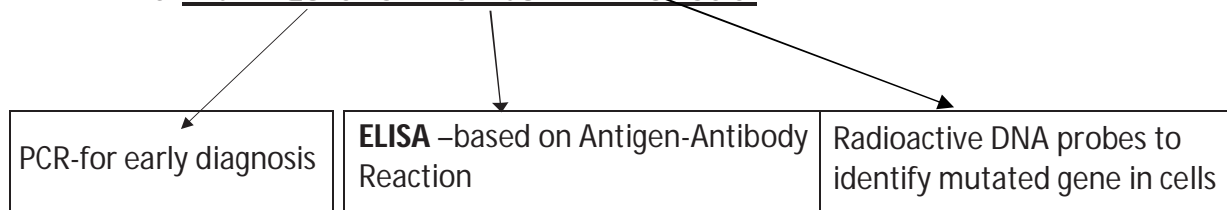




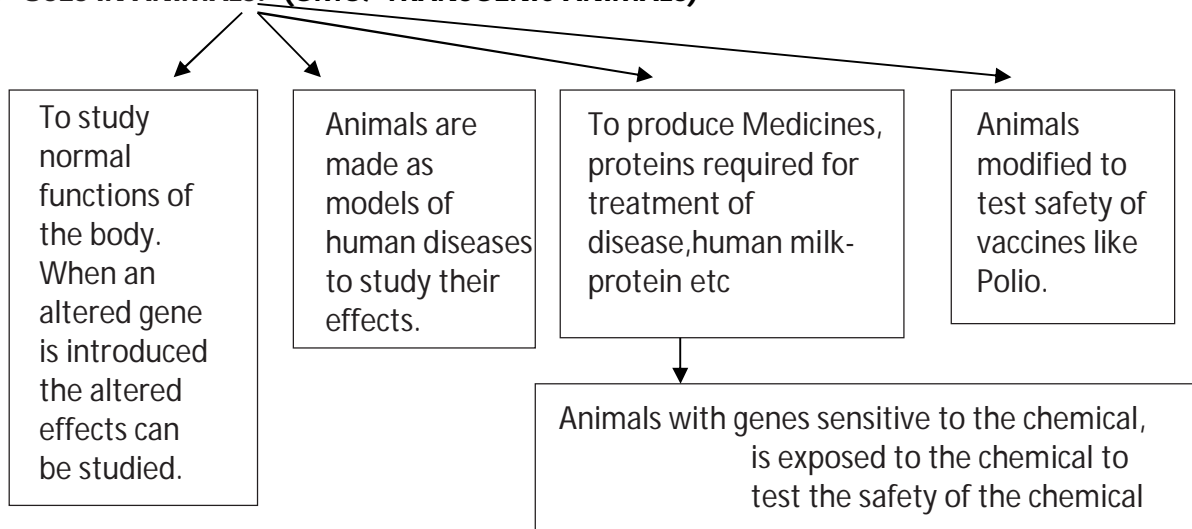
5 GENE THERAPY:



6 TECHNIQUES FOR MOLECULAR DIAGNOSIS:

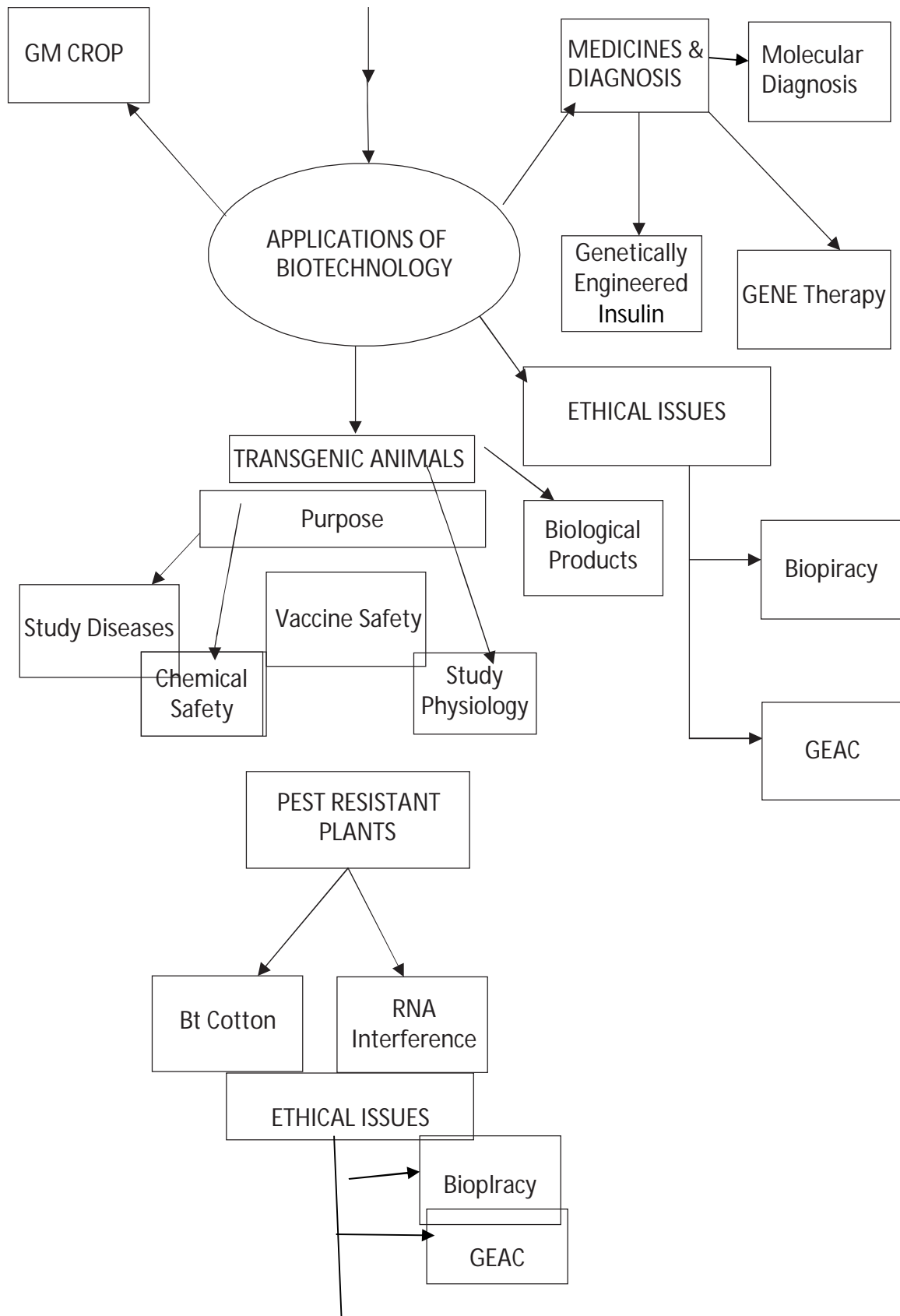


7 USES IN ANIMALS:- (GMO/ TRANSGENIC ANIMALS)



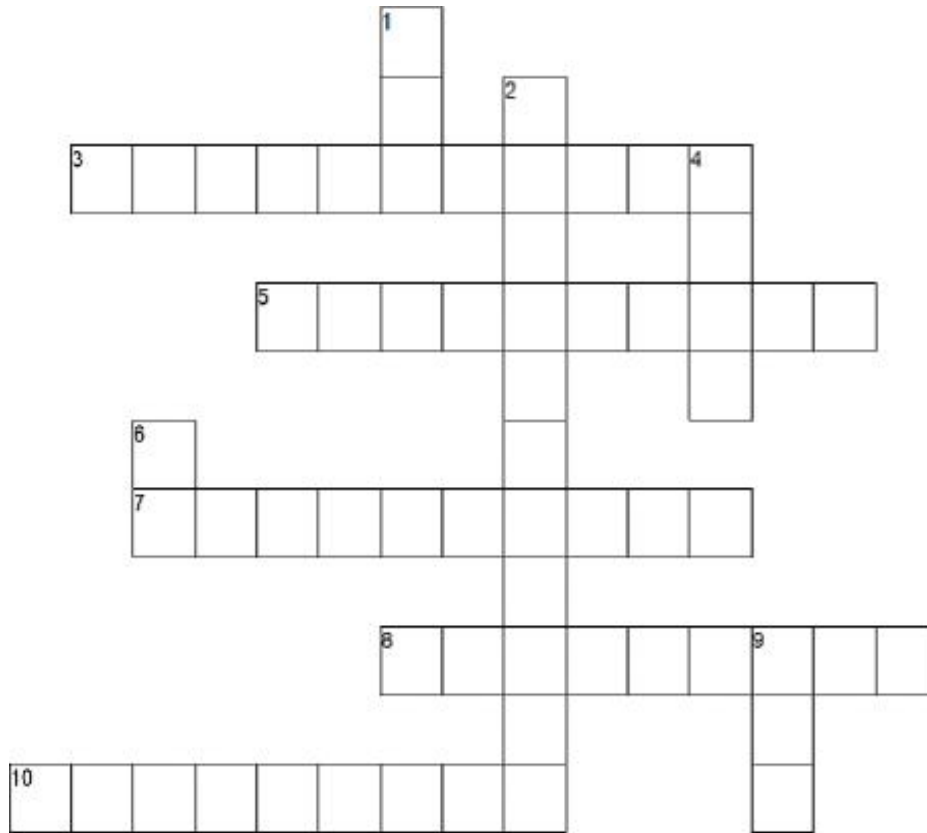


CHAPTER : 12 BIO TECHNOLOGY & ITS APPLICATION
(CONCEPT MAP)





**CHAPTER : 12 BIO TECHNOLOGY & ITS APPLICATION
(CROSS WORD)**



Across:

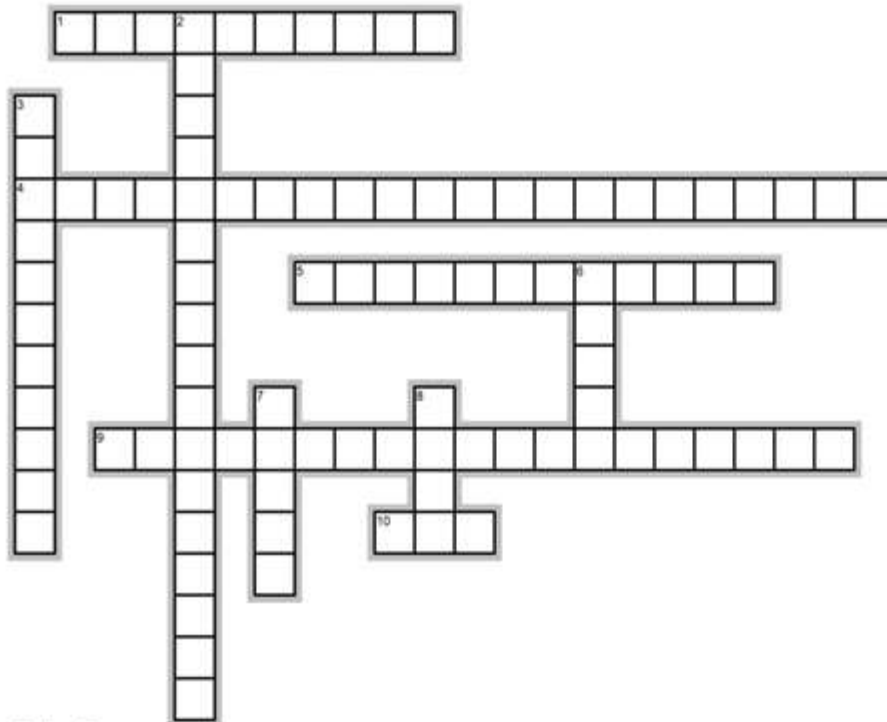
- 3 Crystal protein is a toxin coded by a gene cry & is poisonous to some insects- derived from *Bacillus thuringiensis*
- 5 Genetically engineered rice variety rich in vitamin A
- 7 Animals with foreign DNA
- 8 Transgenic tomato-which has blocked production of polygalacturonase.
- 10 .Use of bioresources by multinational companies & other organisation without proper autorisation from the countries & concerned people without compensatory payments.

- 1 Genetically modified plant /animal/bacteria/fungi/, whose genes have been altered by manipulation.
- 2 Collection of methods that allows correction of gene defects diagnosed in a child or embryo.
- 4 Severe Combined Immuno Deficiency
- 6 *Bacillus thuringiensis*
- 9 Adenosine deaminase

Down:

BIOTECHNOLOGY AND ITS APPLICATION

KVS



EclipseCrossword.com

Across

1. Vector used to introduce a functional ADA cDNA into the host cells
4. Nematode that infects the roots of tobacco plants
5. Vector used to introduce nematode specific gene
9. The enzyme important for functioning of immune system
10. The technique used to detect HIV in suspected AIDS patients

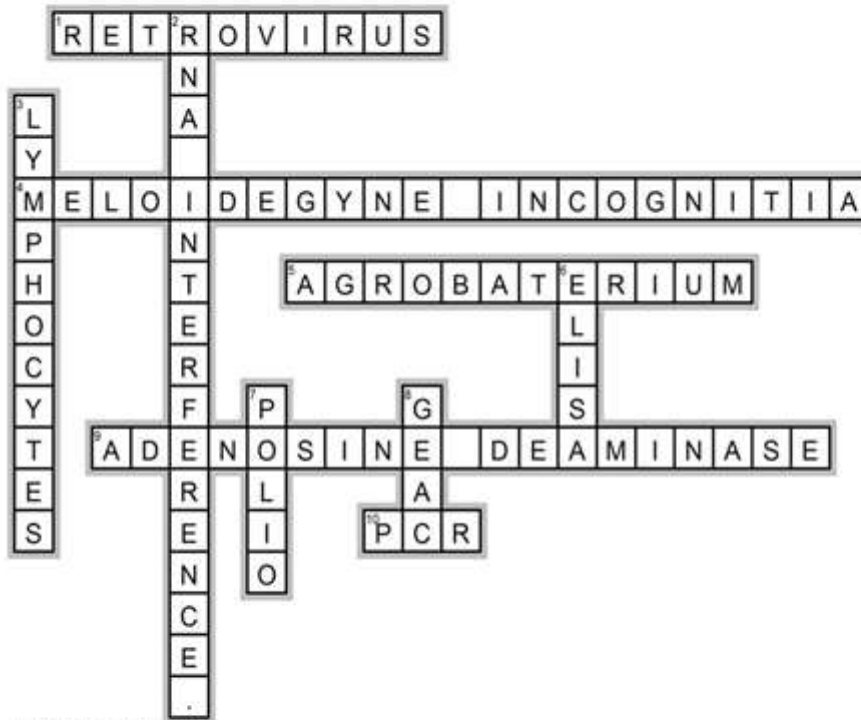
Down

2. Method adapted to prevent the infestation of nematode in the tobacco plants
3. The human cells into which functional ADA cDNA introduced
6. The principle of antigen – antibody is followed in this technique
7. The vaccine safety test against this disease was done using transgenic mice
8. The organisation set up by Indian government to check the validity of GM research



BIOTECHNOLOGY AND ITS APPLICATION

KVS



EclipseCrossword.com

Across

1. RETROVIRUS — Vector used to introduce a functional ADA cDNA into the host cells
4. MELOIDEGYNE INCOGNITIA — Nematode that infects the roots of tobacco plants
5. AGROBACTERIUM — Vector used to introduce nematode specific gene
9. ADENOSINE DEAMINASE — The enzyme important for functioning of immune system
10. PCR — The technique used to detect HIV in suspected AIDS patients

Down

2. RNA INTERFERENCE. — Method adapted to prevent the infestation of nematode in the tobacco plants
3. LYMPHOCYTES — The human cells into which functional ADA cDNA introduced
6. ELISA — The principle of antigen – antibody is followed in this technique
7. POLIO — The vaccine safety test against this disease was done using transgenic mice

8. GEAC — The organisation set up by Indian government to check the validity of GM research

**CHAPTER : 12 BIO TECHNOLOGY & ITS APPLICATION****(QUESTION BANK)**

1. PCR is a powerful diagnostic technique. Justify. (1)
2. Name the diagnostic test for AIDS when the concentration of HIV is (a) low (b) high. (1)
3. State the principle used in ELISA? (1)
4. What is GEAC .State its function? (2)
5. How transgenic animals are made useful in chemical safety testing and studying diseases? (2)
6. Give a schematic representation of the transformation of a pro- insulin to insulin. (2)
7. How is use of rDNA better than using traditional methods of agriculture?
8. Name four application of biotechnology (2)
9. Mention two applications of biotechnology in medicine with examples (2)
10. What problem was faced in production of insulin by rDNA technology and how was it resolved(2)
11. What merits do the products made using Biotechnology have? Give an example of one such product used in treatment. (3)
12. What are the three critical research areas of Biotechnology? (3)
13. How is Biotechnology used to produce Bt cotton? Explain (3)
14. How has the Bt toxin been effective against insects?
15. How can biotechnology help in increasing the yield of tobacco? (3)
16. Name a natural genetic engineer and state how it has been used to create pest resistant tobacco. (3).
17. Insulin produced earlier had problems. It has been overcome with rDNA technology. Explain. Why is Insulin not administered orally? (3)
18. Gene therapy is a better alternative to the other measures taken for ADA deficiency. Why is it a better alternative? What were the other methods used earlier? How can it be done? (3)
19. GMO's have been useful to mankind. List about five useful GMO's created so far. and how they have been useful (5)
20. "Most of the industrialised nations are rich financially but poor in biodiversity and traditional knowledge." Justify this statement with an example. (3)
21. How would you have used Biotechnology if you had the complete technology in Your hands? (5)



CHAPTER : 12 BIO TECHNOLOGY & ITS APPLICATION
(ANSWER KEY)

Q.No	Hints	Marks
1	Diagnosis at the time when symptoms are not shown(early stage)of AIDS /Cancer	½+½
2	PCR,ELISA	1
3	Antigen-antibody interaction	1
4	Genetic Engineering Approval Committee, ensure safety and validity of experiments	1+1
5	Made sensitive to chemicals, making them disease models for studying	1+1
6		
7	Use of fertilizers ,pesticides minimized, only desirable traits can be selected for breeding, create tailor made plants for industries	½+½+½+½
8	(I) therapy,(ii) Diagnostics,(iii) Genetically modified crop in agriculture,(iv)Biofortified food,(transgenic animals)	½+½+½+½
9	Insulin production ,treatment of genetic disorders with gene therapy as in ADA deficiency	1+1
10	To assemble mature insulin from Proinsulin, separate production of A and B chains of <i>E Coli</i> peptide and combined	1+1
11	No allergic reactions(Could cause allergy if made using other animals), α-1 antitrypsin in treatment of emphysema	1+1



CHAPTER : 12 BIO TECHNOLOGY & ITS APPLICATION

12	Providing the best catalyst in the form of a microbe/enzyme, creating optimal conditions for their action, downstream processing technologies	1+1+1
13	Toxins of Bacillus introduced into cotton using r DNA, BT Toxin gene has been cloned from bacteria , and expressed in cotton.	1+1+1
14	The larva ingests the leaves of Bt cotton containing the toxin, the toxin is activated in the gut of the insect by enzymes, which solubilize the toxin, the toxin binds to the lining of epithelial cells create pores cause swelling and death of the insect (i) cause for tobacco reduction due to infection by parasitise, nematode <i>Meloidegyne incognita</i> , in roots.	1+1+1
15	RNA interference, <i>Agro bacterium</i> as vectors, formation of complementary RNA double strand specific to nematode DNA, silencing of mRNA of nematode, makes tobacco pest resistant	1+1+1
16	<i>Agro bacterium tumifaciens</i> , By RNA interference, and stopping of nematode protein production, agro bacterium as vectors to introduce genes into tobacco plants which results in ,formation of complementary RNA double strand specific to nematode DNA, silencing of mRNA of nematode, makes tobacco pest resistant	1+1+1

BIOLOGY



17	Obtained from animals caused allergic reactions, Insulin produced using rDNA did not cause allergic reactions as animal proteins were not used here , Insulin being a protein gets digested if taken orally.	1+1+1
18	Permanent cure ,Bone marrow transplantation and enzyme replacement therapy, introducing cDNA of a functional ADA using retrovirus into the stem cells/early embryonic stages	1+1+1
19	Crops tolerant to a biotic stress, reduced reliance on chemicals, reduced post harvest loss, enhanced nutritional value, physiological models, human lactalbumin producing cow(any 5)	1+1+1+1+1
20	(i)ethical issues (iii) e.g basmati an Indian variety, patent obtained by a US company (iv) awareness of Biopiracy and need for Biopatent of the additional resources and wisdom	1+2
21	Any five applications of the students choice-values of societal needs problem awareness, selflessness reflected in the answers	1+1+1+1+1



UNIT - 10 ECOLOGY
CHAPTER : 13 ORGANISMS AND POPULATIONS
(KEY POINTS)

S.N	Term	Explanation
1	Benthic Zone	Angler
2	Carrying capacity	Max. no. of an organism of a population that can be sustained by a given habitat or ecosystem
3	Ecological niche	Ranges of tolerance, resources utilizes & its functional role in an ecosystem
4	Aerenchyma.	In aquatic plants gives buoyancy to the aquatic plants due to presence of air chambers
5	Eurythermal	Tolerate & thrive in a wide range of temperatures
6	Stenothermal	Organisms restricted to a narrow range of temperatures
7	Habitat	Place where organism lives, reproduces
8	Sexual deceit	Ophrys get its flower pollinated
9	Phytophagous	Animal feeding on plant sap & other parts of plants
10	Allen's rule	Mammals in colder climate have shorter ears & shorter limbs to minimise heat loss.
11	Pseudocopulates	Male bee is attracted to what it perceives as female "pseudo copulates" with the flower..e.g. Mediterranean orchid-ophrys-sexual deceit — pollinated-bees, bumblebees.-co-evolution-operates.; (petal similar to female bee)
12	Brood parasitism	Cuckoo/koel lays its eggs(resembles the egg of host)in the nest of crow & lets the host incubate them
13	Competitive release	A species whose distribution is restricted to a small geographical area because of the presence of a competitively superior species, is found to expand its distributional range when the competing sps. Is removed.(Connell's elegant field experiments —rocky sea coasts of Scotland-larger competitively superior barnacle balanus dominates, & excludes smaller barnacle chatharrialus), Abingdon Tortoise eliminated by goat due to greater grazing efficiency

BIOLOGY



14	Regulators	Organisms maintain homeostasis by physiological & behavioral means
15	Conformers	Organisms change their osmotic concentration of the body fluids change with that of the ambient water osmotic concentration
16	Age pyramid	Age distribution (percent individuals of a given age group) is plotted for the population. Shape of the pyramid-expanding, stable & declining
17	Natality Mortality Emigration Immigration	Birth rate Death rate Moving out-population decreases Coming in population increases.
18	Logistic growth	When the resources become limited ,population growth will be 's 'shaped,' sigmoid', no exponential
19	Mutualism	Interaction in which both species are benefitted
20	Amensalism	Interaction between 2 different species —one harmed & the other neither benefitted nor harmed.
21	Predation	Interspecific interaction where an animal —predator kills & consumes the other weaker animal-prey.
22	Competition	Both the species suffer & it may exist between some sps.(interspecific competition) or between individuals of different species(intraspecific competition)
23	Gause's Principle	'Competitive exclusion principle' states that two closely related species competing for the same resource cannot coexist indefinitely & the competitively inferior one will be eliminated eventually by the superior one
24	Resource partitioning, co-existence.	Phenomenon- in which species facing competition might evolve mechanisms that promote co-existence rather than exclusion. MacArthur showed that 5 closely related warblers living on the same tree were able to avoid competition &co-exist due to behavioural differences in their foraging activities.
25	Parasitism	One sps. Depends (parasite) on other sps.(host) for food, shelter, and in the process host is damaged.

BIOLOGY



26	Endoparasite	Parasite live inside the host's body. E.g. Plasmodium
27	EctoParasite	Parasite feed on the external surface of the host organism for food & shelter-lice, copepods, ticks, cuscuta
28	Diapause	In unfavourable conditions, many sps. In lakes & ponds are known to enter a stage of suspended development-diapauses. It occurs both in summer & winter, e.g. Zooplankton —diapauses in lakes & ponds
29	Hibernation	Winter /summer sleep to evade stress/unfavorable conditions. Winter-bear winter sleep. Frog
30	Prey defence mechanism	Insects & Frogs-camouflaged. Monarch Butterfly-distasteful to birds(by eating. Poisonous weed, -spl chemical inside body) Plants-thorns/spines-Acacia, Cactus Plants produce highly poisonous chemicals like cardiac glycosides, nicotine, caffeine, quinine, strychnine, opium-defence against grazers & browsers.
31	Phenotypic adaptation	Non-genetic temporary nonheritable changes in physical or morphological characteristics/behaviour/physiology-in response to changes in environment. E.g. appearance of mountain sickness at high altitude —gradually disappear by increasing RBC, increasing breathing rate.
32	Endothermic	Warm blooded- regulate body temp.-Monkey
33	Ectothermic	Cold blooded-changes its body temp with that of envt.
34	ECOLOGY	Branch of Science —deals with interactions among organisms & between the organisms (biotic)& its Physical (abiotic) environment
35	Population	Sum total of all individuals of a species in a specific geographical area.
36	Species	Group of individuals of one or more populations —resemble each other, interbreed among themselves successfully.
37	Biotic community	Assemblage of all the populations of different species present in an area that interact among themselves.3 types, Plant community, Animal community, & Microbial community

