

CHAPTER

8

REPRODUCTION

Syllabus

Reproduction in animals and plants (asexual and sexual), reproductive health-need and methods of family planning; Safe sex, HIV/AIDS; Child bearing and women's health.

Trend Analysis

List of Concepts	2018 (OD/D)	2019 (OD/D)	2020 (OD/D)
Basics of reproduction, Asexual reproduction – their methods and vegetative reproduction	1 Q (3 M)	1 Q (5 M)	
Sexual reproduction in plants		1 Q (5 M)	1 Q (5 M)
Reproduction in human beings	1 Q (5 M)		OR 1 Q (5 M)



TOPIC - 1

Asexual Reproduction and Vegetative Propagation



Revision Notes

Introduction

- Reproduction is the process by which living organisms produce new individuals similar to themselves. It ensures continuity of life on earth.
- Nucleus of the cell contains DNA (Deoxyribose Nucleic Acid) which is the hereditary material.
- DNA replicates and forms new cells causing variation. So, these new cells will be similar but may not be identical to original cell.
- Variations are useful for the survival of the individual and species over time. It is the base of evolution.

Types of Reproduction

(a) Asexual Reproduction

- A single individual give rise to new individual.
- Gametes are not formed.
- New individual is identical to parent.
- Adopted by lower organisms.

TOPIC - 1

Asexual Reproduction and Vegetative Propagation

TOPIC - 2

Sexual Reproduction in Plants

TOPIC - 3

Reproduction in Human Beings

(b) **Sexual Reproduction**

- Two individuals i.e., one male and one female are needed to give rise to new individual.
- Gametes are formed.
- New individual is genetically similar but not identical to parents.
- It is useful to generate more variations in species.
- Adopted by higher organisms.

➤ **Asexual reproduction** takes place through fission, fragmentation, regeneration, budding, vegetative propagation, and spore formation. These modes of reproduction depend on the body design of the organisms.

(a) **Fission:** It is of two types - binary fission and multiple fission.

- (i) **Binary fission:** It is the division of one cell into two similar or identical cells. The nucleus first divides amitotically into two, followed by the division of the cytoplasm. The cell finally splits into two daughter cells. *e.g., Amoeba*
- (ii) **Multiple fission:** In multiple fission, many individuals are formed from a single individual. *e.g., Plasmodium*. The nucleus divides repeatedly, producing many nuclei and many daughter cells are formed.

(b) **Fragmentation:** It takes place in multicellular organisms with simple body organisation such as in *Spirogyra*. In this, the body breaks up into two or more small pieces of fragments upon maturation. These fragments grow into new individuals.

(c) **Regeneration:** It is the ability of a fully differentiated organism to give rise to new individual organisms from its body parts. Small cut or broken parts of the organism's body grow or regenerate into separate individuals. **For example:** *Planaria* and *Hydra*.

(d) **Budding:** In budding, a small part of the body of the parent grows out as a bud which then detaches and becomes a new organism. *Hydra* reproduces by budding using the regenerative cells.

(e) **Vegetative Propagation:** In many plants, new plants develop from vegetative parts of plant body such as stem, roots, leaves, etc.

Methods of vegetative propagation:

(i) **Natural methods are:**

- (a) By roots: *e.g., Dahlia, sweet potato.*
- (b) By stems: *e.g., Potato, ginger.*
- (c) By leaves: *e.g., Bryophyllum* (leaf margins bear buds which develop into plants).

(ii) **Artificial methods:**

- (a) Grafting: *e.g., Mango*
- (b) Cutting: *e.g., Rose*
- (c) Layering: *e.g., Jasmine*
- (d) Tissue culture: *e.g., Ornamental plants, orchid.*

(f) **Spore Formation:** Spores are small bulb like structures which are covered by thick walls. Under favourable conditions, they germinate and produce new organisms.



Mnemonics

Concept: Vegetative Reproduction

Mnemonics: Positive Example Based Learning

Interpretation:

P - Potato

E - Eyes

B - Bryophyllum

L - Leaf buds

How is it done on the GREENBOARD?