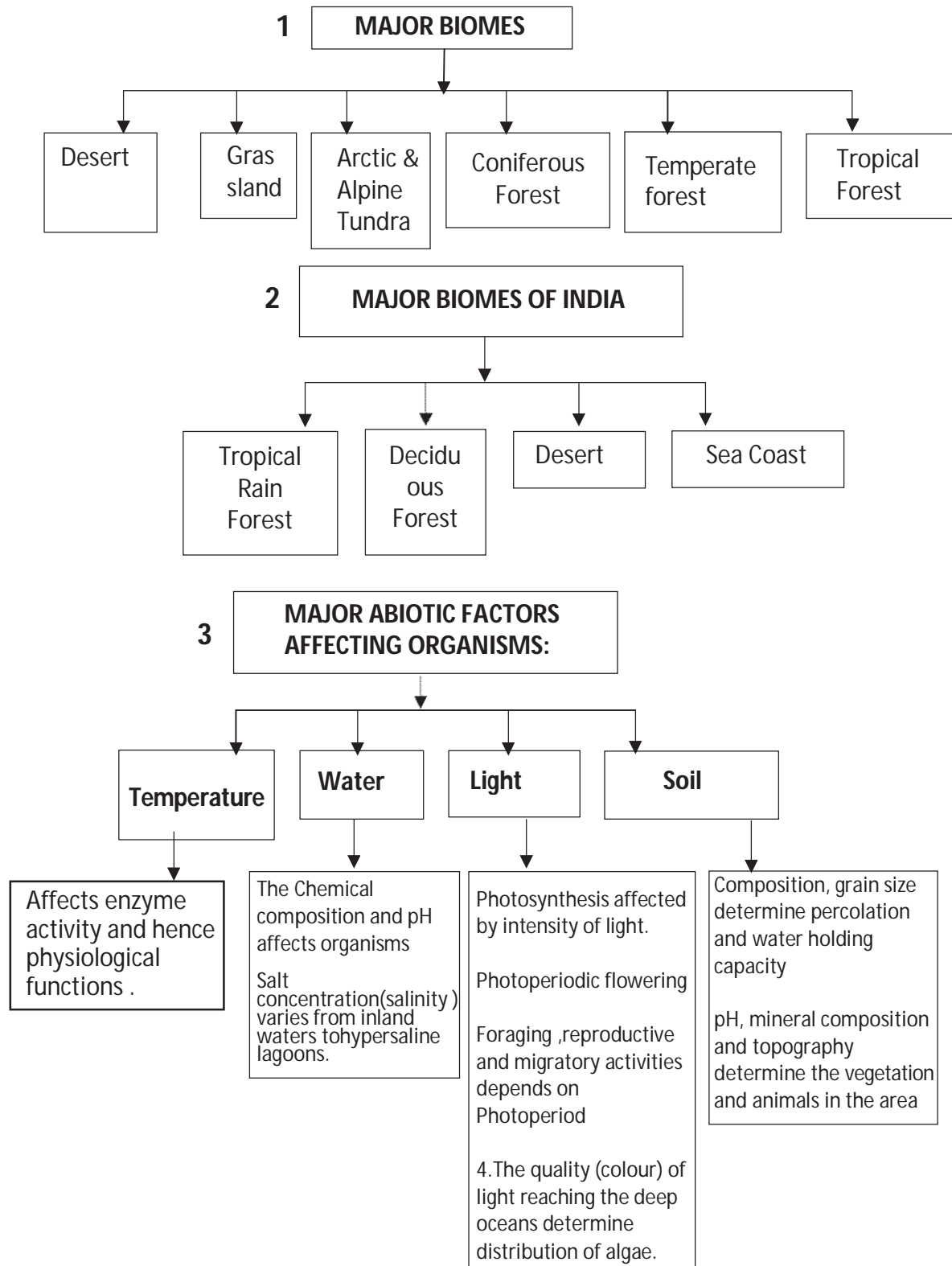
BIOLOGY

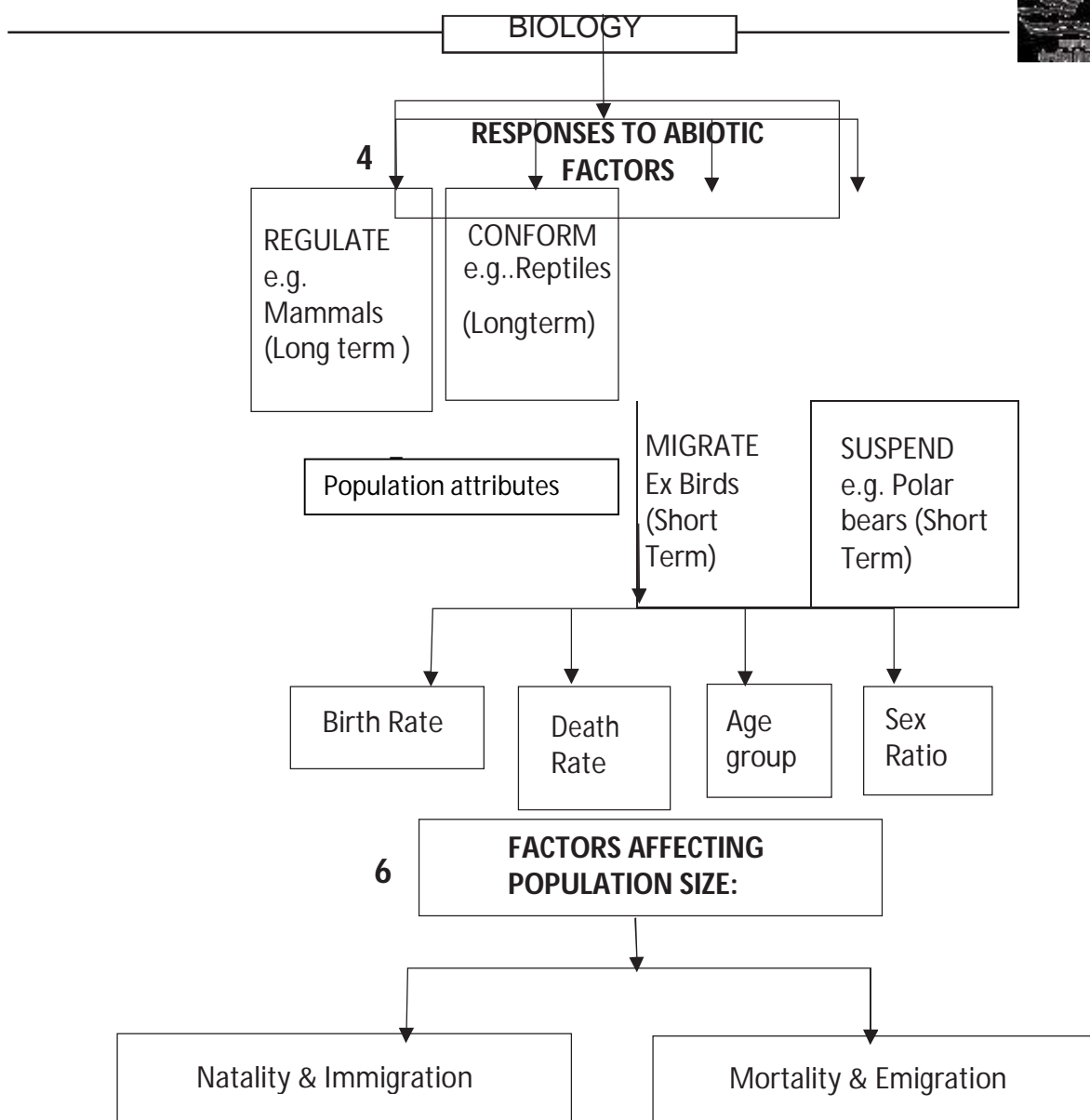


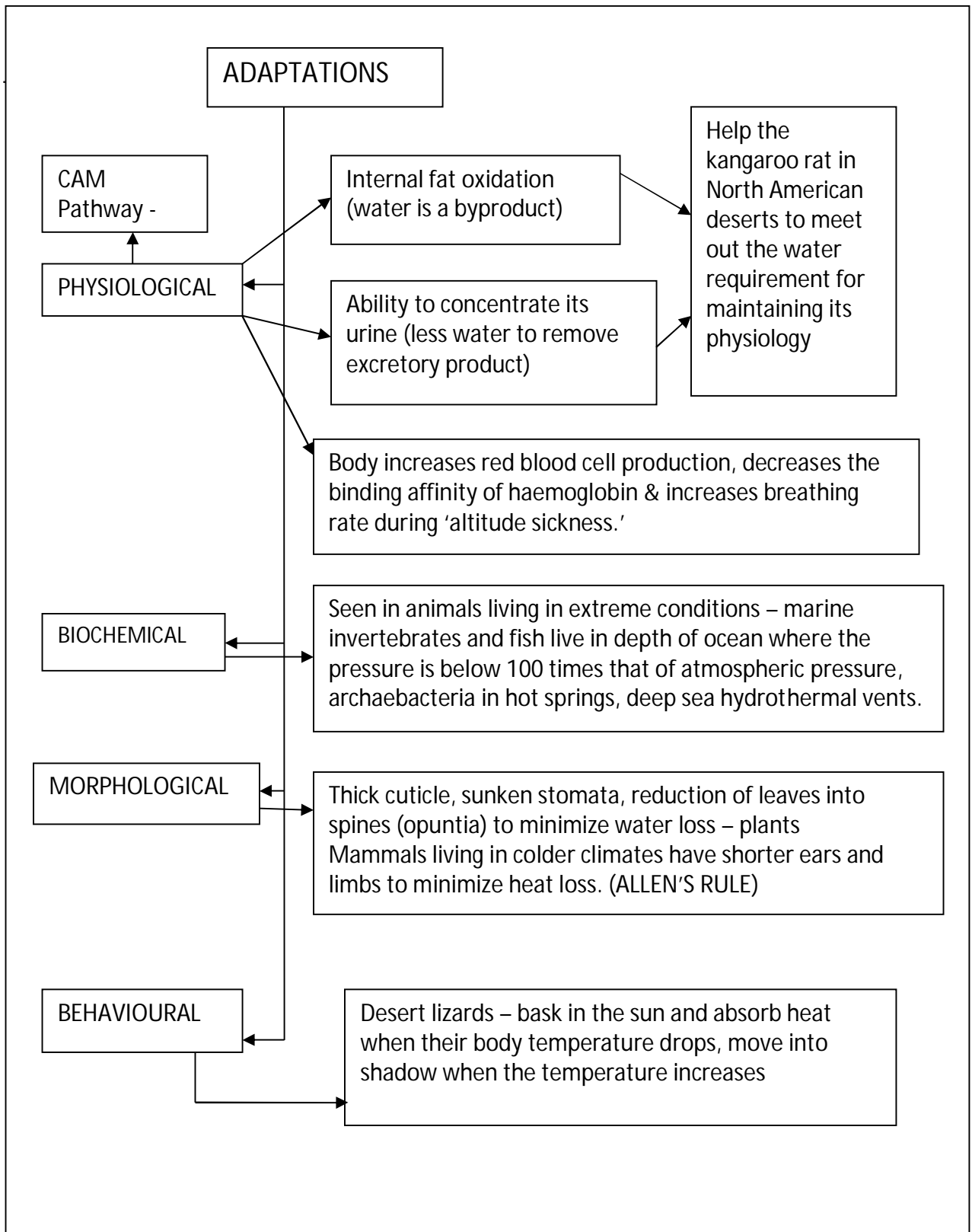
38	Ecosystem	Sum total of biotic & abiotic components of a particular geographical area being integrated through exchange of energy & recycling of nutrients are collectively called ecosystem
39	Biome	Large unit of environment, consists of a major vegetation type & its associated fauna in a specific climatic zone
40	Biosphere	All ecosystems of the world-collectively called Biosphere
41	Factors of environment	Abiotic(Temperature, water, light, Soil), Biotic(Pathogen, Parasites, Predators & Competitors)
42	CAM	Crassulacean Acid Metabolism-Photosynthetic pathway
43	Adaptation-desert plants	Waxy coating on leaf-cuticle, CAM(Stomata closes during day),Spines-in place of leaves--> reduce water loss
44	Adaptation-Mammal-Cold climate	Shorter ears & limbs-Allen's rule, Thick layer of fat-blubber below skin-insulator-reduce loss of heat.
45	Adaptation-desert-Lizards	Absorb heat from sun when body temp. drops below comfort zone., move to shade when ambient temp. temp. rise above comfort levels
46	Adaptation-high altitude-human	Compensate low O ₂ by increasing RBC & total HB-increased breathing-vital capacity.
47	Population density	No. of individuals of a species per unit area or volume. PD=N/S; N=individuals, S=Area
48	Birth rate	No. of births per 1000 individuals of a population
49	Death rate	No. of deaths per 1000 individuals of a population
50	Sex ratio	No. of females per 1000 males of a population in a given time
51	Exponential growth	-common where the resources (food+ space) are not limited. $dN/dt=(b-d)N= dN/dt= rN$; r=intrinsic rate of natural increase

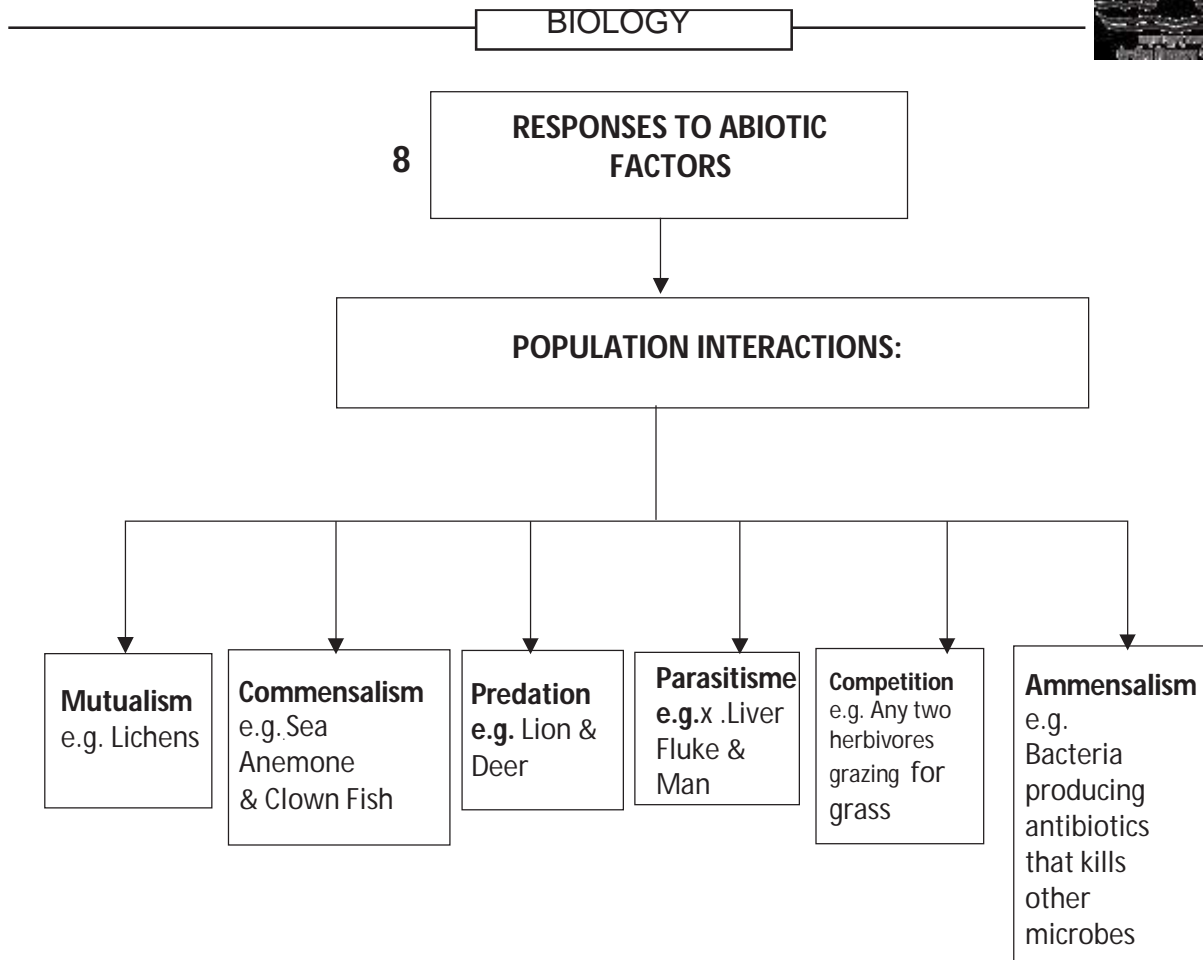


**CHAPTER : 13 ORGANISMS AND POPULATIONS
(FLOW CHART)**



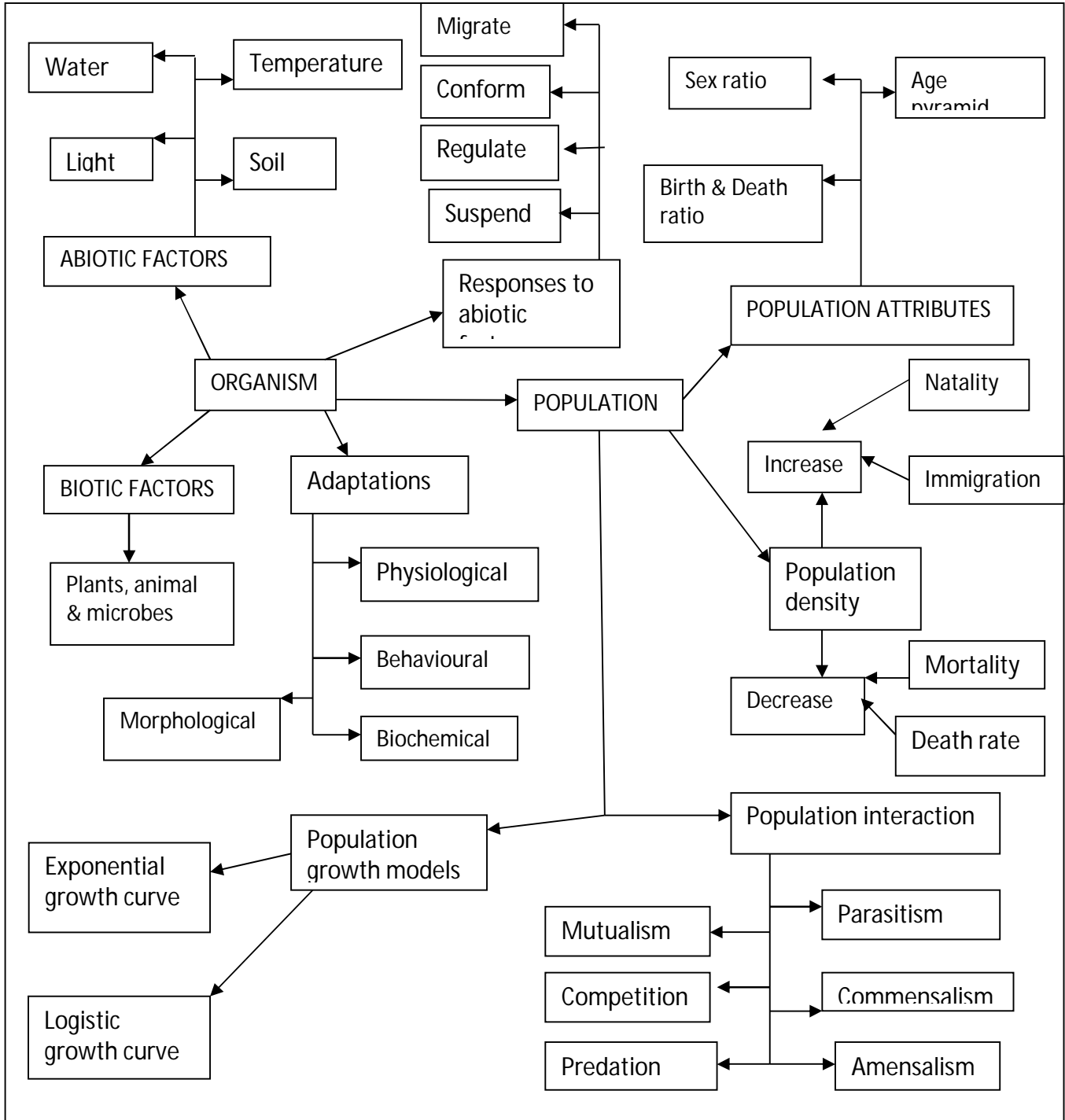






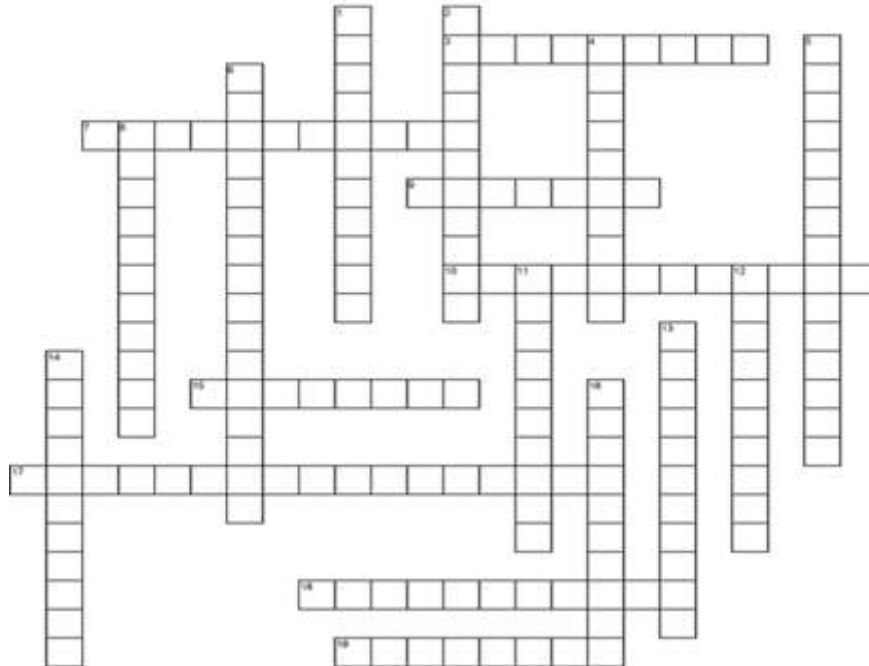


CHAP. 13 ORGANISMS AND POPULATION
CONCEPT MAP





**CHAPTER : 13 ORGANISMS AND POPULATIONS
(CROSS WORD)**



Across:

- 3 It refers to the number of deaths in a population at a given period
- 7 It is the process of spending the winters or very cold conditions in an inactive or dormant state to escape in time.
- 9 It is the place where an organism lives.
- 10 these are the animals, which can tolerate only a very narrow range of temperature and are restricted in distribution.
- 15 refers to the number of births added to the initial population during a given period.
- 17 It refers to the total number of individual species, present per unit area or volume, at a given time,
- 18 It is the process of spending the dry hot periods or summers in an inactive or dormant state to escape in time.
- 19 It is a stage of suspended development shown by many zooplankton species in fresh water bodies.

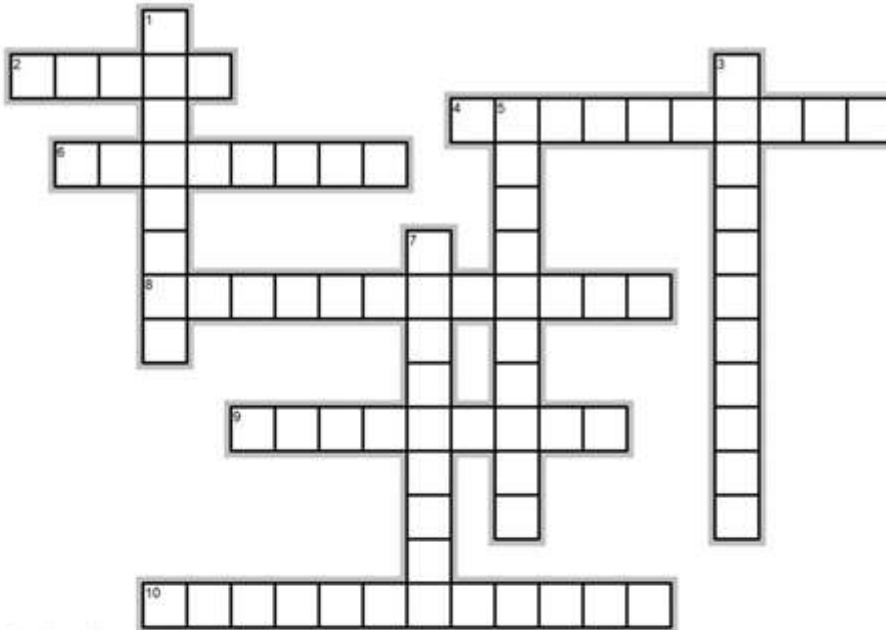
Down

- 1 These are the animals, which can tolerate a wide range of temperature and are geographically widely distributed.
- 2 It is an interaction between species where one is harmed and the other is unaffected..

- 4 Any morphological, physiological or behavioural attribute of an organism that enables it to survive and reproduce in its habitat.
- 5 It refers to the range of conditions an organism can tolerate, the resources it utilises and its distinct functional role in the ecological system.
- 6 It is the maximum number of individuals of a population (or a population) that can be sustained by a given habitat.
- 8 It refers to the number of individuals of the same species that come into a habitat from elsewhere during the time period under consideration,
- 11 It refers to the number of individuals of the same species that left the habitat during the time period under consideration,
- 12 Those organisms which maintain a constant internal (within the body) environment (homeostasis), despite the fluctuations in the environment.
- 13 These are the animals, which can tolerate a very narrow range of salinity
- 14 It is the maintenance of a steady internal environment by organisms,
- 16 These are the animals, which can tolerate a wide range of salinity.

ORGANISM AND POPULATIONS

KVS



EclipseCrossword.com

Across

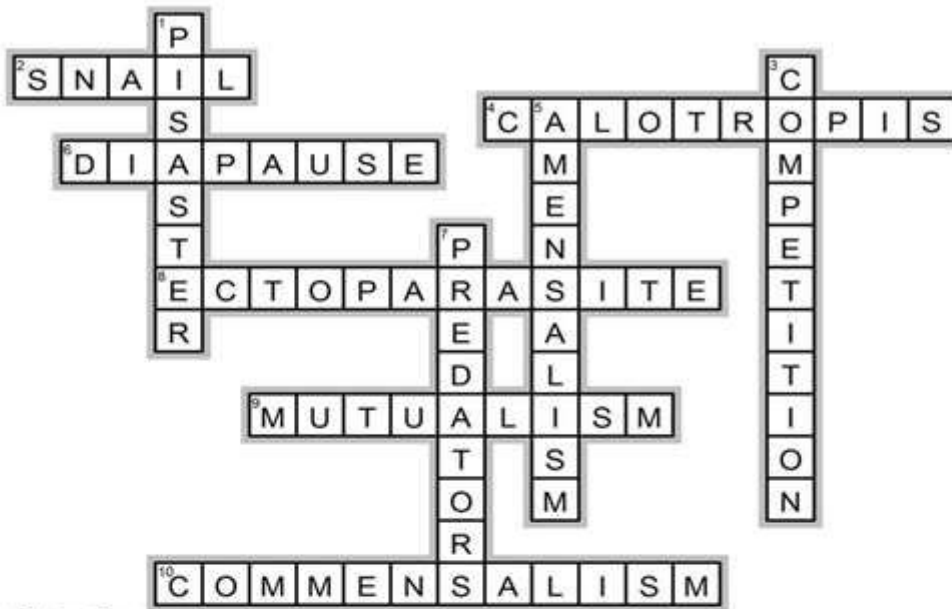
- Human liver fluke depends on this intermediate host along with a fish to complete its cycle
- The weed that is not eaten by any cattle
- under unfavorable conditions zooplanktons undergo this process
- Parasites that feed on external surface of the host are called
- lichens exhibit this interaction
- The interaction in which one species is benefitted and the other is neither benefitted nor harmed

Down

- Removal of this animal led to the extinction of more than 10 species of invertebrates in American pacific coast
- The population interaction in which fitness of one species is lower in the presence of another species
- The interaction where one species is harmed and the other is unaffected
- These organisms act as 'conduits' for energy transfer across the trophic levels

ORGANISM AND POPULATIONS

KVS



EclipseCrossword.com

CHAPTER : 13 ORGANISMS AND POPULATIONS (QUESTION BANK)

1. Predators are prudent. Why?	1
2. Will the distribution level of species be affected by gradual increase in temperature? Say briefly	1
3. How is orchid ophrys pollinated by sexual deceit?	1
4. What is the relationship between egret and grazing cattle? Why?	1
5. Why is female mosquito not considered a parasite?	1
6. What is brood parasitism?	1
7. How is liver fluke adapted to parasitism?	1
8. Gause's competitive exclusion principle, where does this apply?	1
9. How is competition avoided in Nature? Give example.	1
10. How have prey reduced impact of predation?	2
11. How have plants developed defence against predators?	2
12. How are the four levels of biological organisations in ecology interrelated?	2
13. How does temperature affect distribution of animals? Name two types based on their temperature tolerance.	2
14. How does water affect aquatic animals? Explain.	2
15. What is the importance of light for organisms? How do deep sea organisms get their energy?	2
16. Which is the deepest dwelling algae- red, green or brown, why?	2
17. What characteristic of solid determine the vegetation? How are these different at different places?	2
18. What adaptation have parasites evolved?	2
19. What do you mean by competitive release?	2
20. The following graph represents the organismic response to certain environmental condition (e.g. temperature)	
Which one of these, 'a' or 'b' depicts conformers?	
What does the other line graph depict?	
How do these organisms differ from each other with reference to homeostasis?	
Mention the category to which humans belong.	
21. What are the roles of predators?	3
22. Give three example of mutualistic relationship.	3
23. Name the major biomes and the factors by which they vary.	3
24. What are the factors that lead to the variation in the conditions of the habitat?	3
25. How does sconstancy in the internal environment help an organism? How do organisms achieve it with regard to temperature? Give example.	3
26. What alternatives do organisms take it stressful external conditions are localized? Give examples.	3
27. What is altitude sickness? How does the body overcome this?	3
28. Give example of adaptation to desert condition shown by organisms.	5

29.	Give example of biochemical adaption shown by organisms. What are the behavioral adaptations shown by organisms?	5
30.	Define population and population density. How is it estimated? What are the attributes that determine the population characteristics?	5
31.	What factors contribute to growth in population. In what way logistic growth differs from exponential growth?	5
32.	Define adaptation. What is the adaptation shown by –a) whales, b) kangaroo rat, c) polar bear. Why do cold regions not have small animals?	5
33.	Lions are natural predators. Can you compare this act with that of indiscriminate killing of animals by humans for their leather horns etc .Comment.	3

BIOLOGY



**CHAPTER : 13 ORGANISMS AND POPULATIONS
(ANSWER KEY)**

Q.NO.	Value Points	Marks
1	They keep the prey population in check without causing their extinction	1
2	Yes the pattern of distribution will shift towards the poles with increase in temperature	1
3	Sexual deceit	1
4	Commensalism-egret benefits while the cattle are not affected	$\frac{1}{2}+\frac{1}{2}$
5	It does not live in/on the body of the host	1
6	One species lays eggs in the nest of another bird, let the host incubate them E.g. Cuckoo lays eggs in the nest of a crow	1
7	Flat body, suckers for adhering to the host	$\frac{1}{2}+\frac{1}{2}$
8	Organisms living closely related and in case if resources are limiting	1
9	Resource partitioning, two species adopt to have different grazing time to avoid competition.	1
10	Various defences-distasteful ,cryptically coloured to avoid detection	1+1
11	Morphological-thorns and chemical-cardiac glycosides defences	1+1
12	-Similar organisms make Populations -make communities make Biomes	$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$
13	Enzymes activity and therefore metabolic activities ,Eurythermal,stenothermal	$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$
14	pH of water salt concentration Salinity,	1+1
15	Quality of light, photoperiod affect photosynthesis, affect reproductive, for aging activities, ii)scavenging and predation	1+1
16	Red-has longest wavelength	1+1
17	Soil composition, grainsize, percolation and water holding capacity-different based on climate and the weathering process	1+1
18	Loss of unnecessary sense organs, presence of adhesive organs, suckers , loss of digestive system, high reproductive capacity	1+1
19	A species whose distribution is restricted because of the presence of a competitively superior species, expands its distribution when the superior competitor is removed	1+1
20	i) a = conformers = $\frac{1}{2}$ ii)response of the regulators = $\frac{1}{2}$ iii)maintain homeostasis by physiological means, others either migrate, or suspend activities = $\frac{1}{2} \times 3$ iv)regulators = $\frac{1}{2}$	3
21	Conduits of energy, checks prey population, maintains species diversity	1+1+1
22	Lichens-algae and fungi, bird and cattle, wasp and fig tree,	1+1+1
23	Desert, forest and grasslands-Precipitation, temperature, soil	1+1+1

BIOLOGY



24	Soil, temperature, water, light and biotic components like pathogens, parasites, predators and competitors.	1½+1½
25	Constant internal environment permits all biochemical reactions to proceed with maximal efficiency, ii)regulate by physiological means eg sweating to reduce temperature when the external temperature increases.	1+1+1
26	Suspend activities for a brief period till the stressful conditions go(Hibernate or aestivate),migrate–move away to a far off place and return when stressful period is over-birds	1½+1½
27	At higher altitudes the body shows symptoms like nausea, fatigue, heart palpitations, due to insufficient oxygen in the body. The body increases RBC production, decreases oxygen binding capacity of haemoglobin and Increases breathing rate.	1½+1½
28	Spines in place of leaves in cactus, deeply seated stomata, thick cuticle covering leaves, CAM photosynthetic pathway ,minimum loss of water in excretion, flattened green photosynthetic stems in place of leaves	½ x 6
29	Presence of thermos table enzymes in thermophiles, presence of antifreeze proteins in cold water fishes, presence of molecules that can withstand high pressure conditions in the deep sea .Lizards bask in the sun when temperature of their body drops and move to shade, burrows when the temperature around starts increasing	1x5
30	The organisms of the same species at a given time in a specific area. Number of organisms is a measure of population density, or the biomass cover, ii) attributes are natality, mortality, immigration emigration, sex ratio and age distribution	1+1+1+1+1
31	Increase Natality and Immigration .decrease mortality and emigration. exponential growth takes place when resources are unlimited and therefore the reproductive potential is highest., logistic growth shows that the population cannot grow beyond the carrying capacity of the environment.(Depict graphically)	1+1+1+1+1
32	Adaptation is any attribute of an organism that allows the organism to survive and reproduce in its habitat. i)Blubber a layer of fat to prevent heat loss from the body ii)the animal needs only the metabolic water to survive iii) hibernation in polar bears iv)they lose heat faster than the rate of production as their surface area is large compared to its volume.	
33	No predators are prudent and with decrease in prey population the predator population also decreases. This is a Natural chain that helps in keeping a check on population size. Humans on the other hand kill for greed and not for basic needs. It should be realized that every species has a significant role in Nature	1+1+1



CHAPTER : 14 ECOSYSTEM (KEY POINTS)

S.N	Term	Explanation
1	Photosynthetic efficiency	Some plants have more efficiency to trap sunlight-sugarcane
2	Ecosystem	The unit including biotic and a biotic components and their interactions .(Coined-Sir A. G. Tansley1935)
3	Abiotic	Non-living (ex. Temp, light, water, utrients)
4	Biotic:	Living organisms (called biota)
5	Functional Components of Ecosystem	1. Productivity, 2. Decomposition 3. Energy flow 4. Nutrient cycling
6	Primary Production	Amount of biomass or organic matter produced per unit area. Over a time period by plants during photosynthesis, expressed in terms of weight (e) or energy (kcal m-2).
7	Productivity	Rate of biomass production-expressed in terms of g^2yr^{-1} or $(kcalm^2)yr^{-1}$
8	Gross primary productivity Net primary productivity Secondary productivity	-rate of production of organic matter during photosynthesis-GPP GPP- respiratory loss(R)=NPP-> available to heterotrophs (herbivore & decomposers) Rate of formation of new organic matter by consumers
9	Decomposition	Decomposer & break down complex organic matter into inorganic substances like carbon dioxide, water & nutrients
10	Detritus	Dead plant remains such as leaves, bark flowers & dead remains of animals, including faecal matter.-raw material for decomposition, found above & below the ground.
11	Decomposition	Includes Fragmentation, leaching, catabolism, humification & mineralisation
12	Detritivores	Use to breakdown detritus into smaller particles —fragmentation.
13	Process of Decomposition	Fragmentation- Earthworm-breaks down detritus into smaller particles Leaching--Water soluble inorganic nutrients go down into soilhorizon, get precipitated as unavailable salts Catabolism-Bacterial & fungal enzymes convert degraded detritus into Inorganic substances(Simpler) Humification-Occur during decomposition in the soil, lead to accumulation of dark coloured amorphous substance resistant to microbial action, undergoes decomposition at extremely slow rate.(Humus)' Mineralisation- Humus degraded by microbes & release inorganic-nutrient
14	PAR	Photo synthetically Active Radiation
15	Producers	Autotrophs-produce organic matter from in organic matter(producing chemical energy in the form of organic matter)

BIOLOGY



16	Consumers	Heterotrophs-herbivore-carnivore / that depend on producers or other consumers for food.
17	Decomposers	Fungi & bacteria-heterotrophic organisms that break down(decompose)detritus
18	Saprotrophs	Sapro- meaning decompose; decomposers secrete digestive enzymes that breakdown dead & waste materials into simple, inorganic material-subsequently absorbed by them.
19	Food chain	Transfer of energy from producers to top consumers through a series of organisms, one organism holds only one position in the chain, thereby transferring matter/energy from one level to the next.
20	Food web	No. of food chain interconnected with each other like a web, one organism holds more than one position., there are series of branching lines, competition among different members of different trophic levels.(complex network of many interconnected food chains and feeding relationships_
21	Standing crop	Each trophic level with certain mass of living material at a particular time
22	Seral community	Individual transitional community —seral stage/seral community
23	Climax community	Community that is in near equilibrium with the environment
24	Pioneer community	Species that invade a bare area.
25	Primary succession	Establishment of a biotic community in a newly cooled lava, bare rock, newly created pond or reservoir.-slow processes (In water primary succession Phytoplankton->free floating angiosperm-rooted hydrophytes->sedges grasses-> trees->forest(climax)
26	Secondary succession	It begins in areas where natural biotic communities have been destroyed e.g. abandoned farm land, buried or cut forests. Since soil is available —faster process.
27	Hydrarch succession	Takes place in wetter areas(water bodies)& the series progress from hydric to mesic conditions
28	Xerarch succession	Takes place in dry areas (rocks)& series progress from xeric to mesic conditions.
29	Gaseous cycle	Reservoir-atmosphere; nutrient —gas/vapour; quick/faster cycling eg. C& N2-cycle
30	Sedimentary Cycle	Reservoir-earth crust; Nutrient-nongaseous; slow; e.g. P,S cycle
31	Phosphorous	Make shell, bone, teeth, biological membrane, nucleic acids, cellular energy transfer system.
32	Ecosystem services	Robert Constanza-18 trillion US \$ price tag of Nature's life support services.- '1. Purify air,2.cycle nutrient,3.mitigate droughts .& floods, 4.generate fertile soil, 5.provide wild life habitat, 6.Pollinate crop,7.Maintain biodiversity,8.Provide storage site for C, 9.provide aesthetic, cultural & spiritual.

BIOLOGY



33	Energy flow	Solar energy 100%-->plants 2-10%—>consumers; Energy is transferred in an Ecosystem & in each step food is degraded & major portion lost as heat energy at each step.
34	Lindeman's 10% Law	At each step of food chain when food energy is transferred from one trophic level to the next only 10% of energy is passed on to next level.-(1942).
35	Ecological pyramid	The relation between producers & consumers in an.ecosystem —graphically represented in the form of pyramid
36	Pyramid of Number	Relationship between producers & consumers in an ecosystem represented in the form of a pyramid in terms of number. - upright(except tree ecosystem-inverted)
37	Pyramid of Biomass	Relationship between producers & consumers in an ecosystem represented in the form of a pyramid in terms of biomass.(biomass in sea-inverted, e.g. fish-Plankton)
38	Pyramid of energy	Relationship between producers & consumers in an ecosystem represented in the form of a pyramid in terms of flow of energy. - always upright never inverted
39	Ecological succession	Sequential, gradual & predictable changes in the species composition in an area.
40	Sere	Entire sequence of communities that successively changes in a given area.
41	Biome	:Any of the world's major ecosystems, classified according to the predominant vegetation and characterized by adaptations of organisms to that environment. Terrestrial regions inhabited by certain types of life, especially vegetation. eg. Deserts, grassland and forests.
42	Carrying capacity(K)	-maximum population of a particular species that a given habitat can support over a given period of time.
43	Competition	-two or more individual organisms of a single species(intraspecific competition) or two or more individuals of different species (interspecific competition) attempting to use the same /scarce resources in the same ecosystem.
44	Consumer	-organism that cannot synthesize the organic nutrients it needs and gets its organic nutrients by feeding on the tissues of producers or of other consumers; generally divided into primary consumers(herbivores),secondary consumers(carnivores),tertiary(higher- level)consumers, omnivores, and detritivores (decomposers and detritus feeders).
45	Deforestation	-removal of trees from a forested area without adequate replanting.
46	Desert	-biome where evaporation exceeds precipitation and the average amount of precipitation is less than 25 centimeters(10inches)a year. Such areas have little vegetation or have widely spaced , mostly low vegetation.

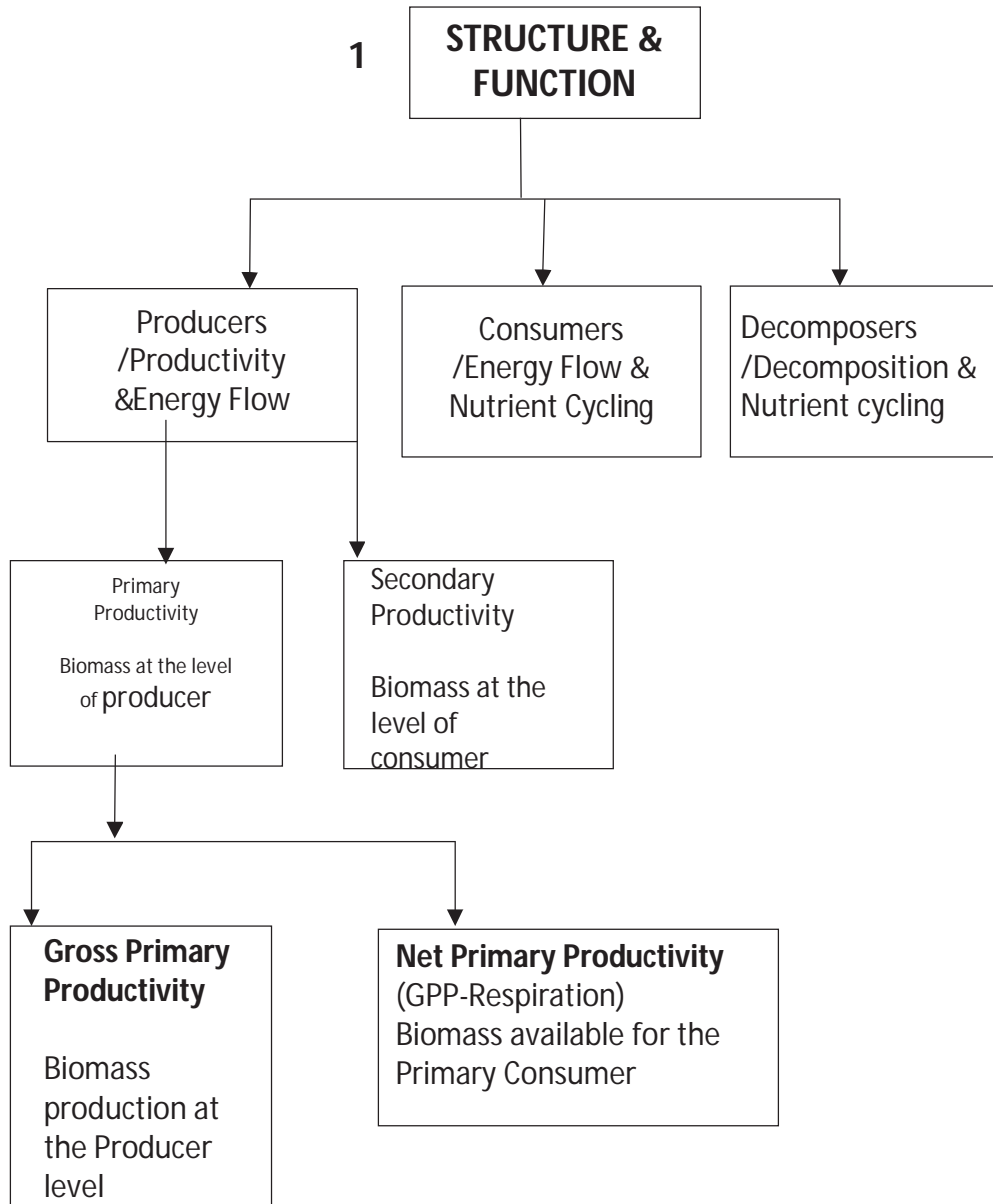
BIOLOGY



47	Desertification	-conversion of range land, rain-fed cropland, or irrigated cropland to desert like land, with a drop in agricultural productivity of 10% or more. It is usually caused by a combination of overgrazing, soil erosion, prolonged drought, and climate change.
48	Ecological niche	-total way of life or role of a species in an ecosystem. It includes all physical, chemical, and biological conditions a species needs to live and reproduce in an ecosystem.
49	Environmental degradation	-depletion or destruction of a potentially renewable resource such as soil, grassland, forest, or wildlife by using it at a faster rate than it is naturally replenished. If such use continues, the resource can become nonrenewable on a human time scale or nonexistent (extinct).
50	Extinction	-complete disappearance of a species from the earth. This happens when a species cannot adapt and successfully reproduce under new environmental conditions or when it evolves into one or more new species (speciation).
51	Forest	-biome with enough average annual precipitation (at least 76 centimeters, or 30 inches) to support growth of various species of trees and smaller forms of vegetation.
52	Grassland	-biome found in regions where moderate annual average precipitation (25 to 76 centimeters, or 10 to 30 inches) is enough to support the growth of grass and small plants, but not enough to support large stands of trees.
53	Habitat	-place or type of place where an organism or a population of organisms lives.
54	Keystone species	species that play roles affecting many other organisms in an ecosystem.
55	Limiting factor	-single factor that limits the growth, abundance, or distribution of the population of a species in an ecosystem.
56	Native species	-species that normally live and thrive in a particular ecosystem.
57	Pioneer community	-first integrated set of plants, animals, and decomposers found in an area undergoing primary ecological succession.
58	Pioneer species	-first hardy species, of microbes, mosses, and lichens, that begin colonizing a site as the first stage of ecological succession.
59	Primary succession	-sequential development of communities in a bare area that has never been occupied by a community of organisms.
60	Secondary succession	-sequential development of communities in an area in which natural vegetation has been removed or destroyed but the soil is not destroyed and has remnants of vegetation.
61	Stratification	Stratification in an ecosystem refers to the vertical distribution of different species occupying different levels



**CHAPTER : 14 ECOSYSTEM
(FLOW CHART)**



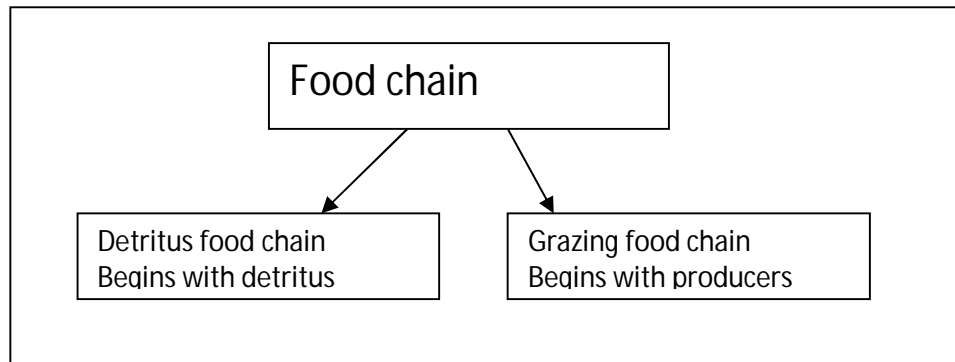


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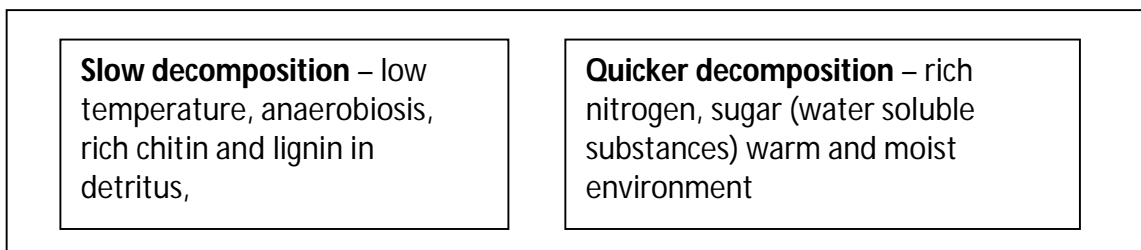
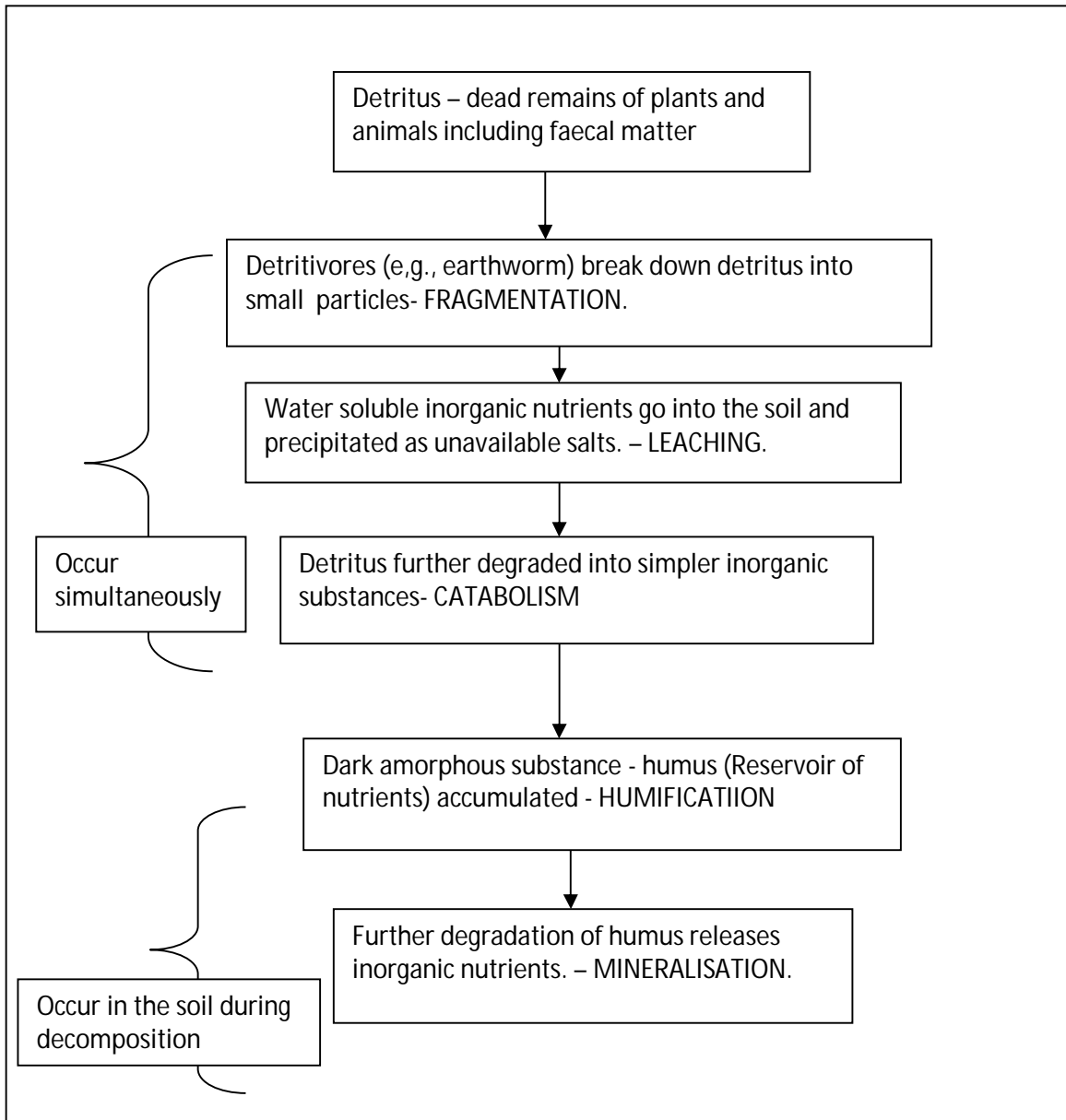
**ENERGY FLOW
FROM SUN TO PRODUCERS TO CONSUMERS**

10% law only (10% of the previous level is transferred to the successive level)	Flow is unidirectional Loss of energy in the form of heat takes place at each level	Flow is from Producers through the Primary, secondary, tertiary consumers	Decomposers derive energy from dead bodies of both Producers and consumers
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3

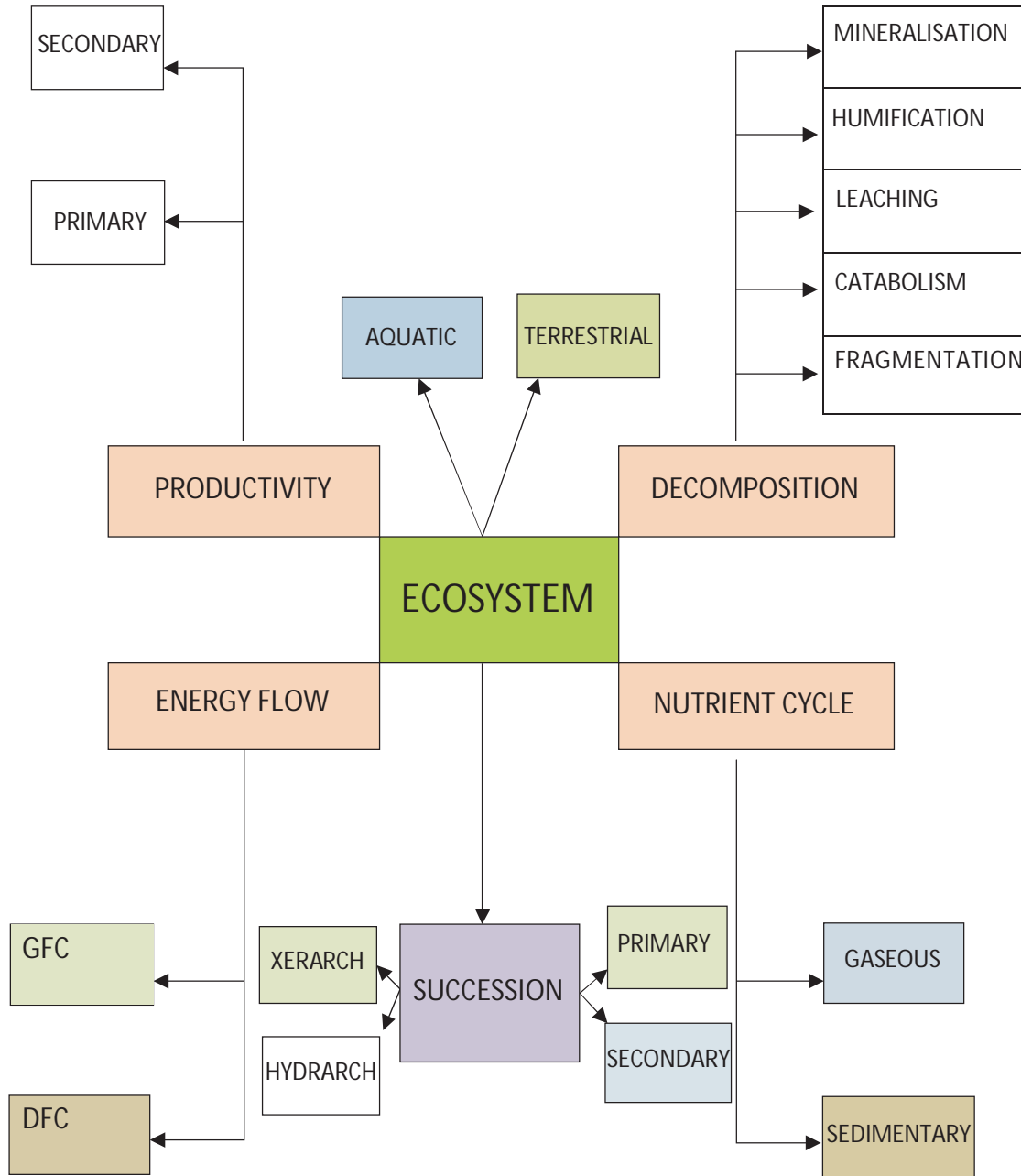


Decomposition - Break down of complex organic matter into inorganic substances like CO_2 , water and nutrients by decomposers



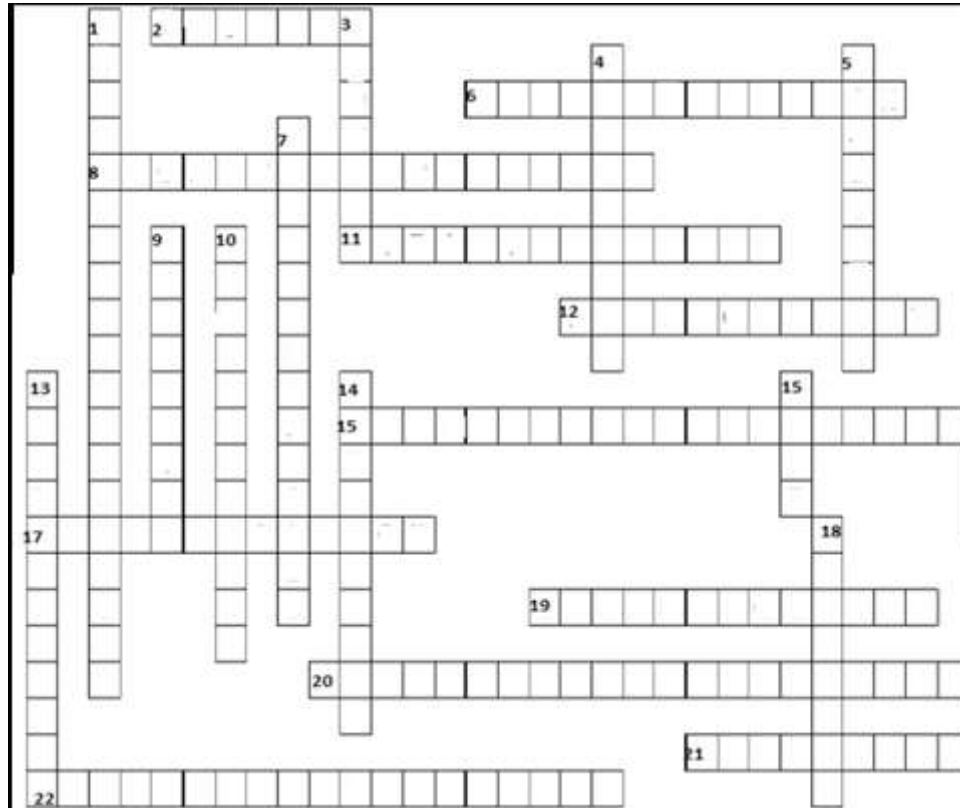


**CHAPTER : 14 ECOSYSTEM
(CONCEPT MAP)**





**CHAPTER : 14 ECOSYSTEM
(CROSS WORD)**



ACROSS:

- 2 An interconnected matrix of food chains,
- 6 It is the process by which humus is degraded to release inorganic nutrients
- 8 The graphic representation of the trophic levels of a food chain.
- 11 refers to the vertical distribution of different species occupying different levels.
- 12 The rate of production of biomass is called
- 16 Ecological succession is a community-controlled process in which the structure and composition of communities change in an orderly and manner, leading ultimately to the establishment of a climax community.
- 17 It is the process in which the complex organic matter is broken down into simpler organic substances and ultimately into inorganic compounds

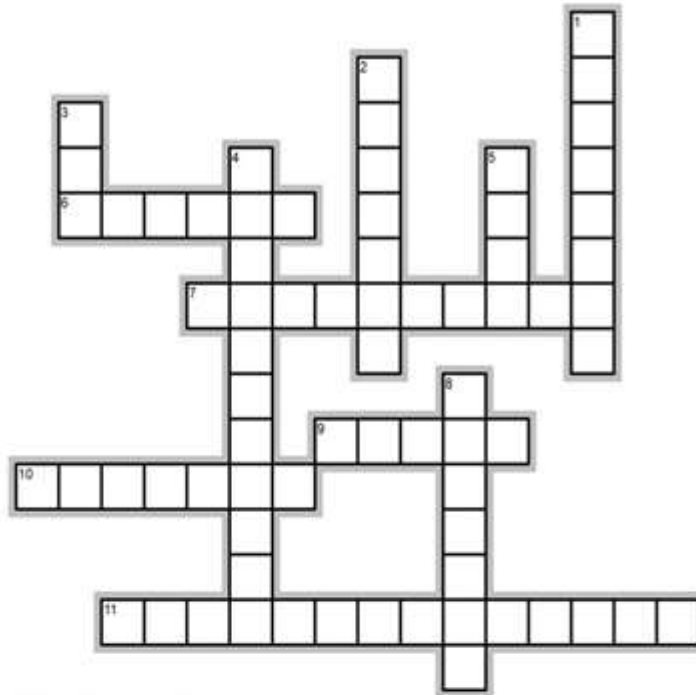
- 3 It is the amount of living organic matter present in an organism/a trophic ecosystem
- 4 The green plants of an ecosystem are called
- 5 It refers to the transfer of energy (food) from the producers through a series of organisms
- 7 The species which invade a bare area and initiate the ecological succession is a functional unit of nature consisting of biotic and abiotic factors, where the living organisms interact among themselves and also with their physical environment (abiotic factors).
- 9 is a functional unit of nature consisting of biotic and abiotic factors, where the living organisms interact among themselves and also with their physical environment (abiotic factors).
- 10 Those organisms which feed on the detritus and break down into smaller
- 11 All organisms/animals which depend directly or indirectly on plants for their food.
- 12 It is defined as the amount of biomass or organic matter produced per unit area over a time period by the plants during photosynthesis.
- 13 It is the mass of living matter in an area
- 14 The primary consumers, which depend only on plants for their food needs.
- 15 The sequential change in the composition of communities that successively change in a given area in a climax community, is called succession.
- 18 The dead remains of plants and animals and other organic matter which are not decomposed, are called detritus.
- 19 It is the amount of nutrients such as nitrogen, phosphorus present in the soil at any given time.
- 20 It is defined as the rate of assimilation and formation of new organic matter by consumers.
- 21 It is the continuous exchange of nutrients among organisms and between organisms and their physical environment
- 22 It is defined as the amount of biomass or organic matter produced per unit area over a time period by the plants during photosynthesis.

DOWN:

- 1 It is the continuous exchange of nutrients among organisms and between organisms and their physical environment
- 3 It is the amount of living organic matter present in an organism/a trophic ecosystem
- 13 It is the mass of living matter in an area
- 14 The primary consumers, which depend only on plants for their food needs.
- 15 The sequential change in the composition of communities that successively change in a given area in a climax community, is called succession.
- 18 The dead remains of plants and animals and other organic matter which are not decomposed, are called detritus.