Q. What is vegetative propagation? List with brief explanation three advantages of practising this process for growing same types of plants. Select two plants from the following which are grown by this process :

Banana, Wheat, Mustard, Jasmine, Gram

5

Solution:

Step I: Vegetative propagation is the development of a new plant from the vegetative parts / roots, stem and leaves of a plant.

Advantages of Vegetative reproduction :

Step II: Such plants can bear flowers and fruits earlier than those produced from seeds.

Step III: Allows propagation of plants (banana, orange etc) that have lost capacity to produce seeds.

Step IV: Two plants grown by this process are:

Jasmine, banana.



Objective Type Questions

1 mark each

A Multiple Choice Questions

Q. 1. Reproduction is essential for living organisms in order to

- (a) keep the individual organism alive.
- (b) fulfill their energy requirement.
- (c) maintain growth.
- (d) continue the species generation after generation.

[NCERT Exemp.]

Ans. Correct option : (d)

Explanation : Reproduction serves to continue the species which would otherwise extinct due to struggle for survival and natural/accidental death of individuals.

1

Q. 2. A feature of reproduction that is common to *Amoeba*, *Spirogyra* and Yeast are that

- (a) they reproduce asexually.
- (b) they are all unicellular.
- (c) they reproduce only sexually.
- (d) they are all multicellular.

[NCERT Exemp.]

Ans. Correct option : (a)

Explanation : All of them reproduce asexually.

1

Q. 3. In *Spirogyra*, asexual reproduction takes place by

- (a) breaking up of filaments into smaller bits.
- (b) division of a cell into two cells.
- (c) division of a cell into many cells.
- (d) formation of young cells from older cells.

[NCERT Exemp.]

Ans. Correct option : (a)

Explanation : Fragmentation is a type of asexual reproduction in animals in which parental body is broken down into pieces and each of these pieces develop into an individual animal.

1

Q. 4. The ability of a cell to divide into several cells during reproduction in *Plasmodium* is called

- (a) budding
- (b) reduction division
- (c) binary fission
- (d) multiple fission

[NCERT Exemp.]

Ans. Correct option : (d)

Explanation : Multiple fission is a repeated division of organism to produce many daughter cells all together.

1

Q. 5. Factors responsible for the rapid spread of bread mould on slices of bread are

- (i) large number of spores.
- (ii) availability of moisture and nutrients in bread.
- (iii) presence of tubular branched hyphae.
- (iv) formation of round shaped sporangia.

- (a) (i) and (iii)
- (b) (ii) and (iv)
- (c) (i) and (ii)
- (d) (iii) and (iv)

[NCERT Exemp.]

Ans. Correct option : (c)

Explanation : Bread mould prefers damp and warm substratum with ample supply of nutrients on which its air-borne spores land and germinate to produce mycelium.

1

B Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A): *Amoeba* reproduces by binary fission.

Reason (R): All unicellular organisms reproduce asexually.

Ans. Correct option : (a)

Explanation : *Amoeba* is a unicellular organism. It reproduces asexually through binary fission. It is the division of one cell into two similar or identical cells.

Q. 2. Assertion (A): Plants are vegetatively propagated even though they bear seeds.

Reason (R): Potatoes reproduce through tubers, apples by cutting etc.

Ans. Correct option : (b)

Explanation : Vegetative reproduction happens through the use of vegetative parts of the plants, such as leaves, stems, and roots to produce new plants or through growth from specialized vegetative plant parts.

Q. 3. Assertion (A): Characteristics of parental plants can be preserved through asexual reproduction.

Reason (R): Vegetative reproduction involves only mitosis.

Q. 3. When a cell reproduces, what happens to its DNA?

Ans. Correct option : (a)

Explanation : Asexual reproduction involves a single individual, which give rise to new individual that are genetically identical to parents. It is because, when organisms reproduce asexually, only mitotic divisions are involved and the chromosome number remains the same.

Q. 4. Assertion (A): *Plasmodium* reproduces by multiple fission.

Reason (R): Multiple fission is a type of asexual reproduction.

Ans. Correct option : (b)

Explanation : *Plasmodium* reproduces asexually by multiple fission.

Q. 5. Assertion (A): DNA copying is necessary during reproduction.

Reason (R): DNA copying leads to the transmission of characters from parents to offspring.