ECOSYSTEM

KVS



EclipseCrossword.com

Across

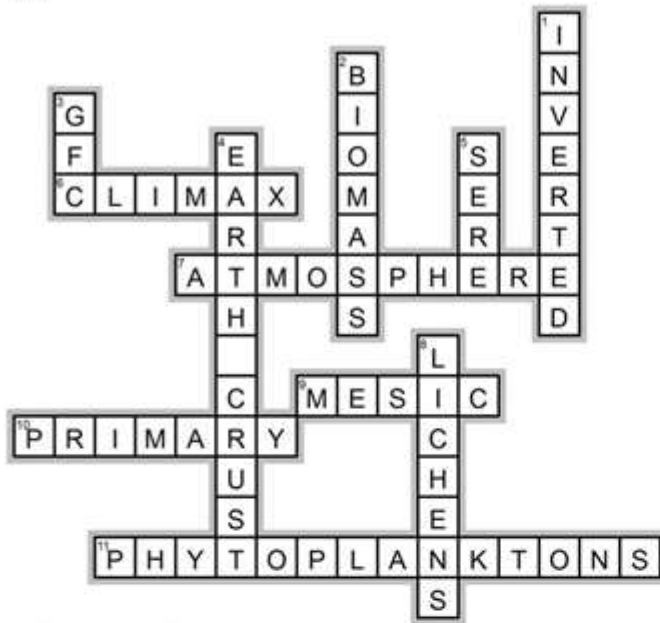
6. Final changes that lead to near equilibrium with the environment in a community
7. The reservoir for gaseous type of nutrient cycle exists in
9. In both hydrarch and xerarch, succession leads to
10. Succession that occurs where no living organisms ever existed
11. The pioneers in water during primary succession

Down

1. The pyramid of biomass in sea is generally
2. The standing crop of trophic level is measured in terms of
3. Major conduit for energy flow in an aquatic system.
4. The reservoir for phosphorus cycle (sedimentary cycle) is in
5. The entire sequence of communities that successively change in given area
8. The pioneer species on rocks are

ECOSYSTEM

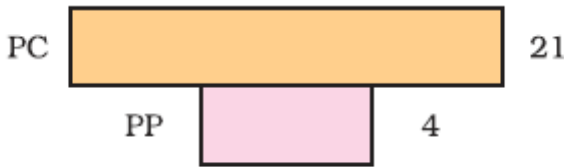
KVS



EclipseCrossword.com

BIOLOGY
(QUESTION BANK)



1.	How is a food web formed?	1
2.	What is stratification in a forest?	1
3.	Define standing crop? How is it measured?	2
4.	What is the importance of humus?	2
5.	Why is secondary succession faster than primary succession?	2
6.	Name the pioneers and climax of primary succession in water and on rocks.	2
7.	The type and number of animals and decomposers also change as succession proceeds. why?	2
8.	Define ecological succession. What is sere?	2
9.	What characteristic features are seen in Ecological succession?	2
10.	Why is there a restriction on trophic levels in a grazing food chain? Is there such a limitation in the detritus food chain? Explain.	2
11.	Schematically show the flow of energy in a grazing food chain from the sun.	2
12.	 <p>Identify the type of the given ecological pyramid and give one example each of pyramid of number and pyramid of biomass in each case.</p>	2
13.	Justify the statement succession and evolution would have been parallel processes at that time when life started on earth.	3
14.	In general all pyramids are upright. Explain. What are the exceptions to this generalization?	3
15.	What are the limitations of ecological pyramids?	3
16.	What are the producers in grass land and oceans .How is GPP different from NPP? Why is the productivity in oceans lesser than on land?	5
17.	Why is it reasonable to think that biodiversity should carry a hefty price tag? Justify.	5
18.	a, Why are Carbon and Phosphorus essential to living organisms?	5
	b, What are the natural reservoirs of these elements and in what form?	
	c, Give the important differences between the two cycles in nature ?	5
19.	With a flow chart explain the process of decomposition .What factors affect this process?	(5)
20.	What are the major functions of an ecosystem? How do the structural components work as a unit to perform the function?	(5)
21.	Humans do a disservice to nature by creating a desert from a forest. Comment	3

BIOLOGY

**CHAPTER 14 – ECOSYSTEM
(ANSWER KEY)**



QNo.	HINTS	Marks
1	Interconnecting food chains/one organism in different trophic levels	1
2	The vertical levels of trees in a forest	1
3	The mass of living matter at a given time measure of biomass ,dry weight of living matter at a given time	1+1
4	The colloidal matter resistant to microbial action ,reservoir of nutrients, breaks down slowly	1+1
5	Soil already formed, spores, seeds remnants of vegetation	½+½
6	Phytoplanktons and forest, lichens and forest	½+½+½+½
7	Vegetational changes, affect food and shelter for various types of animals	1+1
8	Gradual fairly predictable change, in the species composition of a given area. The entire sequence of communities that change in a given area during the succession	1+1
9	There is increase in diversity, species increase and increase in number, increase in biomass	½+½+½+½
10	Energy decreases with successive levels. 10% only transferred to next level.	1+1
11	Sun----1%-----plants----2-10%-----herbivores-----10% -----carnivore	½+½+½+½
12	Inverted pyramid =1 Inverted pyramid of biomass in a lake – phytoplankton---→ zooplankton--→ fish = 1/2 Inverted pyramid of number – tree--→ insects --→ birds = 1/2	
13	Succession starts from the pioneer species giving way to serial communities before establishing the climax. Evolution also involves change of environmental factors followed by change in the communities containing fittest species	1+1+1
14	The producers are the most, in terms of energy, biomass and number and subsequent levels are fewer in number, energy and Biomass .Energy decreases with successive levels, The pyramid of Biomass in the oceans and pyramid of number in the case of a fruiting tree supporting hundreds of consumers, the pyramids can be inverted.	1+1+1
15	Decomposers are not taken into account, two trophic levels may be taken up by the same species which is not considered, a food web is not accommodated	1+1+1
16	Grass, phytoplankton's, GPP is the rate of Biomass production /g/yr whereas NPP is the rate of Biomass converted into plant matter and available for the consumers (NPP=GPP-Respiration),Oceans have less solar energy available compared to land hence productivity is lower.	1+1+1
17	Ecosystem services include 1) maintaining soil 2) regulating rainfall 3) preventing erosion of soil,4) pollination 5)providing materials of medicinal, food and other values	1+1+1+1+1
18	Carbon part of all organic compounds, Phosphorus for ATP, DNA etc Gaseous-Reservoir in atmosphere, Nitrogen cycle b)Sedimentary-Soil, eg-phosphorus. No gaseous component in phosphorus and reservoirs of the two are atmosphere and sediments respectively	1+2+2
19	Breakdown of complex organic matter by decomposers. a)Process- i)fragmentation ii) leaching iii)catabolism. Humification and mineralization–humification leads to accumulation of dark colour substance called humus. Mineralisation result inrelease of in organic substances a)climatic factor– i)temp ii)soil b)chemical quality of detritus. Higher temp and moist condition – high rate of decomposition. Drysoil, High temp–Low rate	2½ +2½
20	Productivity-producers, nutrient cycling and energy flow through the food chains-GFC & DFC, decomposition by the detritivores and decomposers	1+1+1+1+1

BIOLOGY



21	Ecosystem services include regulating the climate, hence livelihood and food of animals and people. Conversion of range land fed cropland, rain or irrigated cropland to desert like and, with a drop in agricultural productivity of 10%ormore.It is usually caused by a combination of overgrazing, soilerosion, prolonged drought and climate change. The soil becomes unsuitable for crops and vegetation food would also become scarce besides water and oxygen.	1+1+1
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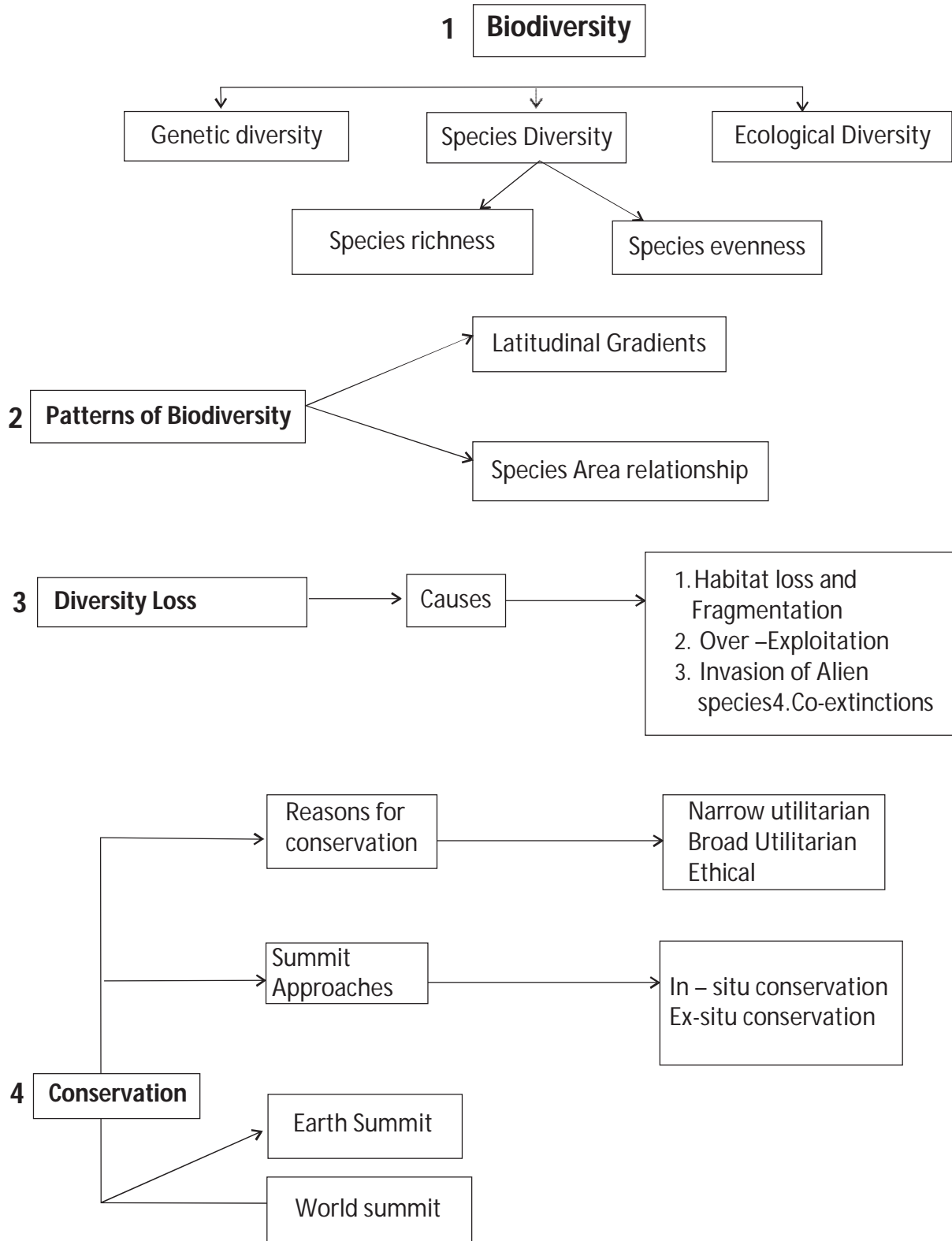


**CHAPTER:15 BIODIVERSITY AND CONSERVATION
(KEY POINTS)**

S.No	Term	Explanation
1	Biodiversity	refers to the sum total of diversity that emits all levels of biological organization
2	Genetic diversity	a single that shows high diversity at the genetic level over its disributional range
3	Species diversity	the diversity at the species level
4	Ecological diversity	the diversity at the ecosystem level
5	Bioprospecting	exploring molecular , genetic and species level diversity for product of economic importance
6	Sacred grooves	tracts of forests were set aside and all the trees and wildlife within were venerated and given total protection
7	Evil Quartet	Sobriquet use to describe 4 major causes of species extinction=Habitat loss & Fragmentation ,Over exploitation ,Alien species invasion & Co extinctions
8	In-situ Conservation	Conservation of species in their natural habitat that is on site conservation
9	Ex-situ Conservation	Conservation of threatened species in special settings where they are protected & given special care that is off site conservation .Eg-zoological parks ,Botanical gardens ,etc.
10	Biodiversity Hotspots	Regions with very high levels of species richness
11	Sacred Groves	Tracts of forests where all trees & wild life within are venerated & given total protection
12	The Earth Summit	Meeting of several nations at Rio de Janeiro in1992 to discuss appropriate measures for conservation of Biodiversity
13	World Summit on Sustainable Development	Meeting of several nations In Johannesburg, South Africa in 2002 to reduce the rate of biodiversity loss
14	Endemism	Species confined to a region & not found elsewhere

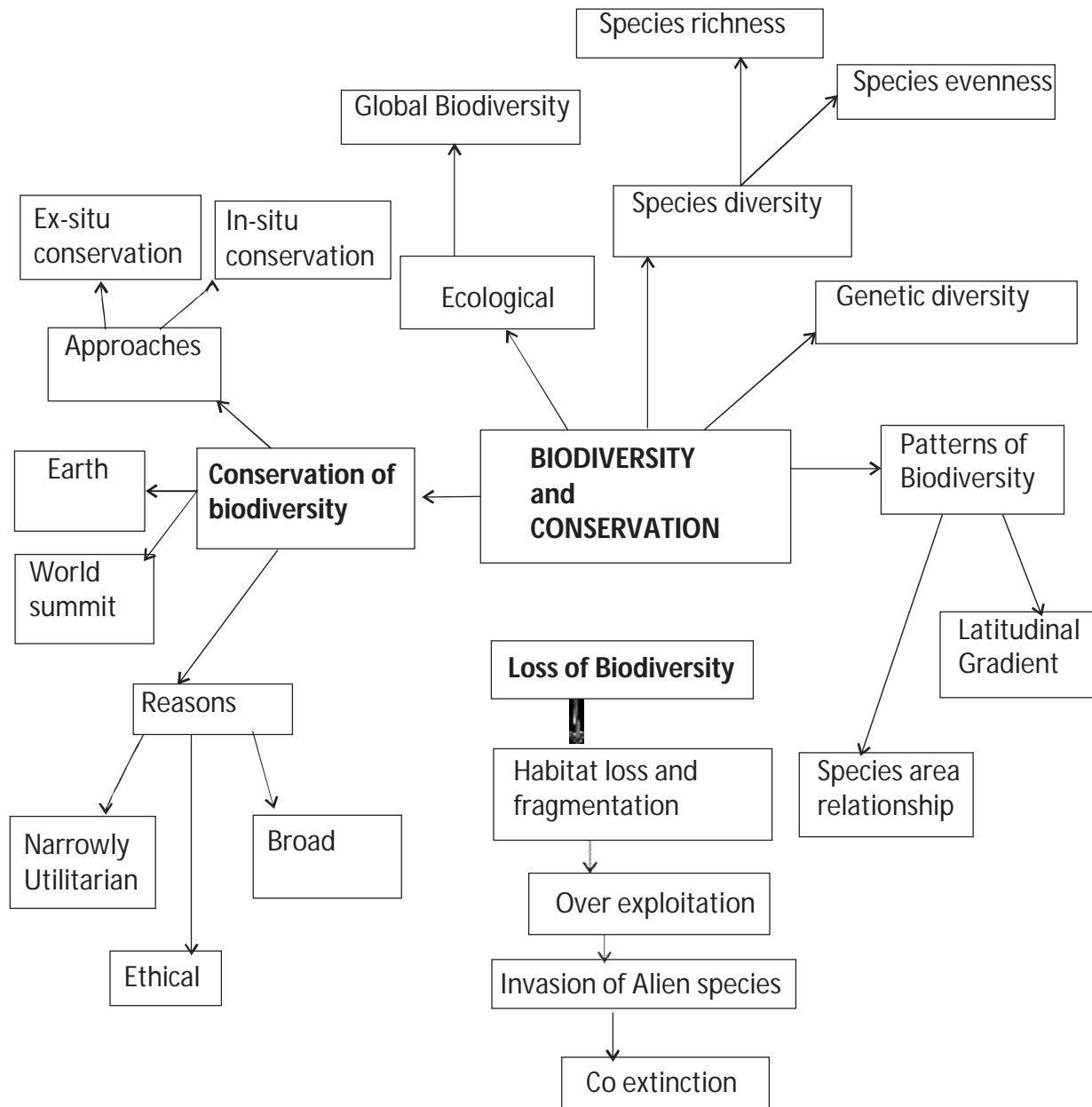


**CHAPTER:15 BIODIVERSITY AND CONSERVATION
(FLOW CHART)**



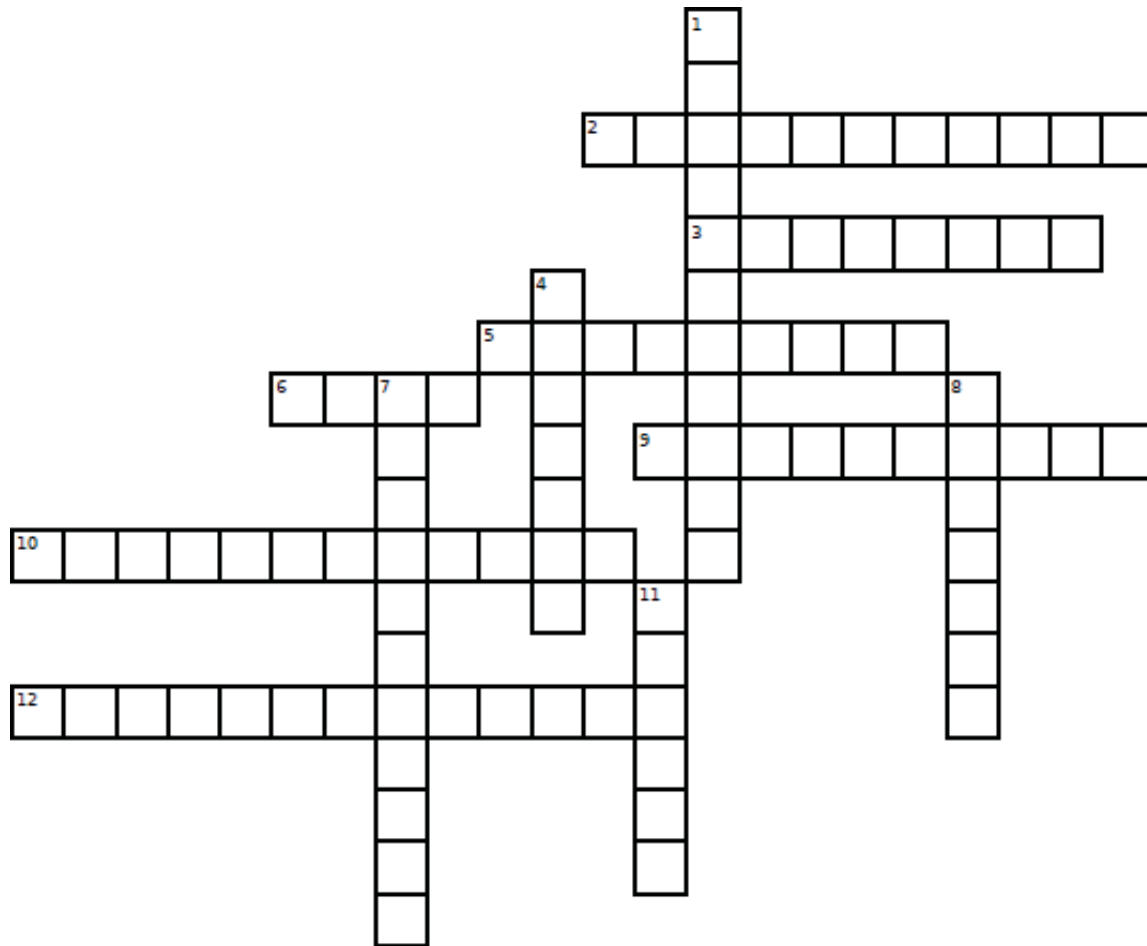


**CHAPTER:15 BIODIVERSITY AND CONSERVATION
(CONCEPT MAP)**





**CHAPTER:15 BIODIVERSITY AND CONSERVATION
(CROSS WORD)**



Down:

1. rivet popper hypothesis
4. priority area of conservation
7. long term ecosystem experiment
8. diversity of genes within aspeices
11. threatened animals and plants are taken out from habitat

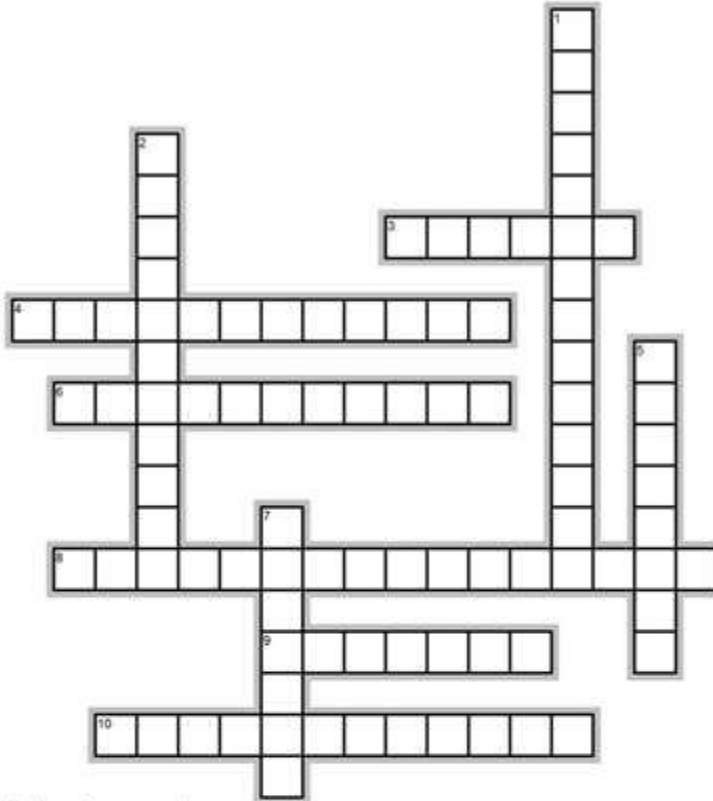
Across:

2. fruit eating animals
3. species confined to specific region
5. estimation of species
6. extinct bird found inmauritis
9. total areas of environment
10. who popularized the term biodiversity
12. sacred grove found in rajasthan



BIODIVERSITY AND CONSERVATION

KVS



EclipseCrossword.com

Across

3. The rain forest that is said to be the Lungs of the planet
4. An American ecologist who showed that increased diversity contributed higher productivity
6. In global biodiversity, estimation of these organisms is not given.
8. The bird that was extinct due to over exploitation of human.
9. Conservation of threatened animals and plants in the off site, away from their natural habitat
10. The combined diversity at all levels of biological organisation is termed as

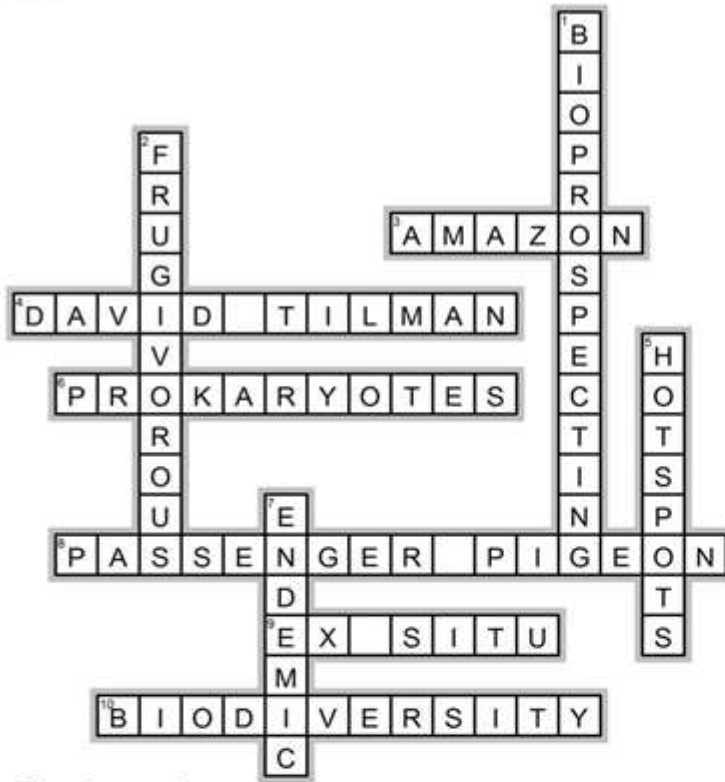
5. A biogeographic region with significant levels of biodiversity that is threatened with humans
7. Species confined to particular area and not found anywhere else

Down

1. Exploring molecular, genetic and species - level diversity for products of economic importance is termed as
2. Fruit eating animals

BIODIVERSITY AND CONSERVATION

KVS



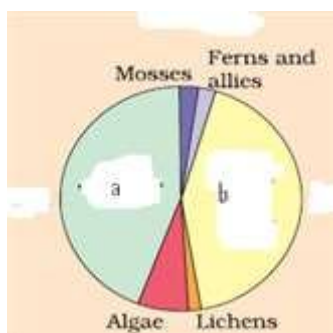
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CHAPTER:15 BIODIVERSITY AND CONSERVATION

(QUESTION BANK)

1. Why is India said to have greater ecosystem than Norway?
2. Name the unlabeled areas 'a' and 'b' of the pie chart representing the biodiversity of plants showing their proportionate number of species of major taxa.



3. Write the importance of cryopreservation in conservation of biodiversity.
4. Write the basis on which an organism occupies a space in its community / natural surroundings?
5. The amazon rain forest is referred to as 'the lungs of the planet'. Mention any one human activity which causes loss of biodiversity in this region.
6. About 20 species of a Cichlid fish became extinct when a particular fish was introduced in Lake Victoria of Africa. Name the invasive fish.
7. What is the expanded form of IUCN?
8. Why is genetic variation important in the plant *Rauwolfia vomitoria*?
9. What is meant by 'alien species' invasion? Name one plant and one animal alien species that are threat to our Indian native species.
10. Why should biodiversity be conserved? List any two ethical arguments in this support.
11. State the use of biodiversity in modern agriculture.
12. Differentiate between in situ and ex situ approaches of conservation of biodiversity?
13. Explain taking one example, the effect of co-extinction on biodiversity?
14. In the biosphere, immense biological diversity exists at all levels of biological organization. Explain any two levels of biodiversity?
15. What does the term genetic diversity refer to? What is the significance of large genetic diversity in a population?
16. The sacred grooves of Aravalli hills and Ooty botanical garden, both aim at biodiversity conservation. How do they differ in their approaches? Explain.
17. Alien species are highly invasive and area threat to indigenous species. Substantiate this statement with any three examples.
18. List the reasons that account for the greater biological diversity in tropics?
19. Explain giving one example, how co-extinction is one of the causes of loss of biodiversity. List the three other causes also (without description).
20. Explain 'Rivet popper hypothesis' name the ecologists who proposed it.
21. What are the two types of desirable approaches to conserve biodiversity? Explain with examples bringing out the difference between the two types.
22. a) Taking one example each of habitat loss and fragmentation, explain how the two are responsible for biodiversity loss.
b) Explain two different ways of biodiversity conservation.



CHAPTER: 15 BIODIVERSITY AND CONSERVATION

23. Isah Upanishad says 'let no one species encroach over the rights and privileges of other species. One can enjoy nature by giving up greed'. But human activities have accelerated the rate of extinction of species in recent times.
- (a) Name any four such mass activities.
 - (b) Describe how each of these activities leads to loss of biodiversity.
 - (c) What value is taught by the Upanishad?
24. During an excursion to a botanical garden, the teacher shows an old tree which was on the verge of extinction. As soon as the teacher advanced with the students, some enthusiastic students climbed up the tree and started cutting the branches, collecting its leaves as precious collection. Rajesh instead took photographs of the tree from various angles. The boys mocked at Rajesh while the teacher appreciated him.
- a) Why should we conserve biodiversity?
 - b) How can biodiversity be conserved?



**CHAPTER:15 BIODIVERSITY AND CONSERVATION
(ANSWER KEY)**

Q. No.	Hints	marks				
1.	India has a number of ecosystems like deserts, rainforests, coralreefs, mangroves, wetlands, estuaries and alpine meadows, hence, it has greater ecosystem diversity than Norway.	1				
2	A= fungi, b = angiosperm=1/2+1/2					
3	<i>Gametes of threatened species can be preserved in viable and fertile conditions for long periods using cryopreservation.</i>	1				
4	feeding relationships with other organisms food habits / trophic					
5.	a) Many plants are cut and land is cleared for cultivation of soybean. b) Conversion of forest land into grassland for raising beef cattle.	1				
6	Nile perch	1				
7	International union for conservation of nature and natural resources.	1				
8	Genetic variation in Rauwolfia is shown in terms of potency and concentration of the active chemical reserpine produced by the plant.	1				
9	The introduction of Nile perch into lake Victoria led to the extinction of more than 200 species of cichlid fish in that lake, Introduction of African catfish clarkias gariepinus for aquaculture poses a threat to the indigenous catfishes in Indian rivers. Carrot grass and lantana introduced into our country have become invasive and caused environmental damage; they pose a threat to the native species of plants in our forests.	2				
10	Biodiversity must be conserved as it plays an important role in many ecosystem services. a) Spiritually or philosophically, we have to realize the every species has an intrinsic value, though it may not be of any economic value to us currently. b) Morally, we have a duty to care for well-being of the species and pass on our biological legacy in good order to future generations.	2				
11	<ul style="list-style-type: none"> • Human beings obtain food, fibers, medicines and many industrial products from plants. • The wild relatives of our crops are useful as a source of disease-resistance, pest-resistance and many desirable characters; they are used in breeding of plants to raise plants with desirable traits. • With increasing resources put into bioprospecting, exploring molecular genetics and species level diversity for economically important products, rich biodiversity will be beneficial. 	2				
12	<table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%; text-align: center;">In situ</th> <th style="width: 50%; text-align: center;">ex situ</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> - It is the method of protecting the endangered species of the plants or animals in the natural habitat, either by protecting or cleaning up the habitat itself or by defending species from predators. - It helps in recovering populations in the surroundings where they have developed their distinct features. </td> <td> <ul style="list-style-type: none"> - It is the method of protecting endangered species of plants and animals by removing them from the unsafe or threatened habitat and placing under the care of humans. - It helps in recovering populations or preventing their extinction under simulated conditions that closely resemble their natural habitats. </td> </tr> </tbody> </table>	In situ	ex situ	<ul style="list-style-type: none"> - It is the method of protecting the endangered species of the plants or animals in the natural habitat, either by protecting or cleaning up the habitat itself or by defending species from predators. - It helps in recovering populations in the surroundings where they have developed their distinct features. 	<ul style="list-style-type: none"> - It is the method of protecting endangered species of plants and animals by removing them from the unsafe or threatened habitat and placing under the care of humans. - It helps in recovering populations or preventing their extinction under simulated conditions that closely resemble their natural habitats. 	2
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BIOLOGY



13	<p>Co-extinction leads to loss of biodiversity because when a species become extinct, the plant and animal species associated with it in an obligatory manner, also become extinct.</p> <ul style="list-style-type: none"> - In case of a co-evolved plant-pollinator mutualists, extinction of one of them invariably leads to the extinction of the other. 	2
14	<ul style="list-style-type: none"> - Humans depend on nature for food and shelter: -But over-exploitation of natural resources has led to extinction of many species in the last 500 years, e.g., Steller's sea-cow and passenger pigeon, are lost due to over-exploitation. - Many marine fish populations around the world are over-exploited thus enhancing the continued existence of some commercially important species. Levels of biodiversity: - Genetic diversity refers to the diversity of genes within a species, e.g., there are more than 50,000 genetically different strains of rice in India. - Species diversity refers to the number of different species within a species within a given region, e.g., Western Ghats have a greater amphibian species diversity than Eastern Ghats. - Ecological diversity refers to variation of habitats, community types and a biotic environments present in a given area. - India has a greater ecosystem or ecological diversity than Scandinavia. 	2
15	<p>Genetic diversity refers to the diversity of genes within a species.</p> <p>Genetic diversity is important for the following reasons:</p> <ul style="list-style-type: none"> - Greater the genetic diversity among organisms of as pecies, more sustenance it has against environmental perturbations. - Genetically uniform populations are highly prone to diseases and harsh environment. 	2
16	<p>The sacred groves are a part of in situ conservation while Ooty botanical garden is a part of ex situ approach.</p>	2
17	<ul style="list-style-type: none"> - The Nile perch introduced into Lake Victoria in East Africa caused extinction of more than 200 species of cichlid fish in that lake. - Parthenium, -Lantna and Eichhornia caused environmental damage and posed threat to many species in our country. Illegal introduction of African catfish, Clariasgariepinus for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers. 	3
18	<ul style="list-style-type: none"> - Speciation is a function of time; the temperate regions were subjected to frequent glaciation in the past, while the tropics have remained undisturbed and hence had longer time to evolve more species diversity. - The tropical environments are less seasonal and relatively more constant and more predictable than temperate regional speciation has been promoted/favored by such constant environments and haven there is greater species diversity. - There is more solar radiation available in the tropical region; this contributes directly to more productivity and indirectly to greater species diversity. 	3
19	<p>Co-extinction is a phenomenon in which when a species becomes extinct, the plant and animal species associated with it, in an obligatory manner, also become extinct .e.g.,</p> <ul style="list-style-type: none"> - In case of a co-evolved plants and its pollinator, if one of them becomes extinct, invariably the other one becomes extinct. -If a host fish becomes extinct, the unique parasites depending on it would also become extinct. <p style="padding-left: 40px;">Three other causes are:</p> <ol style="list-style-type: none"> (I) Habitat loss and fragmentation (ii) Over-exploitation (iii) Invasion of lien species 	3

BIOLOGY



20	<p>Rivet- Popper Hypothesis</p> <ul style="list-style-type: none"> - It was proposed by Paul Ehrlich. - In an airplane all parts are joined together using thousands of rivets. - If every passenger travelling in it, starts popping arrive to take home, it may not affect the flight safety initially, but as more and more rivets are removed, the plane becomes dangerously weak over a periods of time. -Further, which rivet is removed may also be critical; i.e., loss of rivets on the wings. <p>Key species that drive major ecosystem function is obviously a more serious threat to flight safety than loss of a few rivets on the seats or windows inside the plane.</p>	3				
21	<p>(a) The two desirable approaches to conserve bio diversity are:</p> <ol style="list-style-type: none"> 1. In situ conservation and 2. Ex situ conservation <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <th style="width: 50%; padding: 5px;">In situ</th> <th style="width: 50%; padding: 5px;">ex situ</th> </tr> <tr> <td style="padding: 5px;"> <p>It is the method of protecting the endangered species of the plants or animals in the natural habitat, either by protecting or cleaning up the habitat itself or by defending species from predators.</p> <p>It helps in recovering populations in the surroundings where they have developed their distinct features.</p> </td> <td style="padding: 5px;"> <p>It is the method of protecting endangered species of plants and animals by removing them from the unsafe or threatened habitat and placing under the care or humans.</p> <p>It helps in recovering populations or preventing their extinction under simulated conditions that closely resemble their natural habitats.</p> </td> </tr> </table> <p>(b) It is the case of co-evolution.</p> <ul style="list-style-type: none"> - The orchid Oshryemploy's sexual deceit' to get pollinated by the specific bumblebee. - One petal of its flower beer sun canny resemblance to the female of the bee, insize, color and markings. - The male bee perceives it as a female psudocopulates with it; during the process of pollen brought by the bee from the bee from another orchid flower is dusted on the stigma. - If the occurs as light change in the colors or patterns of the female bee, the pollination success will be reduced unless the orchid coevolves to maintain the resemblance of its petal to the female bee. 	In situ	ex situ	<p>It is the method of protecting the endangered species of the plants or animals in the natural habitat, either by protecting or cleaning up the habitat itself or by defending species from predators.</p> <p>It helps in recovering populations in the surroundings where they have developed their distinct features.</p>	<p>It is the method of protecting endangered species of plants and animals by removing them from the unsafe or threatened habitat and placing under the care or humans.</p> <p>It helps in recovering populations or preventing their extinction under simulated conditions that closely resemble their natural habitats.</p>	5
In situ	ex situ					
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22	<p>(a) habitat loss and fragmentation</p> <ul style="list-style-type: none"> - It is the primary cause for extinction. - The tropical rain forests initially covered 14% of the land surface of the earth, but now they cover only 6% of land area. - Total loss of a habitat deprives many animals and plant of their homes and they face extinction. -When a large habitat becomes fragmented, animals requiring large territories and those with certain migratory habits start decreasing. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <th style="width: 50%; padding: 5px;">In situ</th> <th style="width: 50%; padding: 5px;">ex situ</th> </tr> <tr> <td style="padding: 5px;"> <p>It is the method of protecting the endangered species of the plants or animals in the natural habitat, either by protecting or cleaning up the habitat itself or by defending species from predators.</p> <p>It helps in recovering populations in the surroundings where they have developed their distinct features.</p> </td> <td style="padding: 5px;"> <p>It is the method of protecting endangered species of plants and animals by removing them from the unsafe or threatened habitat and placing under the care or humans.</p> <p>It helps in recovering populations or preventing their extinction under simulated conditions that closely resemble their natural habitats.</p> </td> </tr> </table>	In situ	ex situ	<p>It is the method of protecting the endangered species of the plants or animals in the natural habitat, either by protecting or cleaning up the habitat itself or by defending species from predators.</p> <p>It helps in recovering populations in the surroundings where they have developed their distinct features.</p>	<p>It is the method of protecting endangered species of plants and animals by removing them from the unsafe or threatened habitat and placing under the care or humans.</p> <p>It helps in recovering populations or preventing their extinction under simulated conditions that closely resemble their natural habitats.</p>	5
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23	<p>(a) major causes for loss of species include:</p> <ul style="list-style-type: none"> - Habitat loss and fragmentation. - Over-exploitation by man for natural resources. - Invasion of alien species, which compete with the native species and cause their extinction. - Co-extinction of related plants and animals. <p>(b) Biodiversity loss</p> <p>(i) habitat loss and fragmentation</p> <ul style="list-style-type: none"> - It is the primary cause for extinction. - The tropical rain forests initially covered 14% of the land surface of the earth, but now they cover only 6% of land area. - Total loss of a habitat deprives many animals and plants of their homes and they face extinction. - When a large habitat becomes fragmented animals requiring large territories and those with certain migratory habits start decreasing. <p>(ii) Over-exploitation</p> <ul style="list-style-type: none"> - When nature is over exploited by man for the natural resources, many species become extinct <p>(iii) Invasion by Alien Species</p> <ul style="list-style-type: none"> - The alien species become invasive and compete with native species and cause extinction of indigenous species. <p>(iv) Co-extinction</p> <ul style="list-style-type: none"> - It is a phenomenon in which when a species becomes extinct, the plant and animal species associated with it in an obligatory manner, also become extinct. <p>(c) As per the Upanishad itself, you don't have any right to kill other species; live and let others live.</p>	
24.	<p>a) Respect for nature, scientific attitude with a vision of the future</p> <p>b) We should conserve Biodiversity since it provides us</p> <ul style="list-style-type: none"> • Main source of food • Source of economically important fibers (cotton, flax, hemp, jute etc) • Plant products (gum, resin, dye, fragrance, waxes, wool, leather, honey, lac, pearl, ivory, silk, horns) • Drugs and medicine • Sports and recreation • Aesthetic value • Cultural value • Scientific research • Eco system services <p>c) In situ conservation: Sacred grove, Biosphere reserve (Terrestrial and Marine), National parks and Wild life sanctuaries etc)</p> <p>Ex situ conservation: a) Sacred plants, home gardens b) Seed banks, gene bank, cryopreservation c) Botanical garden, Zoological garden, Aquaria etc.</p>	3

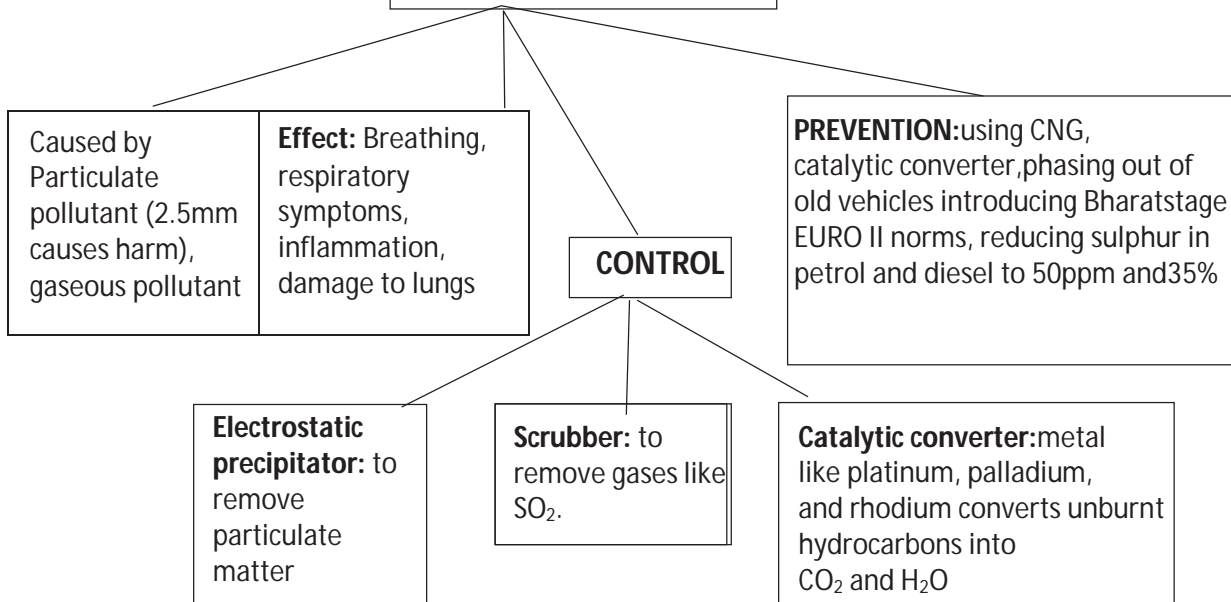
BIOLOGY**CHAPTER:16 ENVIRONMENTAL ISSUES
(KEY POINTS)**

S.No	Term	Explanation
1	DU	Dobson unit
2	CPCB	Central Pollution Control Board
3	BOD	Biochemical Oxygen Demand
4	CNG	Compressed Natural Gas
5	FOAM	Friends of Arcata Marsh
6	JFM	Joint Forest Management
7	PIL	Public interest litigation
9	Air prevention & control	1981 Protect & control of air pollution act
10	Environmental(protection)	1986 Protect & control the quality of environment act
11	Water (prevention & control of pollution)act	1974 Protect & control of water pollution to safe guard water resources
12	Chipko movement	1974 protection of forest
13	Montreal protocol	1989 Control on emission of ozone depleting substances
14	Pollution	Undesirable changes in physical/chemical/biological characteristics of air/water/land
15	Pollutants	Agents which cause pollution
16	Slash and Burn Agriculture (Jhum Cultivation)	Cutting down trees and burn the plant remains. Ash is used as a fertiliser and the land is then used for farming or cattle grazing.
17	Algal Bloom	excessive growth of algae due to presence of nutrient in water
18	PhytoPlankton	Free floating aquatic organisms.
19	Bio magnification	Increase in concentration of toxic substances at successive trophic levels.
20	Eutrophication	Natural aging of lake by nutrient enrichment
21	Snow blindness	Inflammation of cornea due to high dose of UV-B radiation
22	Amrita Devi Bishnoi wildlife protection award	Award given by Govt of India for the individuals/ communities from rural areas that show extraordinary courage and dedication in protecting the wildlife.

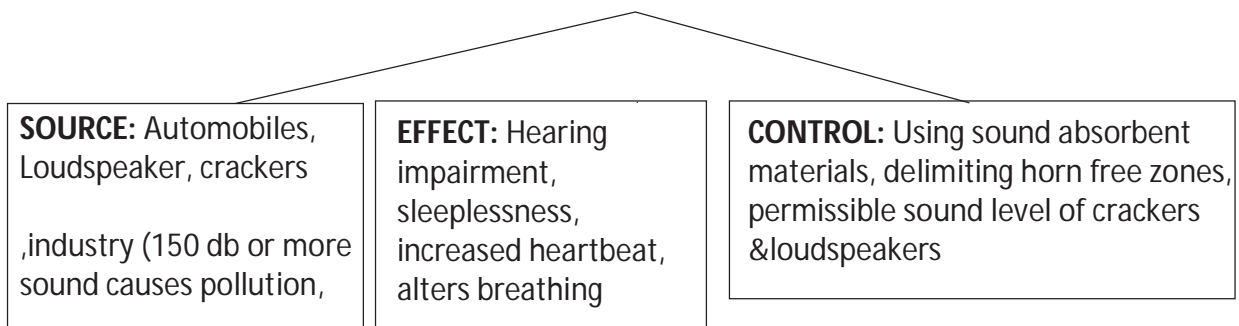


**CHAPTER:16 ENVIRONMENTAL ISSUES
(FLOW CHART)**

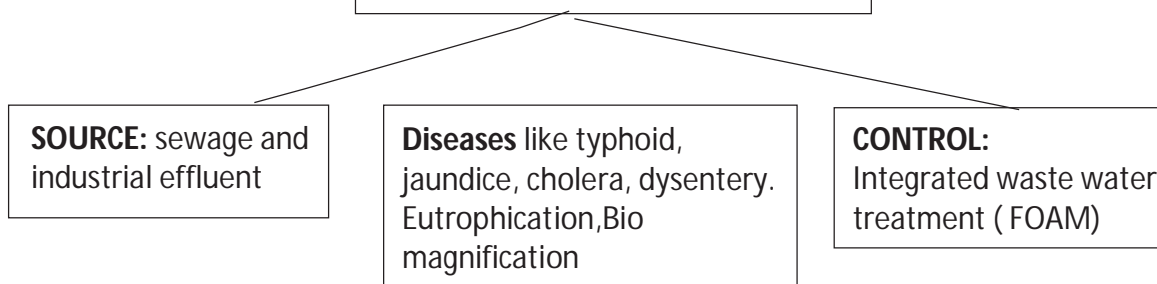
(1) AIR POLLUTION



(2) NOISE POLLUTION



(3) WATER POLLUTION





BIOLOGY

(4) SOLID WASTES

SOURCE: Municipal wastes, hospital wastes, electronic wastes, pesticides, weedicides, human excreta

EFFECT: causes diseases, soil pollution, kills beneficial insects & microbes

CONTROL: recycling, reuse, incineration, used for land filling, preparing

(5) RADIOACTIVE WASTES

SOURCE: Nuclear energy used for generating electricity

Radiation emitted cause mutations ,genetic disorders in organisms

CONTROL: Storing in a shielded container after sufficient treatment & buried within the sea bottom or rocks about 500m deep below the earth surface.

(6) GREEN HOUSE EFFECT & GLOBAL WARMING

CAUSE: Gases like CO₂, methane, CFC, N₂O
Absorbs solar radiation & increase the atmospheric

Melting of polar ice caps, results in rise in sea level & submerges of coastal areas.

control: Reducing the emission of greenhouse gases, planting more trees, increasing efficiency of energy usage.

(7) OZONE DEPLETION

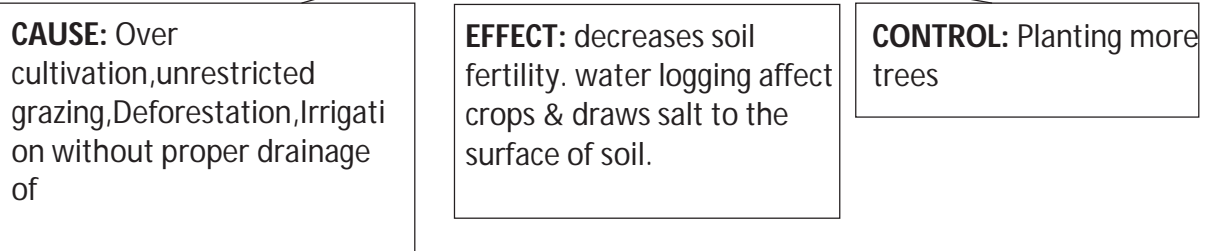
SOURCE: CFC released from refrigerator, AC, jet aeroplane degrades the ozone

Effect: UV rays act on CFCs & release Cl- atoms which act as a catalyst & degrade ozone. Causes cataract, damage to DNA, aging of skin, skin cancer
UV -B casus snow blindness & inflammation of cornea.

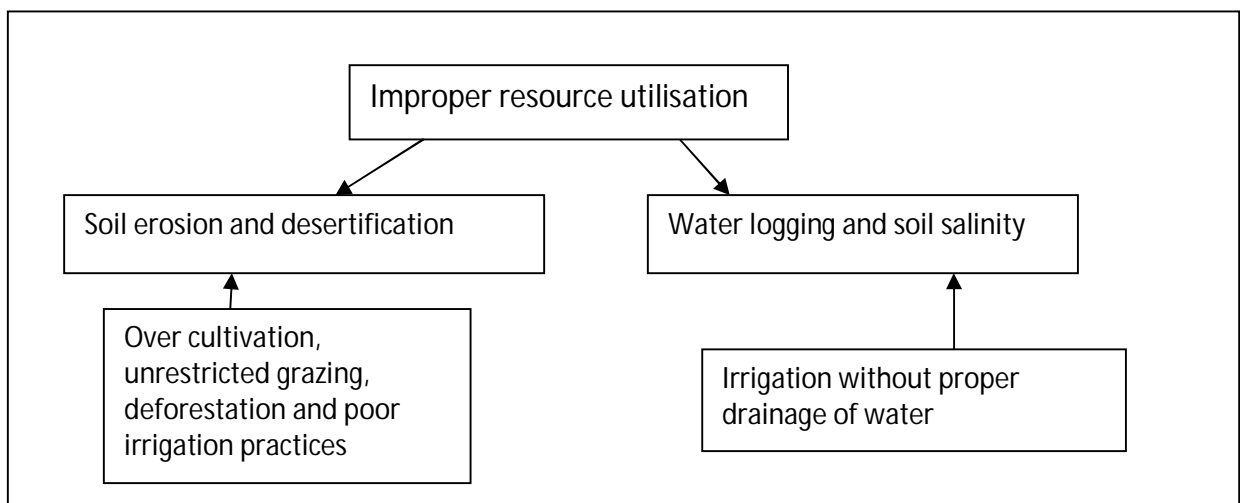
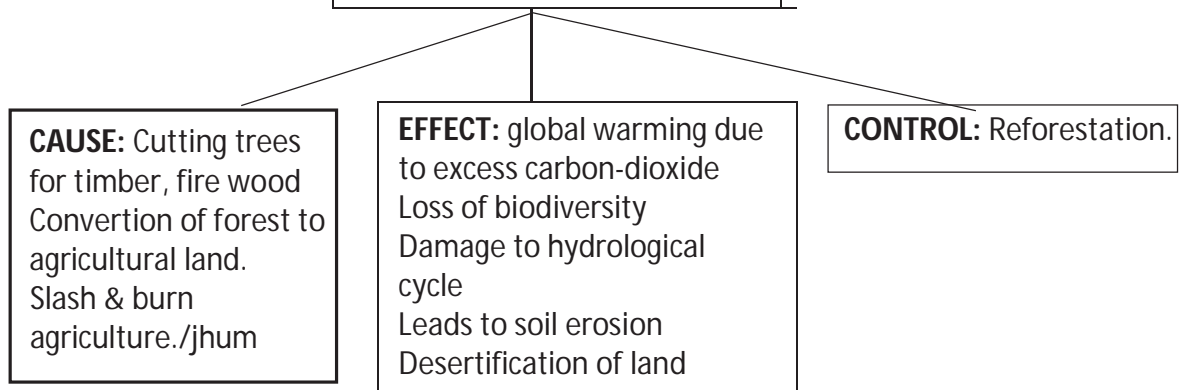
CONTROL: preventing emission of CFC



(8) SOIL EROSION

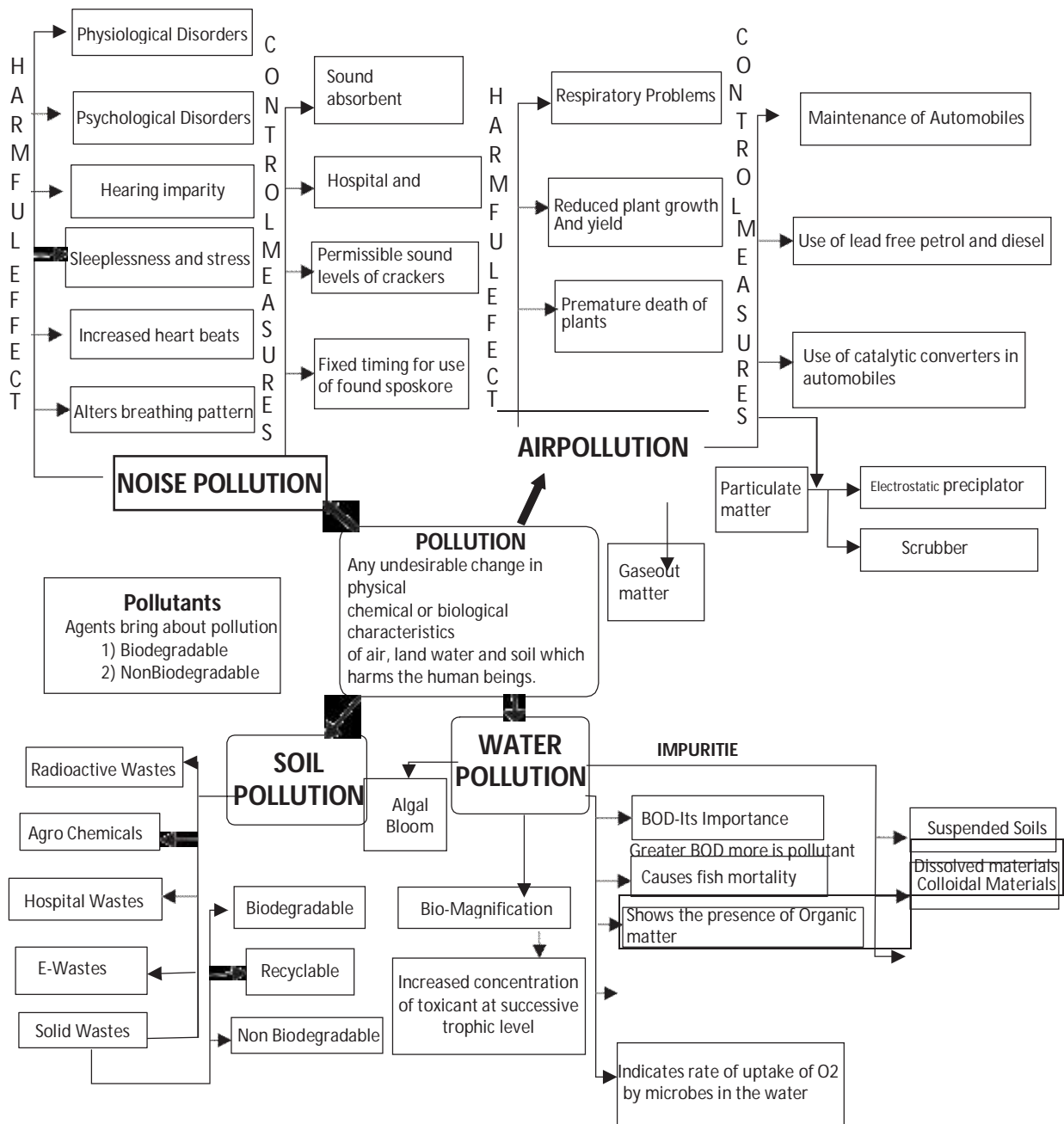


(9) DEFORESTATION



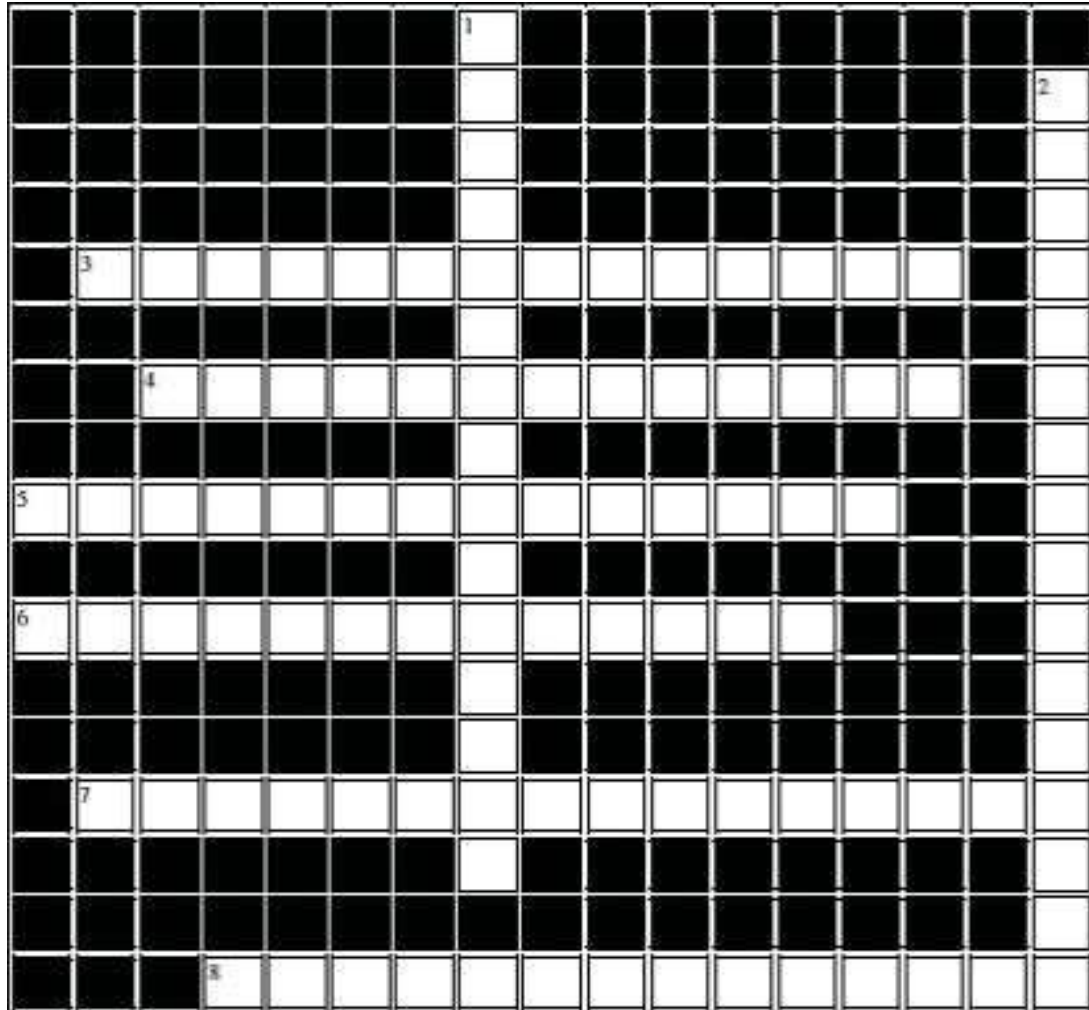


**CHAPTER:16 ENVIRONMENTAL ISSUES
(CONCEPT MAP)**





CHAPTER:16 ENVIRONMENTAL ISSUES
(CROSS WORD)



Across:

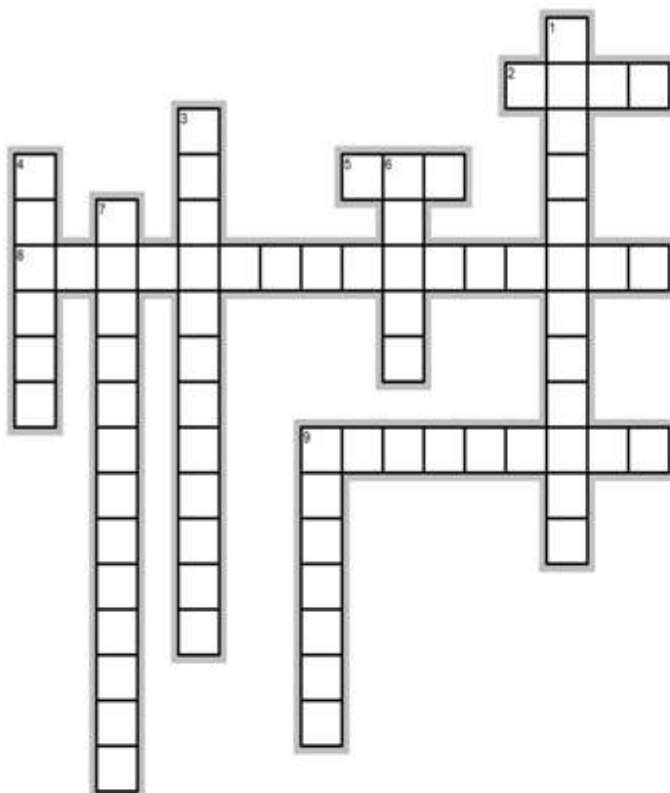
3. a cyclical zero waste procedure of cropping
4. caused by UV RADIATION
5. natural aging of lake
6. terror of West Bengal, problematic aquatic weed
7. natural phenomenon of heating of earth surface
8. caused by CFC

Down:

1. slash and burn cultivation
2. increase in concentration of toxicant at successive toxic level

ENVIRONMENTAL ISSUES

KVS



EclipseCrossword.com

Across

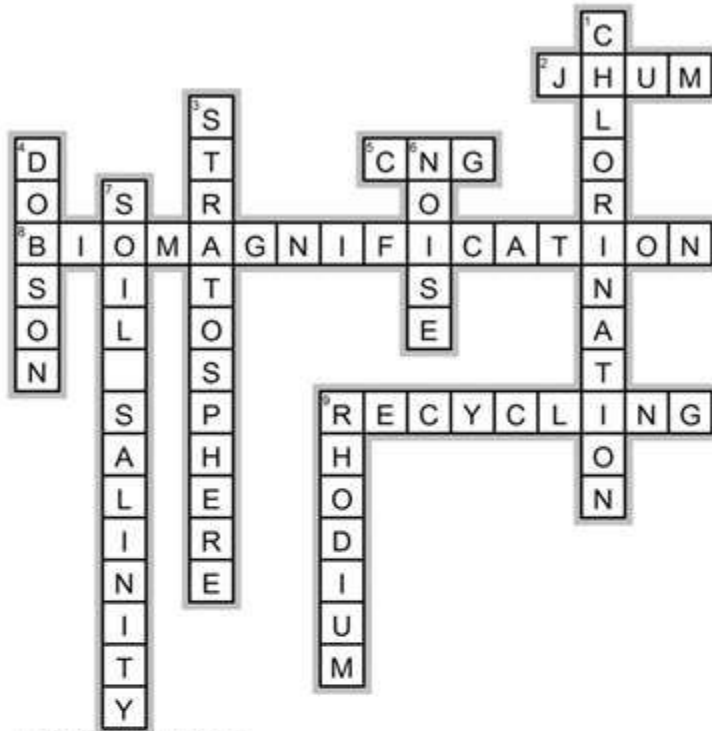
2. The type of cultivation in which farmers cut down the trees of the forest and burn the plant remains for farming
5. The fuel that cannot be siphoned off by thieves and adulterated
8. Increase in concentration of the toxicant at successive trophic levels
9. This is the only solution for the treatment of e-wastes

Down

1. In waste water treatment method, this process is done with sedimentation and filtration
3. The part of atmosphere where 'good ozone' is found
4. The units used for measuring the thickness of the ozone
6. The undesired high level of sound
7. Water logging in the soil leads to
9. In catalytic converters, the mineral used along with platinum – palladium is –

ENVIRONMENTAL ISSUES

KVS.