Ans. Correct option : (a)

Explanation : DNA copying is necessary during reproduction because it leads to the transmission of characters from parents to offsprings and brings about variation.

C Very Short Answer Type Questions

Q. 1. How does *Plasmodium* reproduce? Is this method sexual or asexual type of reproduction?

[U] [Delhi Set III, 2017]

Ans. *Plasmodium* reproduces by a process known as multiple fission. Multiple fission is a type of asexual reproduction.

Q. 2. Name the method by which *Spirogyra* reproduces under favourable conditions. Is this method sexual or asexual type of reproduction?

[R] [Delhi Set I, 2017]

Ans. Fragmentation, Asexual

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

[CBSE, O.D. Set 1, 2017]



Topper Answer, 2017

Ans. Q2: → When a cell reproduces, its DNA makes two copies, each divided cell getting one.

Q. 4. Newly formed DNA copies may not be identical at times. Give one reason. [A] [OD 31/2, 2017]

Ans. If there is an error in DNA copying or mutation, then newly formed DNA copies may not be identical at time.

Q. 5. What are those organisms called which bear both the sex organs in the same individual? Give one example of such organism.

[R] [Board Term-II, O.D. II, 2016]

Ans. Bisexual; For e.g., *Hydra*/Earthworm/Mustard/*Hibiscus*.

(Any one) $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2016]

Q. 6. What is a gene?

Ans. Gene is a part of DNA that encodes the instructions that allow a cell to produce a specific protein or enzyme.

Q. 7. What is DNA?

[R] [Board Term II, Foreign Set III, 2015]

Ans. DNA is the carrier of hereditary information from parents to the next generation. Hereditary material is present in all living cells.

[CBSE Marking Scheme, 2015] 1

Q. 8. Name the type of reproduction mostly seen in unicellular organisms.

[R] [Board Term-II, Delhi 2015]

Ans. Asexual reproduction.

[CBSE Marking Scheme, 2015] 1

Q. 9. Name two simple organisms having the ability of regeneration. [R] [Board Term II, O.D. Set III, 2015]

Ans. *Planaria* and *Hydra*. $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2015]



Short Answer Type Questions-I

2 marks each

Q. 1. List four modes of asexual reproduction.

[R] [O.D. Comptt 31/1 2017]

Ans. Four modes of asexual reproduction are:

- (i) Binary fission
- (ii) Budding
- (iii) Multiple fission
- (iv) Fragmentation. $\frac{1}{2} \times 4 = 2$

AI Q. 2. (i) What is meant by vegetative propagation?

(ii) How will a plant be benefitted if it reproduces by vegetative propagation? [U]

Ans. (i) Propagation by vegetative parts such as the roots, stems and leaves. 1

(ii) Plants raised by vegetative propagation can bear flowers and fruits earlier than those produced from seeds. Such method also makes possible the

propagation of plants that have lost the capacity to produce seeds. 1

Q. 3. How is the process of binary fission different in *Amoeba* and *Leishmania*? [U]

Ans. *Amoeba* reproduces through simple binary fission. *Leishmania* reproduces asexually through binary fission that occurs along a definite orientation related to the whip like structure at one end of the cell. 1+1

Q. 4. Fallen leaves of '*Bryophyllum*' on the ground produce new plants whereas the leaves of rose do not? Explain this difference between the two plants. [A]

Ans. In *Bryophyllum*, vegetative propagation occurs through leaves where buds occur on their margins. 1

Rose leaves do not form buds. 1



Short Answer Type Questions-II

3 marks each

AI Q. 1. (a) List in tabular form two differences between binary fission and multiple fission.

(b) What happens when a mature *Spirogyra* filament attains considerable length?

[U] [Delhi, Set-II, 2020]

Ans. (a) Difference between binary fission and multiple fission:

1.	It is the division of one organism into two similar identical organisms.	It is the division of one organism into multiple organisms.
2.	The nucleus first divides amitotically into two, followed by division of the cytoplasm.	The nucleus first divides repeatedly producing many nuclei and many daughter cells are produced.
	e.g. <i>Amoeba</i>	e.g. <i>Plasmodium</i>

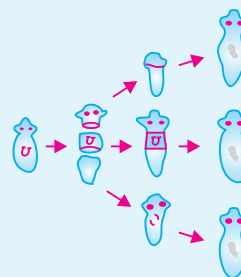
(b) *Spirogyra* reproduces asexually by fragmentation. In this, the body breaks up into two or more small pieces of fragments upon maturation. These fragments grow into new *Spirogyra*. 2+1

Q. 2. (a) Budding, fragmentation and regeneration, all are considered as asexual mode of reproduction. Why?

(b) With the help of neat diagram, explain the process of regeneration in *Planaria*.