EclipseCrossword.com



CHAPTER: 16 ENVIRONMENTAL ISSUES (QUESTION BANK)

1. Why should the velocity of air between the plates of an electrostatic precipitator be low?
2. PM_{2.5} is responsible for causing greatest harm to human health. What is it? How is it harmful?
3. What is the noise level that can cause permanent impairment of hearing ability of human beings?
4. Why was the Montreal Protocol signed?
5. Jhum cultivation has been in practice from earlier days, but it is considered more problematic these days. Why?
6. A radiation causes ageing of skin, skin cancer, and inflammation of cornea called snow blindness. It also damages DNA. Name the radiation.
7. Landfills are not much a solution for getting rid of solid wastes. Why?
8. Electrostatic precipitator can remove over 99% particulate matter present in exhaust from a thermal power plant. How?
9. Why is a scrubber used? Which spray is used on exhaust gases passing through a scrubber?
10. There is a sharp decline in dissolved oxygen downstream from the point of sewage discharge. Why? What are its adverse effects?
11. Catalytic converters use expensive metals as catalysts.
 - (a) Name the metals generally used.
 - (b) What precaution should be observed while using catalytic converter?
12. What are e-wastes? Why are they creating more problems in developing countries in comparison to developed countries?
13. Water logging and salinity are some of the problems that have come in the wake of Green revolution. How does water logging create problems of salinity?
14. What is the relationship between BOD, micro-organisms and amount of biodegradable matter?
15. Deforestation is creating a lot of problems in the environment. List the consequences of deforestation.
16. Enlist four harmful effects caused to the humans living in areas having polluted air. Suggest two measures to reduce air pollution.
17. People have been actively participating in the efforts for the conservation of forests.
 - (i) Name the award instituted in respect of Amrita Devi to promote such efforts.
 - (ii) Name the movement launched to protect the trees by hugging them.
 - (iii) Name the step Government of India has under taken in 1980 to work closely with the local communities for protecting and managing forests.
18. Pollutant released due to human activities (like effluents from industries and homes) can radically accelerate the ageing process of the water body.
 - (a) Explain how this process occurs during natural ageing of lake.
 - (b) Give the term used for accelerated ageing of water bodies. Also give the term used for the natural ageing of lake.



19. In Arcata, the town's people have created an integrated wastewater treatment process within a natural system. A citizen group called FOAM helps in upkeep of this project.
- (a) What are the main steps in waste water management done in this way?
- (b) Ecosan in Kerala and Sri Lanka is also an initiative for water conservation. How?
20. What are the contributions of AhmedKhan in Bangalore and Ramesh Chandra Dagar in Sonipat?
21. Since the use of poly bags has become so rampant in our day-to-day life, it is impossible to go back to non-plastic era. Today, the plastic menace has spread from cities to small towns and village. They are "Garbage Forever".
- i) What are the harmful effects of using poly bags?
- ii) In your opinion, what steps should be taken to solve this problem?
22. Nowadays, we see that people use CDs & DVDs for storing information, movies and songs. Do you think these things create pollution?

**CHAPTER:16 ENVIRONMENTAL ISSUES
(ANSWER KEY)**

S.no	Value point	Marks
1	To allow the dust to fall.	1
2	PM2.5 stands for particulate matter of size 2.5 micrometres or less in diameter. It's responsible for causing greatest harm to human health as it can be inhaled deep into lungs and cause breathing problems.	1m
3	150 dB or more	1m
4	To control emission of ozone depleting substances	1m
5	Enough time gap is not being given for the natural process of recovery of land from the effect of cultivation	1m
6	Ultraviolet B rays (UV-B rays)	1m
7	Landfill sites are getting filled very fast due to large amount of garbage generation. Also underground water resources may get polluted due to seepage of chemicals	1+1=2m
8	Electrode wire at thousand volts, produce corona to release electrons, electrons attach to dust particulars giving them net negative charge, charged dust particulars attracted/collected by collecting plates which are grounded	1+1=2m
9	To remove gases like sulphur dioxide. Spray of water or lime is used	1+1=2m
10	Following discharge of sewage into river, micro organisms involved in biodegradation of organic matter present in sewage consume more oxygen. This cause mortality of fish and other aquatic creature	
11	(a) Catalysts : platinum - palladium and Rhodium (b) Motor vehicles equipped with catalytic converters should use unleaded petrol as lead inactivates the catalysts.	1+1=2m

BIOLOGY



12	a) Irreparable computers and other electronic wastes. (b) Recycling in developing countries involves manual participation thus exposing workers to toxic substances. In developed countries its mechanized so less dangerous	1+1=2m
13	Water logging draws salt to surface of soil. Salt deposited on land surface as a thin crust or at the roots of the plants	2m
14	Increase in amount of biodegradable matter leads to rapid multiplication of micro organisms to degrade it, thereby increasing BOD level of the water body.	2m
15	Enhanced CO ₂ concentration in atmosphere, Loss of biodiversity, Soil erosion, Desertification, Disturbed hydrological cycles.	3×1=3m
16	Breathing problems, irritation and inflammation, Damage to lungs, Premature death. Reduce emission from automobile exhaust, Growing more trees	6×1/2=3m
17	(i) Amrita Devi Bishnoi Wildlife Protection Award. (ii) Chipko movement (iii) Joint Forest Management (JFM).	1+1+1=3m
18	a) The phenomenon is eutrophication. More nutrients in water, aquatic life increases organic remains deposited on lake bottom, lake grows shallower and warmer, gradually transforms into land due to deposition of silt and organic debris. (b) Cultural or Accelerated eutrophication, Natural ageing is Eutrophication	1+2+3=5
19	a) Conventional sedimentation, filtering and chlorine treatment. Absorption and assimilation of pollutants by algae, fungi and bacteria. (b) Ecosan derived from ecological sanitation. Handling human excreta using dry composting toilets. Its practical, hygienic and cost effective method.	2+3=5
20	a) Polyblend, a fine powder of recycled modified plastic is mixed with bitumen & used to lay roads. This increases bitumen water repellent properties & increase road life by a factor of three b) Integrated organic farming is a cyclical, zero waste procedure, where waste from process are recycled as nutrients for other process. He included beekeeping, dairy management, water harvesting, composting and agriculture in a chain of processes.	2+2=4
21	(I) Nondegradable, choke our sewage & drainage system, stray cattle eat it & choke its digestive system (II) Using paper, jute, cloth bags. Minimise the use voluntarily. Segregation of biodegradable & non-biodegradable material to safe disposal. Educating people on health risk, production of biodegradable plastic bags by mixing cellulose during their manufacturing.	2+2=4
22	Yes, these contain heavy metals & toxic substances. As the technology is changing these products are replaced by i pods, pen drives. They constitute e-waste.	1+1+1=3

BIOLOGY
ANSWERS OF CROSS WORD PUZZLES
ANSWERS OF CROSS WORD PUZZLES
CHAPTER:1



S.NO	ACROSS	S.NO	DOWN
1.	CONIDIA	2.	OESTRUS - CYCLE
4.	ZYGOTE	3.	ZOOSPORES
6.	BULBUL	5.	VIVIPAROUS
9.	RHIZOME	7.	CELL DIFFERENTIATION
12.	JUVENILE PHASE	8.	PERICARP
13.	SYNGAMY	10.	ASEXUAL REPRODUCTION
16.	HERMOPHRODITE	11.	SEXUAL REPRODUCTION
17.	REPRODUCTION	14.	EMBRYO GENESIS
18.	MONOECIOUS	15.	BINARY FISSION
21.	ANTHEROZOID	18.	MEIOCYTE
22.	GEMMULE	19.	CLONE
23.	INTERNAL FERTILISATION	20.	STAMINATE
24.	LIFESPAN		

CHAPTER:2

S.NO	ACROSS	S.NO	DOWN
1	EMBRYO SAC	2	SPOROGENOUS TISSUE
6	POLYEMBRYONY	3.	APOMIXIX
9	PERISPERM	4.	COLEOPTILE
14	GENERATIVE CELL	5	THALAMUS
16	SPOROPOLLENIN	7	TAPETUM
19	INTINE	8	OVARY
20	SYNCARPOUS	10	SCUTELLUM
22		11	TRIPLE FUSION
23	PARTHENOCARPY	12	CLEIOSTOGAMOUS
24	HILUM	13	XENO GAMY
25	SYNERGID	15	STRAWBERRY
	DOWN	17	EMASCULATION
21	CHALAZA	18	ANTIPODALS

S.NO	ACROSS	S.NO	DOWN
3.	MORULA	1.	GRAAFIAN FOLLICLE
5.	ENDOMETRIUM	2.	PLACENTA
7.	SPERMIATION	4.	OXYTOCIN
10.	INFUNDIBULUM	6.	ISTHMUS
12.	MENARCHE	8.	CLEAVAGE
13.	PARTURITION	9.	ANTRUM
15.	ACROSOME	11.	MITOCHONDRIA
20.	SPERMIOGENESIS	14.	SCROTUM
21.	TROPHOBLAST	16.	COLOSTRUM
22.	SERTOLI CELL	17.	CORPUS LUTEUM
23.	LEYDIG CELL	18.	ZONA PELLUCIDA
24.	PERIMETRIUM	19.	MENOPAUSE
25.	OVULATION		

BIOLOGY

**CHAPTER:4**

S.NO	ACROSS	S.NO	DOWN
7.	LACTATIONAL AMENORRHEA	1.	DIAPHRAGM
9.	TUBECTOMY	2.	INVITRO FERTILISATION
10.	LIPPES LOOP	3.	SAHELI
		4.	PROGESTASERT
		5.	INFERTILITY
		6.	STERILISATION
		8.	AMNIOCENTESIS

CHAPTER:5

S.NO	ACROSS	S.NO	DOWN
1.	HAEMOPHILIA	2.	PHENYLKETONURIA
5.	SAHIWAL	3.	VALINE
6.	PUNNETT	4.	HETEROGAMETY
8.	MUTATION	7.	SATIVUM
11.	KLINEFELTER SYNDROME	8.	MORGAN
13.	CHROMOSOME	9.	DROSOPHILA
14.	ALLELES	10.	ANEUPLOIDY
		12.	FACTORS

CHAPTER:6

S.NO.	ACROSS	S.NO.	DOWN
5.	PNEUMOCOCCUS	1.	NUCLEOSIDE
6.	DNA	2.	DYSTROPHIN
8.	HETEROCHROMATIN	3.	LACTOSE
9.	LIGASE	4.	TRANSLATION
12.	HISTONE	5.	POLYMORPHISM
13.	EUCHROMATIN	7.	BACTERIOPHAGE
14.	SPLICING	10.	CISTRON
		11.	URACIL

CHAPTER:7

S.NO	ACROSS	S.NO	DOWN
6.	SPORES	1.	HOMOLOGOUS
7.	PASTEUR	2.	GIRAFFE
8.	PALEONTOLOGY	3.	CONVERGENT
12.	DARWIN	4.	MARSUPIALS
		5.	FOSSIL
		9.	LAMARCK
		10.	GALAPAGOS
		11.	BIGBANG

BIOLOGY



S.NO.	ACROSS	S.NO.	DOWN
1.	WIDAL TEST	2.	TRICHOPHYTON
3.	SALMONELLA TYPHI	3.	SPOROZOITES
7.	MACROPHAGES	4.	PLASMODIUM VIVAX
8.	ELISA TEST	5.	ENTAMOEBA
9.	COLOSTRUM	6.	RHINO VIRUS
10.	ASCARIS		
11.	WUCHERERIA		

S.NO.	ACROSS	S.NO.	DOWN
2.	MICROPROPOGATION	1.	BIOFORTIFICATION
5.	INBREEDING	3.	OUTBREEDING
6.	MOET	4.	TOTIPOTENCY
7.	SPIRULINA		
8.	SCP		
9.	SOMACLONES		

S.NO.	ACROSS	S.NO.	DOWN
4.	CYCLOSPORIN - A	1.	BACILLUS THURIENGENSIS
6.	STREPTOKINASE	2.	PRIONS
7.	FLOCS	3.	PROTEASES
9.	AZOSPIRILLUM	5.	NOSTOC

CHAPTER: 11

S.NO.	ACROSS	S.NO.	DOWN
1.	BACTERIOPHAGE	2.	PRIMERS
6.	RESTRICTION SITE	3.	rDNA
7.	ANNEALING	4.	BIOLOGISTICS
9.	ELUTION	5.	CLONING VECTORS
13.	ROP	8.	EXONUCLEASE
16.	RECOGNITION SITE	10.	INSERTIONAL
23.	MOLECULAR SCISSORS	11.	MOLECULAR SCISSORS
24.	STICKY ENDS	12.	BACTERIOPHAGE
25.	ENDONUCLEASE	14.	SELECTABLE MARKER
		15.	TRANSFORMANT
		17.	MICROINJECTION
		18.	BIOREACTORS
		19.	DENATURATION
		20.	PRIMERS
		21.	COSMIDS
		22.	ORIGIN

BIOLOGY

**CHAPTER:12**

S.NO.	ACROSS	S.NO.	DOWN
3.	CRY PROTEIN	1.	GMO
5.	GOLDEN RICE	2.	GENE THERAPY
7.	TRANSGENIC	4.	SCID
8.	FLAVR SAVR	6.	Bt
10.	BIOPIRACY	9.	ADA

CHAPTER:13

S.NO.	ACROSS	S.NO.	DOWN
3.	MORTALITY	1.	EURYTHERMAL
7.	HIBERNATION	2.	AMMENSALISM
9.	HABITAT	4.	ADAPTATION
10.	STENOTHERMAL	5.	ECOLOGICAL NICHE
15.	NATALITY	6.	CARRYING CAPACITY
17.	POPULATION DENSITY	8.	IMMIGRATION
18.	AESTIVATION	11.	EMIGRATION
19.	DIAPAUSE	12.	REGULATORS
		13.	STENOHALINE
		14.	HOMEOSTASIS
		16.	EURYHALINE

CHAPTER:14

S.NO.	ACROSS	S.NO.	DOWN
2.	FOOD WEB	1.	BIOGEOCHEMICAL CYCLE
6.	MINERALISATION	3.	BIOMASS
8.	ECOLOGICAL PYRAMIDS	4.	PRODUCERS
11.	STRATIFICATION	5.	FOOD CHAIN
12.	PRODUCTIVITY	7.	PIONEER SPECIES
16.	ECOLOGICAL SUCCESSION	9.	ECOSYSTEM
17.	DECOMPOSITION	10.	DETRITIVORES
19.	STANDING STATE	13.	STANDING CROP
20.	SECONDARY PRODUCTIVITY	14.	HERBIVORES
21.	CONSUMERS	15.	SERE
22.	PRIMARY PRODUCTIVITY	18.	DETRITUS

BIOLOGY



CHAPTER: 15

S.NO.	ACROSS	S.NO.	DOWN
2.	FRUGIVOROUS	1.	PAUL EHRLICH
3.	ENDEMISM	4.	HOT SPOT
5.	ROBERT MAY	7.	DAVID TILMAN
6.	DODO	8.	GENETIC
9.	BIOSPHERES	11.	EXSITU
10.	EDWARD WILSON		
12.	ARAVALLI HILLS		

CHAPTER: 16

S.NO.	ACROSS	S.NO.	DOWN
3.	ORGANIC FARMING	1.	JHUM CULTIVATION
4.	SNOW BLINDNESS	2.	BIOMAGNIFICATION
5.	EUTROPHICATION		
6.	WATER HYACINTH		
7.	GREEN HOUSE EFFECT		
8.	OZONE DEPLETION		

**PREPARATION FOR EXAMINATION/ EXAMINATION TIPS:**

1. Effectively use the text book and the SSM to master each concept and to review your ability to retain the concepts.
2. Attend to your subject teacher carefully in the class and take down the class notes properly.
3. Spend time every day working on the subject matter. Develop the habit of studying and mastering the concept as and when the subject teacher completes teaching a concept.
4. Facilitate understanding while revising the material. This will help you in critical reasoning and enable you to summarize the section in your own words and style.
5. Give your self regular break as it is an essential part of effective studying and better concentration.
6. Try to move from simple to more abstract so that it is easy to master the different levels in understanding the concept.
7. Practise the last five years question papers to focus on the area so fintereston examiner's point of view.
8. Engage with the support material to help in the learning process. The crossword puzzle given at the end of each chapter is a mind game to test your ability to recapitulate thing learnt.
9. Practice and master on diagrammatic concepts and mind maps which would help you to recollect the concept.
10. Take your own mock tests and self-evaluate your answers forget that explained by the subject teacher to get clarity on scoring points.
11. Practice important diagrams with proper labeling.
12. Budget your time effectively before attempting the question paper.
13. Take good care of your health.
14. Study the Blue print and marking scheme intensely to have an idea as to how an answer script is evaluated.
15. Be positive helpful, cheerful, sensible and responsible.

WISH YOU ALL THE BEST !!!!

General Instructions:

There are a total of 27 questions and five sections in the question paper.

All questions are compulsory. 2. Section A contains question numbers 1 to 5, multiple choice questions of one mark each.

Section B contains question numbers 6 to 12, short answer type I questions of two marks each.

Section C contains question numbers 13 to 21, short answer type II questions of three marks each.

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There is no overall choice in the question paper. However, internal choices are provided in two questions of one mark, one question of two marks, two questions of three marks and all three questions of five marks. An examinee is to attempt any one of the questions out of the two given in the question paper with the same question number.

SECTION A

1. What are the types of gametes produced in staminate and Pistil late flowers-
- Female and male gametes respectively
 - Male and female gametes respectively
 - Both male gametes
 - Both female gametes

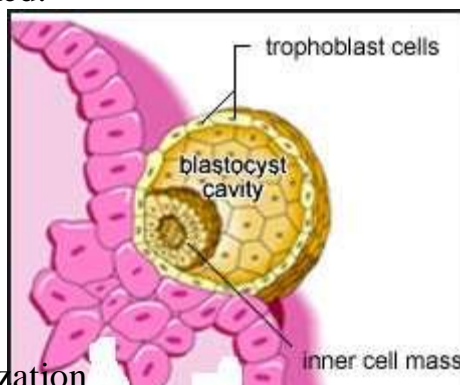
OR

How can Hepatitis B and genital herpes be prevented in humans?

- By avoiding blood transfusion without proper testing
 - By avoiding sexual inter course with multiple partners/ strangers
 - Always using sterilized needles
 - All the above
2. What would be the fate of a Microspore if the tapetum is not developed in the Microsporangium?
- Microspores will undergo meiosis
 - Nourishment will be deprived to microspores
 - There will be no change
 - Microspores will undergo mitosis

OR

Identify the part in the human body and name the tissue where this event is likely to happen. What is it called.



- Fallopian tube, fertilization
- Ovary, Ovulation
- Uterus, Implantation
- Fimbria, ovulation

3. In a cross between two *Pisum sativum* plants with axial flowers and terminal flowers , the offspring produced were equal number of plants with Axial and terminal flowers each. What will be the genotype of the parents-
 - a. AA, AA
 - b. aa, Aa
 - c. Aa, Aa
 - d. aa, aa
4. Why does the increased intake of certain drugs lead to addiction-
 - a. Increase in the tolerance level of receptors in the body leads to greater intake
 - b. Decrease in the tolerance level of receptors in the body leads to greater intake
 - c. Drugs bind to the receptors in the CNS
 - d. Drugs do not bind with the receptors in the brain anymore
5. In an rDNA experiment PBR322 was used as vector and Bam HI as the enzyme to insert the gene of interest into it. Bacteria was the host for cloning the gene .How will you select the recombinant bacteria from the non recombinants from this sample .
 - a. Non recombinant will not grow on tetracycline while recombinants will grow on tetracycline medium
 - b. Non recombinant will grow on tetracycline while recombinants will not grow on tetracycline medium
 - c. Non recombinant will not grow on ampicillin while recombinants will grow on ampicillin medium
 - d. Non recombinant will grow on ampicillin while recombinants will not grow on ampicillin medium

SECTION B

6. Bt corn is a transgenic plant. How would , such a crop which is resistant to corn borer created ? Explain briefly.
7. How are sticky ends produced in r DNA technology. Show diagrammatically the process and label the palindrome and RE used to produce such ends. Why is this stickiness significant?
8. How do DNA fragments get separated by gel electrophoresis? Explain
9. Mycorrhizae- Plant association is a mutualistic one. How are the plants benefitted in this partnership?
10. What would the anticodon end of the t RNA, carrying Methionine be? Why would it be so?

OR

How are drones and worker bees produced in a colony of honeybees?

11. During the Industrial revolution a study of England's Industrialized regions, it was found that the count of melanized moths in those areas was high compared to the white winged and vice versa in rural non industrialized areas. How can you account for this observation based on your understanding of Charles Darwin's theory?
12. The strength of linkage between two genes y and w is higher than between w and m. How did Thomas Morgan arrive at this conclusion based on his studies with *Drosophila*?

OR

Bb heterozygotes of Pea plant produces round seeds with intermediate size starch grains.

What would be the Phenotype of off springs produced if such a plant is self - pollinated? (Assuming that dominance is not an autonomous property of an allele)

SECTION C

13. Differentiate GPP from Secondary productivity. Give one reason why the Primary productivity varies in different Ecosystems?
14. A pond performs all the functions of an Ecosystem. Explain how.

OR

The Amazonian tropical rain forest has the greatest Biodiversity on Earth. Give reasons why it is so ?

15. Without the greenhouse effect the average temperature of the earth would have been a chilly -18°C . How is this phenomenon (green house effect) caused? What is the correlation between this phenomenon and global warming?
16. How is PCR a better method of diagnosis than the conventional method. Name any two diseases that are diagnosed using PCR.
17. How is gene therapy done in the embryonic stage and in the adult stage of an individual with ADA deficiency? State basic difference in the two methods described?
18. Tissue culture is used to get healthy plants from diseased plants. Explain the process involved.

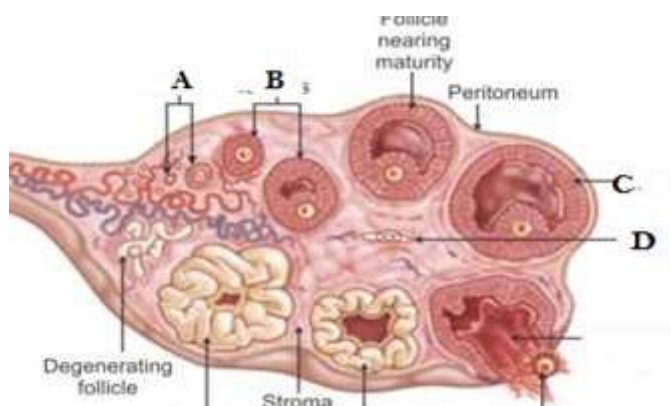
OR

Artificial insemination helps to overcome several problems related to normal mating. Justify. Describe this procedure adopted in cattle.

19. Both Phenylketonuria and Skin colour inheritance do not strictly follow Mendelian pattern. How are they different from one another? Explain
20. How is the endosperm in coconut formed? Why does it persist?
21. How is gene therapy done in embryonic stage and adult stage of an individual with ADA deficiency? State basic differences in the two methods described.

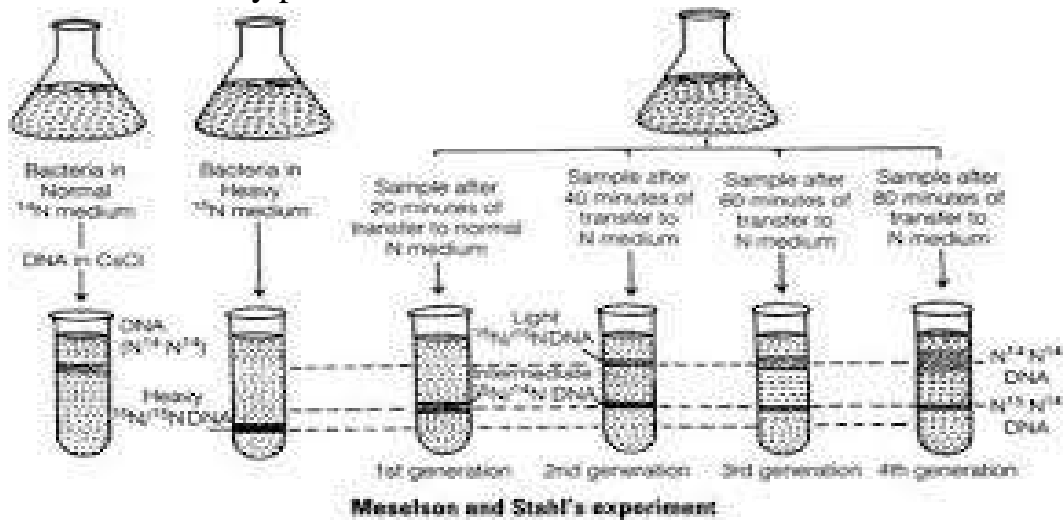
Section-D

22. a. A blood test of a pregnant female shows presence of hormones not normally found in non pregnant females .What are they?
b. Identify & Label the Primary and mature Graafian follicles in the diagram and give two differences that is observed in the two.



23. Meselson & Stahl grew E Coli in a medium containing NH_4Cl for several generations before transferring it to another medium to understand the mode of DNA replication.
 - a. Why were two different mediums used in the experiment ?
 - b. What results were obtained after 1st generation and 2nd generation subsequently?

c. What did they prove?



24.

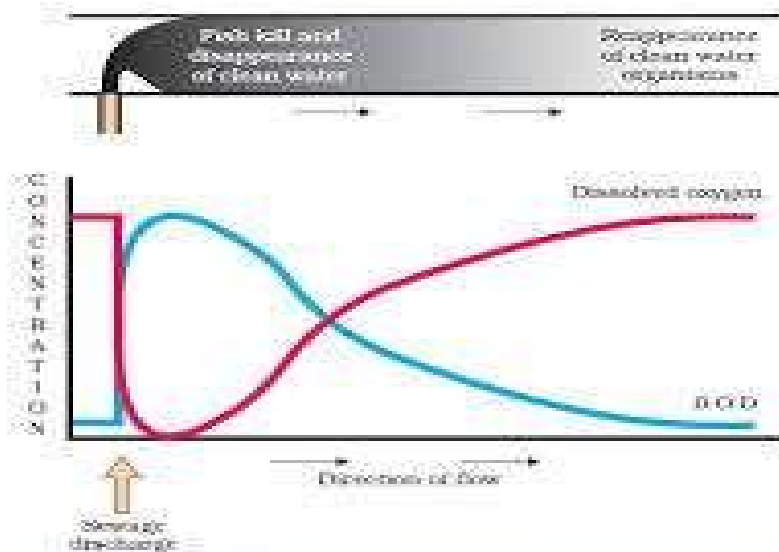


Figure 19.3 Effect of sewage discharge on some important characteristics of a river

- How is BOD a measure of the polluting power of water? Explain.
- How does untreated sewage discharge effects the BOD of a pond water.
- What is the role of STP's in regulating the BOD?