[R] + [U] [Board Outside Delhi, Set-III, 2019]

Ans. (a) Because these methods involve only one parent / organisms are formed as a result of mitotic division / progeny (organisms) are similar in their genetic make up and no variations. (any one) 1



Regeneration of *Planaria* 1

(i) *Planaria* can be cut into any number of pieces and each piece grows through specialized cells into a complete organism.

[CBSE Marking Scheme, 2019] 1

AI Q. 3. Write one main difference between asexual and sexual mode of reproduction. Which species is likely to have comparatively better chances of

survival-the one reproducing asexually or the one reproducing sexually? Justify your answer.

[AE] [CBSE, Delhi & OD, 2018]

Ans. Any one of the following difference:

- (i) In sexual reproduction, two opposite sexes are involved whereas in asexual reproduction, only one individual is involved.

- (ii) In sexual reproduction, male and female gamete formation takes place whereas in asexual no gamete formation occurs.

Sexually reproducing organisms have better chances of survival.

Because more variations are generated. 1 + 2

[CBSE Delhi, O.D. Marking Scheme, 2018]



Topper Answer, 2018

Ans.

Asexual mode of reproduction is uniparental & thus, doesn't involve any fusion of gametes & hence, fertilization.

Sexual mode of reproduction is biparental & thus involves fusion of both male & female gametes.

Among the two, sexually reproducing species have a better chance of survival. This is because reproduction in such species require contributing equal genetic material from both the parents. This results in various combinations for genes.

Hence, the process of creation of variations is increased manifold. ^{as compared to asexually reproducing organism} Thus, accumulation of such variations for long time, may lead to evolution. Not only this, we also know that variations are helpful for continuation of species in case the niche changes drastically due to factors not under our control like global warming, meteorite hits etc. Asexual reproduction involves slight variations & thus, will not be very beneficial to produce a variation adaptable to drastically changed

[AI] Q. 4. What is reproduction? Explain two advantages of sexual reproduction over asexual reproduction.

[U] [Delhi Comptt. 31/1/3, 2017]

Ans. **Reproduction:** It is a (biological) process by which new individuals of the same species are produced by the existing organisms. 1

Advantages of sexual reproduction:

- (i) Leads to stability of population of species. 1
(ii) Results in variations useful for the survival of species over time.

[CBSE Marking Scheme, 2017] 1

Q. 5. What is vegetative propagation? State two advantages and two disadvantages of this method.

[U] [CBSE OD. Set 1-2017]

Ans. Vegetative propagation is a mode of asexual reproduction in which new plants are formed from roots, stems, leaves and buds of the individual vegetative parts of the plants. e.g. eyes of potato. 1

Advantages:

- (i) Offsprings are genetically identical and therefore useful traits can be preserved. 1/2
- (ii) It is a rapid and economical method. 1/2

Disadvantages:

- (i) New characters cannot be introduced. 1/2
- (ii) The disease of the parent plant gets transferred to the offsprings. 1/2

OR



Topper Answer, 2017

Ans.

→ Vegetative Propagation :- Propagating (or growing) plants from their vegetative parts like stem, leaves, roots etc. is known as vegetative propagation.

Advantages :-

- 1) Plants produced by vegetative propagation flowers & have fruits much earlier than plants produced by seeds.
- 2) It is easy, fast method and can be used for propagation of plants which don't produce seeds.

Disadvantages :-

- 1) Since plants are genetically very similar & almost identical, no new variations can be generated.
- 2) Plants can still suffer from various plant diseases.

Q. 6. Reproduction is one of the most important characteristics of living beings. Give three reasons in support of the statement.

[AE] [CBSE OD. Set 1-2017]



Topper Answer, 2017

Ans.