SECTION- E

25. What type of population growth curve is depicted by the equation $dN/dT=rN$

Represent the growth curve. How will the population of lady beetles be affected if there is emigration of 20 beetles and death of 25 beetles in 7 days.

(OR)

Show Species-Area relationship curve and the expression for the same, on a log scale. Explain each term in the equation. For large areas the z value in SAR curve is between 0.6 to 1.2. What does this mean?

- Explain how a human body responds to a pathogen that invades it for the first time and then how the response differs in subsequent encounters.
- How do the lymph nodes provide immunity?

OR

A disease resistant plant was produced using the conventional method. What would have been the steps involved in the process. Explain the significance of *Parbhani kranti* variety

of lady's finger?

27. In a given population the frequency of alleles for brown fur is 0.6 and that for black fur is 0.4. What is the possible frequency of homozygous brown and heterozygous brown in the population assuming that the population is in the Hardy Weinberg equilibrium. State any four factors that can cause a change in the allele frequency in the population.(5)

OR

In a bacterial culture ,how will the expression of the structural genes be affected if the bacteria is provided with galactose as a nutrient.

- ii) What changes would happen in the DNA expression, if galactose is replaced with Lactose. Explain.

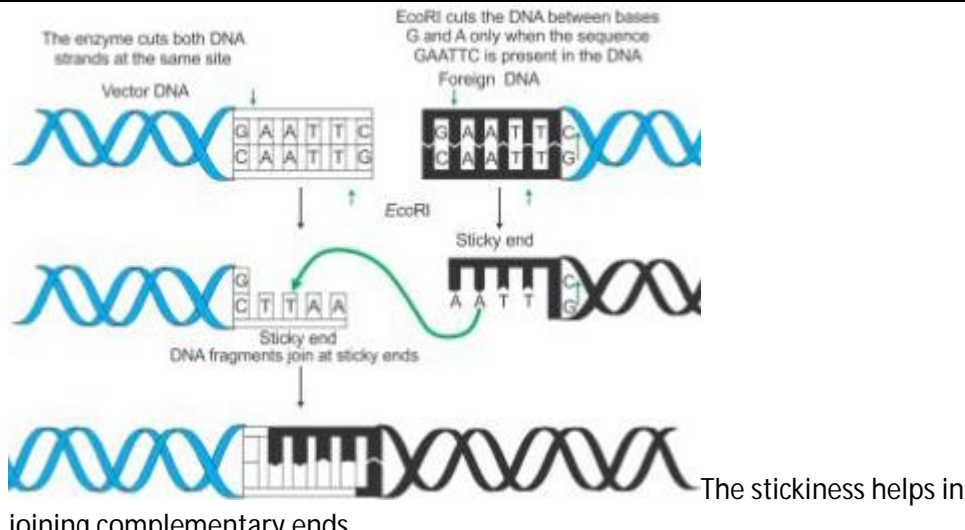
MARKING SCHEME FOR PRACTICE PAPER I

CLASS XII

BIOLOGY

DUR: 3HRS

M.M.:70

Q No.	Key points (HINTS)	Marks allotted
1	B. Male & female respectively OR D. All the above	1
2	b. Nourishment will be deprived to microspores or c. Uterus, Implantation	1
3	b. aaxAa	1
4	a. With repeated use of the drug the tolerance level of receptors ,in our body increases ,receptors then respond only to greater intake(hence addiction)	1
5	b. Nonrecombinants will grow in tetracycline/recombinants will not grow in tetracycline containing medium	1
6	Introducing cry I AB gene of Bacillus thuringensis into the corn plant by rdNA	½ X4
7	 <p>The enzyme cuts both DNA strands at the same site</p> <p>EcoRI cuts the DNA between bases G and A only when the sequence GAATTC is present in the DNA</p> <p>Sticky end</p> <p>DNA fragments join at sticky ends</p> <p>The stickiness helps in joining complementary ends</p>	½ X 4
8	Sieving effect of the agarose gel ,the electronegative DNA move towards the anode and separated by size , smallest moving the farthest.	2x1
9	More intake of phosphates, resistance to root borne pathogens, tolerance to salinity and drought, overall increase in growth	2x1
10	UAC/,It is complementary to the codon of Methonine which is AUG OR Drones, haploid by parthenogenesis and worker bees diploid through fusion of egg and sperm.	2x1
11	Melanized moths was naturally selected as they were camouflaged on the barks of the tree, deposited with soot hence not eaten by predators, whereas birds easily spotted then on the background of lichen covered light trees easily .	
12	Based on recombination frequency./ The recombinants between y and w was found to be lesser than the recombinants between w and m (y and m parental types were a high percentage. They concluded that the two genes were closely linked physically located close to one another that recombination between them happened lesser number of times.) OR Bb X Bb (Parents) Round intermediate size Offspring BB,Bb,bb Round large, Round intermediate ,wrinkled small (B shows dominance for shape but incomplete dominance for size of seed)	2x1
13	GPP is rate of production of organic matter during Photosynthesis/rate of formation	2x1+1/2

	of new organic matter by consumers./It depends on plant species in a particular area ,environmental factors, nutrient availability ,(or any 2)	+1/2
14	Phytoplanktons are the producers-Producers/Nutrient cycled through flow of energy in food chain/decomposers cause decomposition OR High productivity due to more sunlight available/no seasonal fluctuation hence more chance of speciation/No glaciation hence more niche specialization.	1x3= 3 1x3= 3
15	Heat radiated from earth is absorbed by the greenhouse gases ,retains heat/Increased greenhouse gases/ increases temperature leading to global warming	1x3= 3
16	Can help in early diagnosis even with little amount of DNA Explanation of 3 steps Any two diseases	½ ½ x 3= 1 ½ ½ x 2= 1
17	Embryonic cells are introduced with gene for ADA /Adults Lymphocytes cultured with cDNA of ADA gene introduced into it/and reintroduced into the body	1x3= 3
18	Tissue of meristem taken, grown in mimum culture medium containing a carbon source, hormones , tissue taken is explant is virus free/ OR Artificial insemination is advantageous as the semen can be used immediately or frozen and transported to a distant place from the bull./ The semen is introduced into the reproductive tract of the female.	
19	Explain pleiotropism and polygenic inheritance and two differences	1+2=3
20	Pollination and fertilization is independent of water/better dispersal strategies/sufficient food reserves	3x1
21	Stability of DNA /RNA labile and mutates/RNA has catalytic role besides translation into proteins	3x1
22	HCg/HPL, Relaxin /development of mammalian glands/no menstruation	1x3
	A & C ,No antrum and single layer of granulosa in Primary follicles	
23	DNA containing N15 and N 14 had different densities and could be separated easily by centrifugation-N 15 is heavier isotope and N14 the lighter one / to prove semi conservative method of DNA relication	1x3
24	High BOD indicates more organic matter ,more use of oxygen, STP reduces BOD	1x3
25	J shaped growth curve(Exponential growth curve)/Reduction of population OR Linear graph with equation NCERT Fig 15.2) Log S =log C+Z log A It means steeper slope of the curve hence more Species richness /area explored.	3+2
26	Primary immune response / Secondary immune response (explain each)/ Spleen has lymphocytes and phagocytes that filter blood by filtering pathogens engulf pathogens. OR Collection of variability, evaluation& selection of parents, cross hybridisation among the selected parents, selection and testing of superior recombinants, Testing, release and commercialization of new cultivars. /Resistance to TMV in behind	2+2+1
27	Homozygous brown =p ² =.6 ² = .3.6 heterozygous brown =2pq=2x.6x.4=4.8. Genetic drift, gene flow, mutation, recombination. OR Inducer not present/repressor binds with operator/prevents transcription of structural genes/When lactose is present it acts as an inducer binds to repressor and removes it from the operator site and lac operon is switched off.	

PRACTICE PAPER II

TIME: 3Hrs

CLASS XII- BIOLOGY (044)

MAX.MARKS:70

GENERAL INSTRUCTIONS:

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SECTION A

- 1 Identify the vegetative propagule amongst the following- 1
- a) Zoospores
 - b) Conidia
 - c) sucker
 - d) gemmules.
- 2 Development of fruit without undergoing fertilization is called 1
- a) Parthenogenesis
 - b) Parthenocarp
 - c) Apomixis
 - d) Polyembryony

OR

Some flowers selected for artificial hybridization, do not require emasculation but bagging is essential for them. Select an appropriate reason-

- a) to prevent contamination of its stigma with unwanted pollen grains
 - b) to prevent contamination with dust
 - c) to protect from predators
 - d) to ensure optimal temperature
- 3 Two closely related species competing for same resources cannot coexist indefinitely (the inferior will be eliminated). Which principle state this? 1
- a) Rivet-Popper Hypothesis
 - b) Gause's Competitive Exclusion Principle
 - c) Hardy Weinberg Principle
 - d) Verhulst-Pearl logistic equation
- 4 A boy of 10 years had chicken pox. He is not expected to have the same disease for the rest of his life because- 1
- a. He has undergone vaccination for chicken pox
 - b. His immune system have antibodies against the pathogen
 - c. Immune system has memory of the first encounter to protest the body in future.
 - d. He will not have any immunity against the same disease
- 5 Name the gene which exhibits multiple phenotypic expressions. 1
- a. Dominant gene
 - b. Recessive gene
 - c. Polymorphic genes
 - d. Pleiotropic gene

OR

A garden pea plant produced axial white flowers. Another of the same species produced terminal violet flowers. Identify the dominant traits.

- a) axial, violet flowers.
- b) Axial, white flowers
- c) Terminal, violet flowers
- d) Terminal, white flowers

SECTION B

- 6 Differentiate between perisperm and endosperm giving one example each. 2
- 7 a) Where do the signals for parturition originate from the humans? 2
 b) Why is it important to feed the newborn babies on colostrums?
- 8 Write the full form of VNTR. How is VNTR different from 'Probe'? 2
- 9 According to Hardy-Weinberg's principle the allele frequency of a population remains constant. How do you interpret the change of frequency of alleles in a population? 2
- 10 Why is tobacco smoking associated with rise in blood pressure and emphysema? Explain. 2

OR

Write the functions of bone marrow as the primary lymphoid organ and lymph nodes as the secondary lymphoid organs.

- 11 Explain the two factors responsible for conferring stability to double helix structure of DNA. 2
- 12 v have transgenic animals proved to be beneficial in: 2
 i) Production of biological products
 j) Chemical safety testing

OR

Biopiracy should be prevented. State why and how.

SECTION C

- 13 Name the source of *Taq* polymerase. In which technique it is used? Explain the advantage of its use in biotechnology 3
- 14 Scientist has succeeded in recovering healthy sugar plants from a diseased one. 3
 (a) Name the part of the plant used as explants by the scientist.
 (b) Describe the procedure the scientists followed to recover the healthy plants.
 (c) Name this technology used for crop improvement.

OR

- (a) Mention the property that enables the explants to regenerate into a new plant.
 (b) A banana herb is virus infected. Describe the method that will help in obtaining healthy banana plants from this diseased plant.

- 15 a) A DNA segment has a total of 800 nucleotides, out of which 150 of them are guanine containing nucleotides. How many pyrimidine bases this DNA segment possesses? 3
 b) Draw a diagrammatic sketch of a portion of DNA segment to support your answer.

OR

Explain how sex is determined in honey bee? Mention the number of chromosomes present in male and female.

- 16 (a) What do contraceptive pills contain and how do they act as contraceptives? 3
 (b) What schedule should be followed for taking these pills?

does GIFT differ from ZIFT?

- 17 How does industrial melanism support Darwin's theory of natural selection? Explain. 3
- 18 Name and describe the technique that helps in separating the DNA Fragments formed by the use of restriction endonuclease. 3
- 19 Particulate and gaseous pollutants along with harmless gases are released from the thermal power plants. 3
 i) name any two harmless gases released.
 ii) name the most widely used device of removing particulate pollutants from the air
 Explain how the device is used.
- 20 Plasmid is a boon to biotechnology. Justify this statement quoting the production of human insulin as an example. 3
- 21 Taking one example of each of habitat loss & fragmentation, explain how the two are 3

responsible for biodiversity loss.

b) Explain two different ways of biodiversity conservation.

SECTION D

Confurous graph of NCERT Page – 223 Figure – 13.3

Biogas Diagram Page – 186 Figure – 10.8

- 22 a) Explain the role of microbes in biogas production 1.5
b) Explain how sludge obtain from STF is used in biogas production 1.5
23. Life cycle of Malaria. Page -148 Figure – 8.1
- 24 A flower of tomato plant following the process of sexual reproduction produces 120 viable seeds. 5

Answer the following questions giving reasons:

- a) What is the minimum number of pollen grains that must have been involved in the pollination of its pistil?
b) Name the process by which pollen grains are produced?
c) How many megaspore mother cells were involved?
d) Which layer of pollen grain protects it from microbial attack?
e) What is the origin of mega sporangia?

OR

- a) Explain the menstrual phase in a human female. State the levels of ovarian and pituitary hormones during this phase.
b) Why is follicular phase in the menstrual cycle also referred as proliferative phase?
c) Explain the events that occur in a graafian follicle at the time of ovulation and after this process
d) Draw a graafian follicle and label antrum and secondary oocyte.
- 26 A particular garden pea plant produces only violet flowers. 5
a) Is it homozygous dominant for the trait or heterozygous?
b) How would you ensure its genotype? Explain with the help of crosses.

OR

How are the process of DNA replication and transcription in prokaryotes similar? Explain how they differ from each other.

- 27 Explain how Eutrophication brings out succession in lake. 5
- OR
- a) What depletes ozone in stratosphere? How does it affect human life?
b) Explain biomagnifications of DDT in an aquatic food chain. How does it affect the bird population?

MARKING SCHEME FOR PRACTICE PAPER II

TIME: 3Hrs

CLASS XII- BIOLOGY (044)

MAX.MARKS:70

Section A

- | | | |
|---|---|---|
| 1 | c.Sucker | 1 |
| 2 | b. Parthenocarpy | 1 |
| | OR | |
| | a. To prevent contamination of its stigma with unwanted pollen grains | |
| 3 | b. Gause's Competitive Exclusion Principle | 1 |
| 4 | c. The immune system has memory of the first encounter to protect the body in future. | 1 |
| 5 | d. Pleiotropic gene. | 1 |
| | OR | |
| | a. axial, violet flowers. | |

SECTION B

- | | | |
|----|--|---|
| 6 | Perisperm – persistent nucleus = 1/2, diploid = 1/2, eg., black pepper/beet = 1/2
Endosperm – nutritive tissue for embryo = 1/2, triploid = 1/2, ex: maize/rice = 1/2 | 2 |
| 7 | a) from the fully developed foetus/placenta/foetal ejection reflex | 2 |
| | b) contains IgA antibodies to (passively) immunize the baby 1+1 | |
| 8 | Variable Number of Tandem Repeats. = 1 mark | 2 |
| 9 | Probe- is labeled/radioactive (single stranded hybridized DNA fragments). = 1
It indicates gene migration/ gene flow/gene drift/mutation/genetic recombination/
natural selection leading to evolution | 2 |
| 10 | Tobacco has nicotine that stimulates the release of adrenaline/non adrenaline to
raise blood pressure. = 1
Smoking tobacco releases CO which reduces the concentration of haem bound
oxygen. This causes emphysema. = 1 | 2 |
| | OR | |
| | Bone marrow- lymphocytes are produced here, develop and mature into antigen
sensitive lymphocytes 1/2+1/2
Lymph nodes- trap the microorganism/ antigens from the tissue fluid, the trapped
antigens activate the lymphocytes (present in lymph nodes) to cause immune
response 1/2+1/2 | |
| 11 | Presence of H bonds, the plane of one base pair stacks over the other,
complementarity, presence of thymine in place of uracil. Any two = 1+1 | 2 |
| 12 | (Rosie – transgenic cow) produced human protein / alpha lactalbumin enriched milk,
alpha -1 antitrypsin used to treat emphysema. 1/2+1/2
(a) (Toxicity testing) – More sensitive to toxic substances, results
obtained in less time. 1/2+1/2 | 2 |

OR

Biopiracy is an unauthorised exploitation of bio resources of developing/ under
developed countries- hence to be prevented=1

By developing laws to obtain proper authorization / pay compensatory
benefits =1

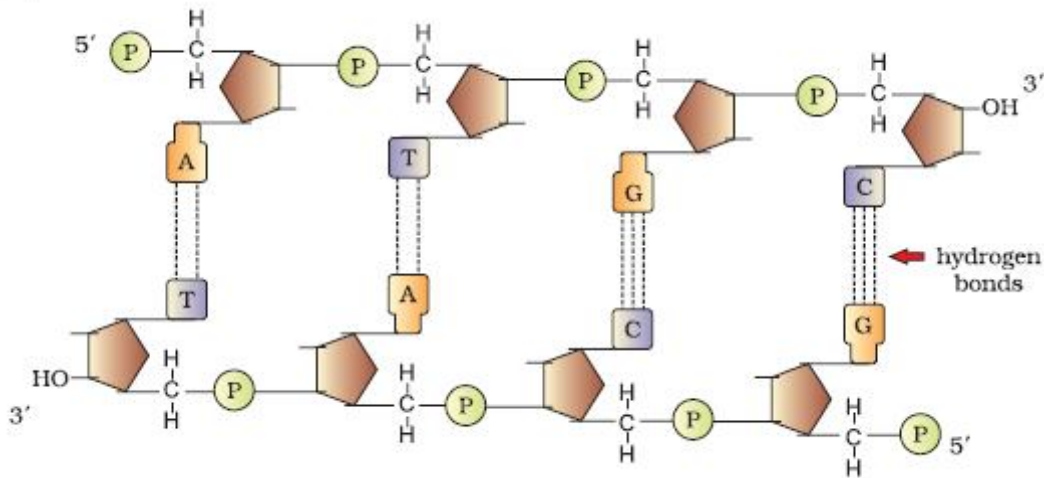
SECTION C

- | | | |
|----|--|---|
| 13 | (A) <i>Thermus aquaticus</i> (1)
PCR, It is a thermostable DNA polymerase, does not get denatured and remain
active during PCR, extends the primers using the nucleotides provided in the
reaction and the genomic DNA as template. (1/2X4=2) | 3 |
|----|--|---|

- 14 (a) Meristem (apical, axillary) = 1/2 3
 (b) Explant/ Virus free meristem is growing in nutrient medium, under aseptic condition; tissue proliferates to form undifferentiated mass or callus, transferred to a medium containing auxins and cytokinins. = 2 marks
 (c) Tissue culture or micro propagation. = 1/2 [1/2+2+1/2 = 3marks]
 OR

- (a) Totipotency. = 1
 (b) Extract the disease free meristem, in vitro culture to get virus free plants. 1+1
 [1+1+1 = 3 marks]

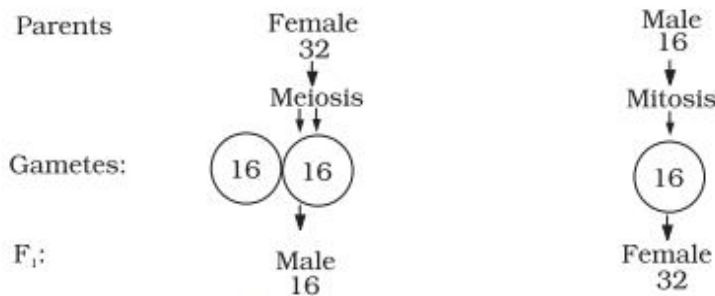
- 15 3
 a) Pyrimidine = 400 = (1/2 mark), G≡C, G=150 hence C=150, G+C=150+150=300, So A+T=800-300=500, A=T, so =500/2=250, so pyrimidines = C+T=150+250=400// purine A and G always pair wit T and C respectively , A/G=T/C=1 (1/2 mark)
 b)



- Polarity = 1/2
 A-T = 1/2
 G-C = 1/2
 H- BOND = 1/2

OR

Based on number of sets of chromosomes an individual receives. Fertilized egg by sperm develops into females; unfertilized egg develops as a male (drone) by parthenogenesis. Males have 16 chromosomes, females have 32 chromosomes
 1+1/2+1/2+1/2+1/2
 (Diagram with label can be considered.)



Sex determination in honey bee

- 16 progesterone / progesterone – estrogen combination; 3
 Inhibit ovulation, inhibit implantation, alter quality of cervical mucus to prevent or retard Entry of sperm. (any two) = 1+1
 Taken daily for a period of 21 days starting
 OR
 GIFT- Ovum collected from donor is transferred into the fallopian tube of another female who cannot produce it.
 - early embryos (with 8 blastomeres) is transferred into the fallopian tube of a female who cannot conceive. 1+1
- 17 re industrial revolution the environment was unpolluted the lichens on the barks of trees – pale white winged moths could easily camouflage, while the dark winged were spotted out by the birds for food – hence they could not survive. After industrial revolution the lichens became dark. This favoured the dark winged moths while the white winged were picked by birds the population of the former increases (naturally selected) = $1/2 \times 6 = 3$ 3
- 18 Gel electrophoresis = $1/2$ 3
 DNA are -vely charged, forced to move towards anode, electric field in agarose gel matrix, separate according to their size / sieving effect, Smaller fragments move faster and further than the larger. = $1/2 \times 5$.
- 19 i) niyrogen, oxygen = $1/2 + 1/2$ 3
 ii) electrostatic precipitator = $1/2$
 electrode wires at several thousand volts produce corona
 ↓
 release electrons attach dust particles & make it negatively charge = $1/2$
 ↓
 collected plates grounded & attract charged dust particles = $1/2$
- 20 Plasmid can be taken out from bacteria, tailored, can be used to insert a required gene, inserted into the bacteria, allowed to replicate in bacteria, to produce insulin = $1/2 \times 6$ 3
- 21 a) habitat loss: amazon rain forest destroyed for soyabean cultivation/ for growing grass land for grazing cattle/ colonization of pacific islands – extinction of 2000 species of native birds = 1 3
 fragmentation: b human activity – migratory birds & animals are affected.
 b) exsitu: $1/2$ threatened organisms are taken out from the natural habitat and placed in special setting with care and protected = $1/2$ eg: zoological park/ botanical garden = $1/2$
 insitu: $1/2$, threatened organisms are conserved in their natural habitat = $1/2$, eg. national parks/ biosphere reserves = $1/2$
- 22 . 3
 a) by physical counting, percent cover or total biomass, from relative density, counting pug marks, counting faecal pellets (any three) $1/2 \times 3$
 b) Status of habitat, whether competition for survival exists or not, whether population is increasing or declining, natality, mortality, emigration, immigration.
 OR
- Migrate temporarily from the stressful habitat to a hospitable area/ suspended activities/form thick walled spores/form dormant seeds/hibernate during winter/aestivate during summer/planktons diapauses (any six) = $1/2 \times 6 = 3$
- 23 a) when BOD of sewage water is reduced, the effluent passes to settling tank where, bacterial flocs are allowed to sediment and this sediment is activated sludge = $1/2 \times 3$ 3
 b) the major part of sludge is pumped into anaerobic sludge digester, here other anaerobic bacteria digest the flocs, during this digestion biogas is produced = $1/2 \times 3$
- 24 *Entamoebahistoltytica* = 1
 Constipation/abdominal pain/cramps/mucous stool/stool with blood clot. (Any two) = $1/2 + 1/2$
 Houseflies' carrier from faeces to person via food products/ contaminated water.

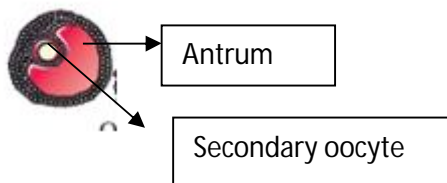
=1[1+1+1= 3marks]

SECTION D

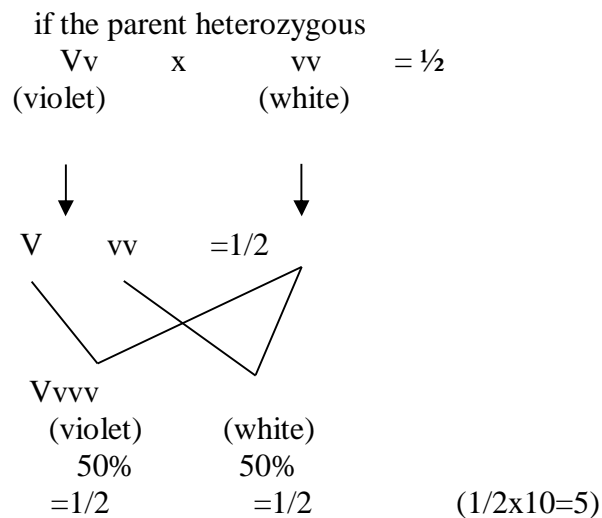
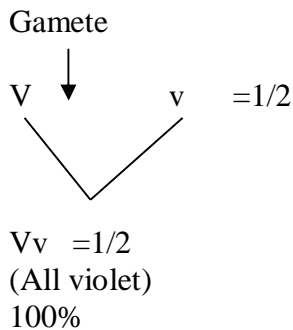
- 25 Ans: a) 120, one pollen involves in fertilization of one ovule $\frac{1}{2}+1/2$ 5
 b) meiosis – microsporogenesis $\frac{1}{2}+1/2$
 c) 120, each MMC forms four megaspores out of which only one remain functional = $\frac{1}{2}+1/2$
 d) exine – outer layer,
 e) Placenta located inside the ovarian cavity.

OR

- a) menstrual phase occurs when released ovum not fertilized, break down of endometrial lining (of the uterus) and its blood vessel form the liquid that comes out through the vagina, lasts for 3-5 days= $1/2 \times 3$
 level of ovarian and pituitary hormones fall= $1/2$
 b) primary follicle grows into graafian follicle under the influence of LH& FSH, regeneration of endometrium= $1/2 \times 2$
 c) graafian follicle ruptures to release the ovum (secondary oocyte), remaining parts of the Graafian follicle transform into corpus luteum= $1/2 \times 2$
 D) DIAGRAM



- 26 a) it could be homozygous dominant , heterozygous dominant = $1/2+1/2=1$ 5
 b) by test cross = $\frac{1}{2}$
 if parent homozygous: $VV \times vv = 1/2$
 (violet) (white)



Or

Similarities-

Both the processes involve-

- i. Unwinding of the helix and separating the two DNA strands.
- ii. Breaking the hydrogen bond between the bases /pairs.
- iii. Follow complimentary base pair rule.
- iv. Polymerization occurs in 5' -3' direction.
- v. Linking/Polymerization of nucleotides.

DISSIMILARITIES

($5 \times \frac{1}{2} + 5 \times \frac{1}{2}$)

DNA replication	Transcription
DNA nucleotides added are ATP, GTP, CTP, TTP	RNA nucleotides added are ATP, GTP, CTP, UTP
Deoxyribose sugar is the part of	Ribose sugar is the part of nucleotide

nucleotides	
Adenine pairs with thymine	Adenine with uracil
Both strands copied	Only one strand copied
Resulting into two DNA molecules	Resulting in formation of an RNA molecule

27 Streams draining into the lake introduce nutrients – nitrogen and phosphorus, encourage the growth of aquatic organisms, as the lake’s fertility increases, plant and animal life begin to grow, organic matter deposited at the bottom of the lake, silt and organic debris pile up, lake grows shallower and warmer with warm water organisms, marsh plants take root in the shallows and begin to fill in the original lake basin, leads to large masses of floating plants, finally converting lake into land – hydrarch succession. 10X1/2=5 5

Or

a) chlorofluorocarbons (CFCs) =1

UV (B) damages DNA causing mutation, skin cancer, inflammation of cornea, cataract, aging of skin, snow blindness 2

(any two) 1/2+1/2=1

b) if DDT leaches from the agricultural field gets into the water body, it gets into the food chain --> zoo planktons --> small fish --> large fish --> any fish eating bird//

concentration of DDT increases, along the food chain, reaching a high level in the top carnivore bird= 1 1/2

DDT concentration disturbs Ca++ metabolism --> egg shells become thin ---> premature breaking resulting in decline in bird population 1 1/2

PRACTICE PAPER III

CLASS XII

BIOLOGY

Time: 3 Hours

Max. Marks: 70

General Instructions:

- (i) There are a total of 27 questions and four sections in the question paper. All questions are compulsory.
- (ii) Section A contains questions number 1 to 5, very short-answer type questions of 1 mark each.
- (iii) Section B contains questions number 6 to 12, short-answer type I questions of 2 marks each.
- (iv) Section C contains questions number 13 to 24, short-answer type II questions of 3 marks each.
- (v) Section D contains questions number 25 to 27, long-answer type questions of 5 marks each.
- (vi) There is no overall choice in the question paper, however, an internal choice is provided in two questions of 1 mark, two questions of 2 marks, four questions of 3 marks and all the three questions of 5 marks. In these questions, an examinee is to attempt any one of the two given alternatives.
- (vii) Wherever necessary, the diagram drawn should be neat and properly labeled.

SECTION: A

1. The thick wall around the fruit is called
 - a) Periderem
 - b) Perisperm
 - c) Pericarp
 - d) Ectocarp
2. How the consecutive nucleotides are linked together in a polynucleotide strands?
 - a) 3 '-3' Phosphodiaster linkage
 - b) 5 '-3' Phosphodiaster linkage
 - c) N – Glycosidic Linkage
 - d) Phosphoester Linkage
3. What does Hardy- Weinberg equation $p^2 + 2pq + q^2 = 1$ convey that the same total of allestic frequencies is
 - a) Zero
 - b) One
 - c) Less than 1
 - d) More than 1
4. Name the lymphoid tissue which is located within the lining of the major tracts.
 - a) Sperm
 - b) Bhymphocytes
 - c) Tlymhocytes
 - d) NALT
5. What is the significance of adding lysozyme at the time of isolating DNA from bacteria?

OR

Why the crystals of Bt toxin produced by some bacteria do not kill the bacteria themselves?

SECTION: B

6. a) What are the characteristics of pollen grains of wind pollinated flowers?
7. b) How are the pollen grains of water – pollinated species protected?
8. a) Write the codon and anticodon for Methionine.
9. b) Differentiate between codon and an anticodon.
10. How is tobacco smoking in Human can lead to oxygen deficiency in their body?
11. Which part is best suited for producing virus-free plants and why?