1. → Reproduction is an important characteristic of living beings because :-

- 1) It promotes continuity of life.
- 2) ^{It} Promotes stability of species.
- 3) It includes creation of variations that are the basis of evolution.
- 4) It regulates population.

Q. 7. What is regeneration? Give one example of an organism that shows this process and one organism that does not. Why does regeneration not occur in the latter? [AE] [Foreign 31/2/1, 2017]

Ans. (i) Regeneration: Ability of organisms to give rise to new individual organisms from their body parts. 1

(ii) *Planaria/Hydra* ½

(iii) *Amoeba/Rhizopus/Banana/Sugarcane/any other* ½

(iv) Regeneration is carried out by specialized cells which are not present in non regenerating organisms. [U] [CBSE Marking Scheme, 2017] 1

Q. 8. What happens when:

(a) Accidentally, *Planaria* gets cut into many pieces?

(b) *Bryophyllum* leaf falls on the wet soil?

(c) On maturation sporangia of *Rhizopus* bursts?

[R] [Delhi Set 1, 2017,

Board Term II, Foreign Set I 2016]

Ans. (a) Each piece regenerates into new *Planaria*. 1

(b) Buds called **leaf buds** at its notches develop into new plants. 1

(c) It releases spores which germinate into new mycelium in moist conditions. 1

[CBSE Marking Scheme, 2017]

Detailed Answer:

(a) When *Planaria* gets cut into many pieces, each piece regenerates into a new Planarian organism.

(b) When *Bryophyllum* leaf falls on the wet soil, the buds that are present along the margin of the leaf will develop into new plants by the process known as **vegetative propagation**.

(c) When the sporangia of *Rhizopus* burst upon maturation, it releases spores which germinate into new mycelium in moist conditions.

Q. 9. How do organisms, whether reproduced asexually or sexually maintain a constant chromosome number through several generations? Explain with the help of suitable example.

[AE] [Board Term-II, Delhi Set-I, 2016]

Ans. (i) When organisms reproduce asexually, only mitotic divisions are involved and the chromosome number remains the same.

(ii) During asexual reproduction, the DNA (in the chromosomes) or the cells involved are copied and then equally divided among the two daughter cells. Thus, chromosome number remains unchanged. ½

(iii) In sexual reproduction, organisms produce gametes through a special type of division called **meiosis reductional division**, in which the original number of chromosomes is reduced to half.

These two male & female gametes fuse to form the zygote and the original number of chromosomes is restored.

(iv) In sexual reproduction, specialized cells / germ cells with only half the number of chromosomes are formed. When these germ cells from two individuals combine to form a new individual, the original chromosome number is restored. ½ + ½

(v) **Example:** In humans, the parents (father and mother) each have 46 or 23 pairs of chromosomes. In the gametes. The sperm has half the number of chromosomes *i.e.*, 23 and the egg also has 23 chromosomes. When the sperm and the egg fuse, the zygote has 46 or 23 pairs of chromosomes. Thus, the chromosome number remains constant.

1½

[CBSE Marking Scheme, 2016]

Q. 10. What is multiple fission? How does it occur in an organism? Explain briefly. Name one organism which exhibits this type of reproduction.

[AE] [Board Term-II, Delhi Set-II, 2016]

Ans. Multiple fission: The process of reproduction in which many individuals are formed or produced from the parent cell. 1

In this process, the nucleus divides repeatedly to produce large number of nuclei. Each nucleus gathers a bit of cytoplasm around itself, develops a membrane around each structure.

Many daughter cells develop which on liberation grow into adult organism. 1½

Plasmodium exhibits this type of fission. ½

[CBSE Marking Scheme, 2016]

Q. 11. Explain the term "Regeneration" as used in relation to reproduction of organisms. Describe briefly how regeneration is carried out in multicellular organisms like *Hydra*. [U] [O.D. Set I, 2016]

Ans. Regeneration: It is the ability of an organism to give rise to a new organism/individual from their body parts.1

Regeneration in *Hydra*:

(i) The body of *Hydra* by any means is cut into number of pieces. ½

(ii) Each piece contains specialized cells. ½

(iii) These cells, proliferate and make large number of cells. ½

(iv) From this mass of cells, different cells undergo changes to become various cell types and tissues, which finally develops into a new organism. [CBSE Marking Scheme, 2016] ½



Ans.