OR

Identify the disease and its causative organism for the following symptoms .
 - (a) Appearance of dry scaly lesions on skin, nails and scalp .
 - (b) Stools with excess mucous and blood clots.
12. What are the consequences of deforestation?
13. Differentiate between in-situ and ex-situ approaches of conservation of biodiversity.

OR

List two criteria used for determining a hot spot.
14. How did the people treat the waste water naturally in the town of Arcata?

SECTION: C

15. How do pills act as contraceptives in human female?

OR

Mention the role of the following structures.(a) Fimbriae (b)Acrosome (c)Myometrium

16. Explain monohybrid cross taking seed coat color as a trait in *Pisum sativum* .

Work out the cross up to F₂ generation.

OR

17. (a) Though 15. 15. 8% of the males are affected with colorblindness only 0.4 % of females are affected by this disorder Why?

(b) What is its pattern of inheritance?

(c) When does a female is affected with this disorder?

18. How was the semi-conservative method of DNA replication proved by Meselson and Stahl?

19. Explain embryological evidences of evolution by taking examples from plants.

20. Trace the life cycle of malaria parasite in the human body when bitten by an infected *Anopheles* mosquito.

OR Many children in Metro cities are suffering from allergy. What is allergy? What are the symptoms of allergy? How is it caused?

21. What are biocontrol agents? Explain their applications taking two examples.

22. What is single cell protein? What is the significance of such a protein?

23. Explain the vector less method of transfer of DNA into a host.

SECTION - D

24. With the help of given diagrammatic representation explain the method of PCR- Diagram Page – 202 figure – 11.6

25. Name the process involved in the production of nematode –resistant Tobacco plant using genetic engineering .Explain the strategy adopted to develop such plants. Diagram – 12.2 Page - 210

26. Mention the harmful effects of noise on human health. **OR** Any newspaper of ill effects of noise. Explain the causes and effects of global warming .What measures need to be taken to control global warming?

SECTION: E

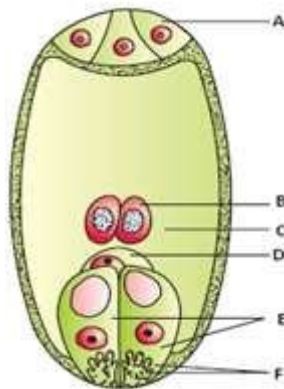
27. a) Explain the role of accessory glands in human male reproductive system.

b) Draw a diagrammatic labeled sectional view of a seminiferous tubule (enlarged)of a human.

OR

a) Label the parts A to F of the figure given below .What is the fate of 'C' after fertilization.

b) Why does a pollen grain possess two male gametes? Explain.



28. a) Explain the process of aminoacylation of tRNA .Mention its role in translation.

b) How do ribosomes act as cellular factory responsible for synthesizing proteins?

c) Describe initiation and termination phases of protein synthesis.

OR

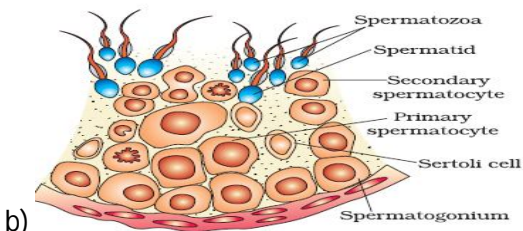
Describe the mechanism of inheritance of the ABO system of blood group, highlighting the principle of genetics involved in it.

29. a) Explain with the help of a graph the population growth curve when resources are
i) limiting and ii) not limiting.
b) Nature has a carrying capacity of a species .Explain.

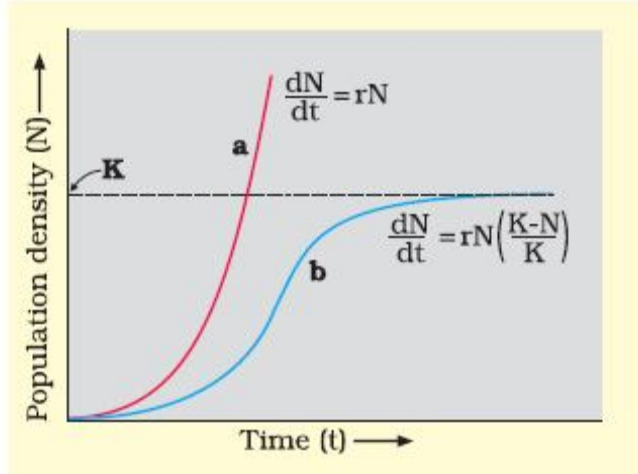
OR

Describe the process of decomposition of detritus.

S.No.	Value points	Marks									
1	Male and female flowers in the same plant , in different plants	½ x2									
2	a) 3'-5' phosphodiester linkage	1									
3	Sum total of all the allelic frequencies is 1	1									
4	MALT	1									
OR	Atlas 66										
5	Remove cell wall	1									
OR	Exists as inactive protoxin										
6	Light , non sticky mucilaginous covering	½+1/2 +1									
7	AUG,UAC ,Codon is the code on mRNA ,bases complementary to codon on t RNA	½ x4									
8	Smoking-increases CO in blood , reduces the conc. Of haem bound oxygen	1+1									
9	Meristem apical and axillary free of virus	1+1									
OR	(a) Ringworm, Trichophyton (any one) (b) Amoebic dysentery , Entamoeba histolytica	½ x 4									
10	Enhanced CO ₂ Conc.,loss of biodiversity, disturbs hydrological cycle, causes soil erosion, lead to desertification (any 4)	½ x4									
11	Conserve and protect the whole ecosystem on-site ,taken out from their natural habitat and placed in special setting off-site	1+1									
OR	High levels of species richness , high degree of endemism , accelerated habitat loss (any two)	1+`1									
12	(a) The conventional sedimentation, filtering and chlorine treatments are given. (b) The biologists developed a series of six connected marshes over 60 hectares of marshland. Appropriate plants, algae, fungi and bacteria were seeded into this area, which neutralize, absorb and assimilate the pollutants	1 + 1									
13	Removal of anther, are bagged before they open ,stigma is receptive desired pollen dusted , rebagged	1+ 2									
OR	(a)Collection of the egg after ovulation (b)help in fertilization of the ovum (c) stronger contraction during delivery of the baby	1 x3									
14	<p>Parent Yellow x Green</p> <p>YY yy</p> <p> ↓</p> <p>F1 generation Yy</p> <p> Yellow Selfing</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>Y</td> <td>y</td> </tr> <tr> <td>Y</td> <td>YY</td> <td>Yy</td> </tr> <tr> <td>y</td> <td>Yy</td> <td>yy</td> </tr> </table> <p>F2 generation YY Yy yy</p> <p>Phenotypic ratio – 3 : 1</p> <p> Yellow Green</p> <p>Genotypic ratio – 1 : 2 : 1</p> <p> YY Yy yy</p>		Y	y	Y	YY	Yy	y	Yy	yy	<p>1</p> <p>1</p> <p>½ + ½</p>
	Y	y									
Y	YY	Yy									
y	Yy	yy									
15	(a)The gene for coloublindness is located on X chromosome . Males have only one X chromosome.(b) Sex linked recessive disorder (c)Mother is atleast a carrier and father is affected.	1 x3									
16	E.coli in ¹⁵ NH ₄ Cl , incorporated , transferred to ¹⁴ NH ₄ Cl , CsCl density gradient centrifugation , after 20 min.intermediate density ,after 40 min.2 hybrid and 2 light DNA	½ x 6									
17	Protonema of moss thalloid, Acacia simple to compound , requirement of	1x3									

	water by <i>Cycas</i> <i>Gingko</i>	
18	Sporozoite injected, reach liver reproduce asexually, RBC reproduce asexually, haemozoin released, gametocytes male and female ,mosquito takes up , fertilization and devt .in mosquito	½ x 6
OR	Exaggerated response of immune system ,sneezing watery eyes running nose difficulty in breathing ,histamine and serotonin from mast cells	1 x 3
19	Biological methods for controlling plant diseases and pests , <i>Bacillus thuringiensis</i> dried spores sprayed, gut toxin released insect larvae die, <i>Trichoderma</i> root ecosystem free-living , Baculo viruses species specific narrow spectrum insecticidal application	1 x 3
20	Alternate source of protein for animal and human nutrition , <i>Spirulina</i> can be grown easily on waste water from potato processing plant straw molasses animal manure sewage , food rich in protein minerals fats carbohydrate vitamins , reduces environmental pollution	1 x 3
21	Taken from media directly -after made competent to take –treated with Ca^{2+} (ice, 42°C ,ice) ,microinjection directly injected into nucleus , biolistics gene gun bombarded with high velocity micro particles of gold or tungsten coated with DNA	1 x 3
22	Denaturation heat unwinding, Annealing two sets of primer Extension Taq polymerase deoxynucleotides	1 x 3
23	RNA interference Using <i>Agro</i> bacterium vector nematode specific genes introduced, produce sense and antisense RNA, complementary ds RNA, silenced mRNA, parasite could not survive	½ x 6
24	Psychological and physiological disorder, damage ear drum, permanent impairing hearing ability, sleeplessness ,increased heart beat, altered breathing pattern , stress	½ x 3
OR	Increase in the level of green house gases, effect-odd climatic changes, melting of ice caps, rise in sea level (any two),control-cutting down of fossil fuel, reducing deforestation,planting trees,decreasing human population (any two)	1+ ½ X 4
25	a)Paired Seminal vesicles , a prostate gland paired bulbourethral gland , secretions constitute seminal plasma rich in fructose calcium certain enzymes . secretions of bulbo urethral gland helps in lubrication of penis . 	3 2
OR	a)A- antipodal B- polar nuclei C- central cell D-egg E-synergids F-filiform apparatus develop into endosperm b) double fertilization	3 2
26	a)amino acids are activated in the presence of ATP linked to tRNA peptide bond formation b)small subunit encounter m RNA translation begins ,two sites of large unit amino acids bind c)start codon AUG initiator tRNA , release factor binds to stop codon terminating translation	1 2 2
OR	I-gene sugar polymer on plasma membrane of RBC,A,B,AB,O, I^a, I^b, i - alleles – multiple allelism I^a dominant to i I^b is dominant to i -law of dominance $I^a I^b$ are codominant	1x 5

27



resources are

unlimited ,reproduce fullest potential when resources are limited
competition among organism fittest survive

Nature has enough possible resources which can support maximum no. of individuals beyond that no further growth is possible this limit is carrying capacity

1

1

1

2

OR

Fragmentation -Detritivores (e.g., earthworm) break down detritus into smaller particles.

Leaching, water soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts.

Catabolism.-Bacterial and fungal enzymes degrade detritus into simpler inorganic substances.

It is important to note that all the above steps in decomposition operate simultaneously on the detritus.

Humification and mineralisation occur during decomposition in the soil.

Humification -leadsto accumulation of a dark coloured amorphous substance called **humus** that is highly resistant to microbial action and undergoes decomposition at an extremely slow rate. Being colloidal in nature it serves as a reservoir of nutrients.

The humus is further degraded by some microbes and release of inorganic nutrients occur by the process known as **mineralisation**.

1 x 5

**SET-3****Series BVM/2**कोड नं.
Code No. **57/2/3**रोल नं.
Roll No.

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परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।

Candidates must write the Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **11** हैं ।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **27** प्रश्न हैं ।
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें ।
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।
- Please check that this question paper contains **11** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **27** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

जीव विज्ञान (सैद्धान्तिक)

BIOLOGY (Theory)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 70

Maximum Marks : 70



सामान्य निर्देश :

- (i) प्रश्न-पत्र में चार खण्डों में कुल 27 प्रश्न दिए गए हैं। सभी प्रश्न अनिवार्य हैं।
- (ii) खण्ड अ में प्रश्न संख्या 1 से 5 अति लघु-उत्तरीय प्रश्न हैं, प्रत्येक प्रश्न 1 अंक का है।
- (iii) खण्ड ब में प्रश्न संख्या 6 से 12 लघु-उत्तरीय प्रश्न प्रकार I के हैं, प्रत्येक प्रश्न 2 अंकों का है।
- (iv) खण्ड स में प्रश्न संख्या 13 से 24 लघु-उत्तरीय प्रश्न प्रकार II के हैं, प्रत्येक प्रश्न 3 अंकों का है।
- (v) खण्ड द में प्रश्न संख्या 25 से 27 दीर्घ-उत्तरीय प्रश्न हैं, प्रत्येक प्रश्न 5 अंकों का है।
- (vi) प्रश्न-पत्र में समग्र पर कोई विकल्प नहीं है, फिर भी 1 अंक वाले दो प्रश्नों में, 2 अंकों वाले दो प्रश्नों में, 3 अंकों वाले चार प्रश्नों में और 5 अंकों वाले सभी तीनों प्रश्नों में भीतरी चयन-विकल्प दिए गए हैं। प्रत्येक परीक्षार्थी को ऐसे प्रश्नों के दो विकल्पों में से कोई एक प्रश्न हल करना है।
- (vii) आवश्यकतानुसार, चित्रों का रेखन साफ-सुथरा एवं यथोचित लेबल होना चाहिए।

General Instructions :

- (i) There are a total of 27 questions and four sections in the question paper. All questions are compulsory.
- (ii) Section A contains questions number 1 to 5, very short-answer type questions of 1 mark each.
- (iii) Section B contains questions number 6 to 12, short-answer type I questions of 2 marks each.
- (iv) Section C contains questions number 13 to 24, short-answer type II questions of 3 marks each.
- (v) Section D contains questions number 25 to 27, long-answer type questions of 5 marks each.
- (vi) There is no overall choice in the question paper, however, an internal choice is provided in two questions of 1 mark, two questions of 2 marks, four questions of 3 marks and all the three questions of 5 marks. In these questions, an examinee is to attempt any one of the two given alternatives.
- (vii) Wherever necessary, the diagram drawn should be neat and properly labelled.



खण्ड अ

SECTION A

1. पौधों तथा प्राणियों से प्रत्येक का एक-एक उदाहरण दीजिए जो अपसारी विकास प्रदर्शित करते हैं । 1

Mention one example each from plants and animals exhibiting divergent evolution.

2. उल्वबेधन (ऐम्नियोसेंटेसिस) पर वैधानिक प्रतिबंध को न्यायोचित सिद्ध करने के पक्ष में एक कारण दीजिए । 1

Give one reason to justify statutory ban on amniocentesis.

3. किन्हीं दो कायिक रोधों (फीज़ियोलॉजिकल बैरियर्स) के नाम लिखिए जो सहज प्रतिरक्षा प्रदान करते हैं । 1

अथवा

निम्नलिखित फ़सलों की किस्मों में से दो रोग प्रतिरोधी किस्मों का चयन कीजिए : 1

हिमगिरी, पूसा गौरव, पूसा कोमल, पूसा A-4

Name any two physiological barriers that provide innate immunity.

OR

Select two disease resistant crop varieties from the list of crop varieties given below :

Himgiri, Pusa Gaurav, Pusa Komal, Pusa A-4

4. निम्नलिखित के कारण होने वाले मानव आनुवंशिक विकार का नाम लिखिए : 1

(a) किसी पुरुष में एक अतिरिक्त X-क्रोमोसोम होना

(b) किसी स्त्री में एक X-क्रोमोसोम का अभाव होना

अथवा

बताइए असुगुणिता (एन्युप्लॉइडी) का क्या परिणाम होता है । 1



Name a human genetic disorder due to the following :

- (a) An additional X-chromosome in a male
- (b) Deletion of one X-chromosome in a female

OR

State what does aneuploidy lead to.

5. द्वितीयक अनुक्रमण की दर प्राथमिक अनुक्रमण दर की अपेक्षा अधिक तीव्र क्यों होती है ? 1

Why is the rate of secondary succession much faster than that of primary succession ?

खण्ड ब

SECTION B

6. जर्मनी के प्रकृतिविद् अलेक्जेंडर वॉन हम्बोल्ट द्वारा दक्षिणी अमेरिका के जंगलों में किए गए गहन अन्वेषण के समय उनके द्वारा किए गए 'दो' प्रेक्षण लिखिए । 2

अथवा

यदि किसी 'N' साइज की समष्टि में जन्म-दर को 'b' तथा मृत्यु-दर को 'd' द्वारा निरूपित किया जाता है, तब इकाई समय अवधि 't' में 'N' में वृद्धि अथवा हास निम्न प्रकार से होगा :

$$\frac{dN}{dt} = (b - d) \times N$$

उपर्युक्त समीकरण को इस प्रकार भी निरूपित कर सकते हैं :

$$\frac{dN}{dt} = r \times N, \text{ जिसमें } r = (b - d)$$

'r' क्या निरूपित करता है ? किसी समष्टि के लिए 'r' का परिकलन करने का कोई एक महत्त्व लिखिए । 2

State 'two' observations made by German naturalist, Alexander von Humboldt during his extensive explorations in South American jungles.

OR



If in a population of size 'N' the birth rate is represented as 'b' and the death rate as 'd', the increase or decrease in 'N' during a unit time period 't' will be :

$$\frac{dN}{dt} = (b - d) \times N$$

The equation given above can also be represented as :

$$\frac{dN}{dt} = r \times N, \text{ where } r = (b - d)$$

What does 'r' represent ? Write any one significance of calculating 'r' for any population.

7. डी.एन.ए. अणु की एक श्रृंखला में 546 न्यूक्लियोटाइड्स हैं । यदि इसमें ऐडेनीन न्यूक्लियोटाइड्स की संख्या 96 है, तो उसमें उपस्थित साइटोसीन न्यूक्लियोटाइड्स की संख्या कितनी होगी ?

2

A segment of DNA molecule comprises of 546 nucleotides. How many cytosine nucleotides would be present in it if the number of adenine nucleotides is 96 ?

8. (a) आपको अरंड तथा सेम के बीज दिए गए हैं । भ्रूण-पोष का अवलोकन करने के लिए आप इनमें से किसका चयन करेंगे ?
- (b) पौधों में भ्रूण-पोष का विकास भ्रूण से पहले होता है । न्यायसंगतता सिद्ध कीजिए ।
- (a) You are given castor and bean seeds. Which one of the two would you select to observe the endosperm ?
- (b) The development of endosperm precedes that of embryo in plants. Justify.

2

9. उस विभेदकारी संरचना का नाम लिखिए जो काली मिर्च के परिपक्व बीज में तो उपस्थित होती है, परन्तु मटर के परिपक्व बीज में अनुपस्थित होती है । यह संरचना किस प्रकार विकसित होती है ?

2

Name a distinguishing structure seen in a mature black pepper seed and not in a pea seed. State how does it develop.

10. क्या कारण है कि बैसिलस थुरिंजिएंसिस द्वारा उत्पादित कीटनाशीय प्रोटीन जीवाणु के लिए घातक नहीं है, परन्तु कपास गोलक शलभ कृमि के लिए प्राणघातक है ? व्याख्या कीजिए ।

2

Why does the insecticidal protein produced by *Bacillus thuringiensis* not kill the bacterium, but kills the cotton bollworm ? Explain.



11. उस पैलिन्ड्रोमिक न्यूक्लियोटाइड अनुक्रम को लिखिए जिसे ईको आर-I (EcoRI) पहचानता है। इसकी कार्यस्थली भी इंगित कीजिए। 2

Write the palindromic nucleotide sequence that EcoRI reads, and indicate the site of its action.

12. मॉस तथा मेंढक दोनों को निषेचन के लिए माध्यम के रूप में जल की आवश्यकता होती है। इन दोनों जीवों में युग्मक-संलयन कहाँ संपन्न होता है और यह किस प्रकार सुनिश्चित होता है? 2

अथवा

प्राणियों की अंडप्रजक तथा सजीवप्रजक श्रेणियों के एक-एक उदाहरण देते हुए उन्हें वर्गीकृत करने का आधार लिखिए। 2

Mosses and frogs both need water as a medium for fertilisation. Where does syngamy occur and how is it ensured in both these organisms?

OR

Write the basis of categorising animals as oviparous or viviparous, giving one example of each.

खण्ड स

SECTION C

13. 'प्रसारी (बढ़ती) आयु पिरैमिड' तथा 'स्थिर आयु पिरैमिड' में अंतर स्पष्ट कीजिए। अपने उत्तर की आरेखों के साथ पुष्टि कीजिए। 3

Differentiate between an 'Expanding age pyramid' and a 'Stable age pyramid'. Substantiate your answer with diagrams.

14. एक शिशु ए.डी.ए.-अभाव के साथ पैदा हुआ है।
(a) जीवनपर्यन्त स्थायी उपचार का एक संभाव्य तरीका सुझाइए तथा उसकी व्याख्या भी कीजिए।
(b) इस रोग के किसी अन्य संभाव्य उपचार का नाम लिखिए। 3

A child is born with ADA-deficiency.

- (a) Suggest and explain a procedure for possible life-long (permanent) cure.
(b) Name any other possible treatment for this disease.



15. जैव-प्रौद्योगिकी प्रयोगशालाओं में सर्वाधिक उपयोग किए जाने वाले बायोरिएक्टर का नाम लिखिए । इस बायोरिएक्टर के अनिवार्य संघटकों का उल्लेख कीजिए जिससे अधिक मात्रा में वांछित उत्पाद पाने के लिए संवर्धन माध्यम को अनुकूलतम परिस्थितियाँ उपलब्ध कराई जा सकें ।

3

Name the most commonly used bioreactor in biotechnology labs. Mention the most essential components this bioreactor must have so as to provide the optimum conditions to the culture medium, resulting in production of large volume of desired product.

16. एक बैंगनी फूल वाले लम्बे मटर के पौधे का सफ़ेद फूल वाले लम्बे मटर के पौधे से संकरण कराया गया । F_1 पीढ़ी में सफ़ेद फूल वाले लम्बे मटर के पौधे, बैंगनी फूल वाले लम्बे मटर के पौधे, बैंगनी फूल वाले बौने मटर के पौधे तथा सफ़ेद फूल वाले बौने मटर के पौधे प्राप्त हुए । इस संभाव्यता को दर्शाने के लिए संकरण (क्रॉस) बनाइए ।

3

A tall pea plant bearing violet flowers is crossed with a tall pea plant bearing white flowers. In the F_1 progeny, there were tall pea plants with white flowers, tall pea plants with violet flowers, dwarf pea plants with violet flowers and dwarf pea plants with white flowers. Work out the cross to show how is it possible.

17. (a) अंतःप्रजनन तथा बहिःप्रजनन में अंतर स्पष्ट कीजिए ।
(b) पशु प्रजनन (पशुपालन) में अंतःप्रजनन के कोई तीन लाभ तथा एक महत्वपूर्ण हानि लिखिए ।

3

- (a) Differentiate between inbreeding and outbreeding.
(b) List any three advantages and one important disadvantage of inbreeding practice in animal husbandry.

18. हार्डी-वीनबर्ग सिद्धान्त की व्याख्या कीजिए ।
Explain Hardy-Weinberg principle.

3

19. “मेसेल्सन तथा स्टाल द्वारा अपने प्रयोगों में नाइट्रोजन के भारी समस्थानिक के उपयोग से यह सिद्ध हो गया कि डी.एन.ए. अर्ध-संरक्षी की तरह प्रतिकृति करता है ।” व्याख्या कीजिए कि वे इस निष्कर्ष पर किस प्रकार पहुँचे ।

3

अथवा

एक असीमकेन्द्रकी के राइबोसोम में होने वाले स्थानांतरण (रूपांतरण) की क्रियाविधि की व्याख्या कीजिए ।

3



“Use of heavy isotope of nitrogen by Meselson and Stahl demonstrated semi-conservative mode of replication of a DNA molecule.” Explain how did they arrive at this conclusion.

OR

Explain the mechanism of translation that occurs in the ribosomes in a prokaryote.

20. (a) न्यूमोनिया तथा सामान्य जुकाम के रोगकारक जीवों के नाम लिखिए ।
(b) इन रोगों के लक्षणों में क्या अंतर है ?
(c) दोनों रोगों के दो उभयनिष्ठ लक्षण लिखिए । 3

अथवा

- (a) मलेरिया के रोगकारक जीव और रोगवाहक जीव के वैज्ञानिक नाम लिखिए तथा इस रोग के लक्षण लिखिए ।
(b) ईडिस स्पी. द्वारा फैलने वाले दो रोगों के नाम लिखिए । 3
(a) Name the causative agents of pneumonia and common cold.
(b) How do these differ in their symptoms ?
(c) Mention two symptoms common to both.

OR

- (a) Write the scientific names of the causative agent and vector of malaria, and write its symptoms.
(b) Name any two diseases spread by *Aedes* sp.

21. घास के भ्रूण की अनुदैर्घ्य/अनुप्रस्थ-काट का आरेख बनाकर उसके भागों को नामांकित कीजिए । 3

अथवा

पुरुष की शुक्रजनक नलिका की काट के आरेखीय दृश्य (आवर्धित) का रेखाचित्र बनाइए तथा इसके भागों को नामांकित कीजिए । 3

Draw L.S. of an embryo of grass and label its parts.

OR

Draw a diagrammatic sectional view of a seminiferous tubule (enlarged) in humans and label its parts.



22. अंडजनन परिघटनाओं के उचित अनुक्रम को प्रदर्शित करने के लिए एक प्रवाह चार्ट बनाइए । 3
Construct a flow chart exhibiting sequential events of oogenesis.
23. पुष्पी पादपों में टेपीटम एवं सहाय कोशिकाएँ कब और कहाँ उत्पन्न होती हैं ? उनके प्रकारों का वर्णन कीजिए । 3

अथवा

एक आवृतबीजी के नर युग्मकोद्भिद में निम्नलिखित संरचनाएँ कहाँ उपस्थित होती हैं ? प्रत्येक के कार्य का उल्लेख कीजिए । 3

- (a) जनन-छिद्र
- (b) स्पोरोपोलेनिन
- (c) जनन कोशिका

When and where do tapetum and synergids develop in flowering plants ?
Mention their functions.

OR

Where are the following structures present in a male gametophyte of an angiosperm ? Mention the function of each one of them.

- (a) Germ pore
- (b) Sporopollenin
- (c) Generative cell

24. प्रकृति में कार्बन चक्र का वर्णन कीजिए । वनोन्मूलन इस चक्र को किस प्रकार प्रभावित करता है ? 3

Describe the carbon cycle in nature. How does deforestation affect this cycle ?



खण्ड द
SECTION D

25. एक सामान्य दम्पति को वर्णान्ध शिशु पैदा होता है, जबकि थैलैसीमिया ग्रस्त शिशु का जन्म सामान्य जनकों से हुआ।
उपर्युक्त प्रकरणों में इन दो विशेषकों की आनुवंशिकता के पैटर्न की तुलना कीजिए। कारण देते हुए स्पष्ट कीजिए कि यह किस प्रकार संभव है।

5

अथवा

- (a) हर्षे और चेस ने जिन कारणों से अपने प्रयोग किए, उनका वर्णन कीजिए।
(b) हर्षे और चेस द्वारा किए गए प्रयोगों पर आधारित निम्नलिखित प्रश्नों के उत्तर दीजिए।
(i) उन्होंने जिन विकिरण सक्रिय समस्थानिकों का उपयोग किया, उनके नाम लिखिए और समझाइए कि उनका उपयोग उन्होंने किस प्रकार किया।
(ii) उन्हें संवर्ध को प्रचक्रित करने तथा हिलाने की आवश्यकता क्यों पड़ी ?
(iii) उनके द्वारा किए गए प्रेक्षणों एवं उनके आधार पर किए गए निष्कर्षों को लिखिए।

5

A normal couple has a colour-blind child, whereas a child suffering from thalassemia is born to normal parents.

Compare the pattern of inheritance of these two traits in the said cases. State the reasons how is it possible.

OR

- (a) State the reasons for which Hershey and Chase carried out their experiments.
(b) Answer the following questions based on the experiments of Hershey and Chase :
(i) Name the different radioactive isotopes they used, and explain how they used them.
(ii) Why did they need to agitate and spin their culture ?
(iii) Write their observations and the conclusions they arrived at.
26. बंगलुरु में प्लास्टिक की बोरी के उत्पादनकर्ता अहमद खान ने प्लास्टिक अपशिष्ट की समस्या का एक आदर्श हल ढूँढ़ निकाला। ठोस अपशिष्ट निपटान की चुनौतियों के समाधान हेतु अहमद खान द्वारा किए गए प्रयासों की व्याख्या पाँच चरणों में कीजिए।

1×5=5

अथवा

- (a) पारिस्थितिक पिरैमिड क्या निरूपित करते हैं ? इन पिरैमिडों की किन्हीं दो सीमाओं का उल्लेख कीजिए।
(b) एक उदाहरण की सहायता से जैव-मात्रा के एक उल्टे पिरैमिड का वर्णन कीजिए।

3+2=5



A plastic sack manufacturer in Bengaluru, Ahmed Khan has managed to find an ideal solution to the problem of plastic waste. Explain in five steps the efforts of Ahmed Khan to meet the challenges of solid waste management.

OR

- (a) What does an ecological pyramid represent ? State any two limitations that these pyramids have.
- (b) Describe an inverted pyramid of biomass with the help of an example.

27. (a) सक्रिय प्रतिरक्षा तथा निष्क्रिय प्रतिरक्षा में अंतर स्पष्ट कीजिए ।
(b) मानव समष्टि को स्वस्थ रखने के लिए टीकाकरण और प्रतिरक्षीकरण के योगदान पर टिप्पणी कीजिए ।

5

अथवा

शहरों में जनित व्यर्थ जल (वाहित मल) को प्राकृतिक जल स्रोतों में विसर्जित करने से पहले किए जाने वाले द्वितीयक उपचार का वर्णन कीजिए । इस प्रक्रम द्वारा होने वाले एक अन्य लाभ का उल्लेख कीजिए ।

5

- (a) Differentiate between active and passive immunity.
- (b) Comment on the role of vaccination and immunization in keeping human population healthy.

OR

Describe the process of secondary treatment given to municipal waste water (sewage) before it can be released into fresh waterbodies. Mention another benefit provided by this process.



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