Fully differentiated or multicellular organisms has the ability to regenerate new cut parts to a complete individual organisms. If the organism is cut or broken, the specialised cells in it which is responsible for reproduction proliferate and create mass no. of cells. These mass number of cells separate and develop into different structures in the body in an organised sequence called development. In simple organisms like Hydra, regenerative cells proliferate and give rise to large number of cells and form into a complete organism. Whereas regeneration cannot be same as asexual reproduction as organism will not depend on being cut up to be able to reproduce. This is an asexual mode of reproduction. This also takes place in Planaria.

Q. 12. In the context of reproduction of species state the main difference between fission and fragmentation. Also give one example of each.

[Board Term-II O.D. Set II, 2016]

Ans. Fission: It is the method of asexual reproduction in unicellular forms of life.

In this process, the parent organism splits to form two or more daughter cells.

Example: Amoeba / Plasmodium / Paramecium.

(Or any other relevant example) 1½

Fragmentation: It is the process found in multicellular organisms. The filament breaks up into two or more pieces upon maturation. These pieces then grow into new individuals.

Example: Spirogyra. 1½

[CBSE Marking Scheme, 2016]

Detailed Answer:

Fission: It is defined as the splitting of a unicellular organism into two or more than two separate

daughter cells. It is the most common and simplest method of asexual reproduction in unicellular organisms, such as bacteria and Protozoa. Generally it is of two types i.e. binary and multiple fission. In binary fission, parent organism divides into two identical daughter organism with definite orientation. In multiple fission, parent organism divides into many identical daughter organisms. The nucleus of the cell splits repeatedly to form many smaller nuclei called **daughter nuclei** surrounded by a little bit of cytoplasm and thin membrane around them. 1½

Fragmentation: It is a form of asexual reproduction in which multicellular organisms like filamentous algae (*Spirogyra*) breaks up into two or more small fragments or pieces. On maturity, each of which subsequently grows to form a complete new organism. 1½

Q. 13. Define reproduction. How does it help in providing stability to the population of species?

[U]

[Board Term II O.D. Set-I, 2016]

Ans. Reproduction: It is a (biological) process by which new individuals of the same species are produced by the existing organisms. 1

- (i) Populations of organisms live in well-defined places called **niches** in the ecosystem using their ability to reproduce. ½
- (ii) Reproduction involves DNA copying which is the source of information for making proteins thereby controlling body design. ½
- (iii) These body designs allow the organism to use a particular niche for the stability of the population of a species. ½
- (iv) (Minor) variations may also lead to the stability of the species. ½

[CBSE Marking Scheme, 2016] ½

OR



Topper Answer, 2016

Ans.

The creation of new individuals from the existing individuals or individual for the species to survive is called reproduction. The consistency of the DNA is maintained in order to reproduce similar kind of organisms with same body design for the organism to fit to a particular niche. Thus, reproduction is linked to the stability of the population of species. It increases population size, that makes us to notice the particular organisms from a species and thus maintains the gene pool of a species.



Long Answer Type Questions

5 marks each

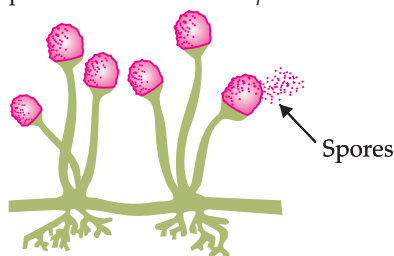
Q. 1. (a) Draw a diagram to show spore formation in *Rhizopus*.

(b) With the help of an example differentiate between the process of Budding and Fragmentation.

(c) Why is vegetative propagation practiced for growing some type of plants?

[Outside Delhi, Set- III, 2020]

Ans. (a) Spore formation in *Rhizopus*:



2

(b) Differences between Budding and Fermentation:

Budding	Fragmentation
In budding, a small part of the body of the parent grows out as a bud which then detaches and become a new organism.	In this, the body breaks up into one or more small pieces of fragments and grow into new individual.
<i>Hydra</i> reproduces by budding using the regenerative cells.	It takes place in multicellular organisms with simple body organisation such as <i>Spirogyra</i> .

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

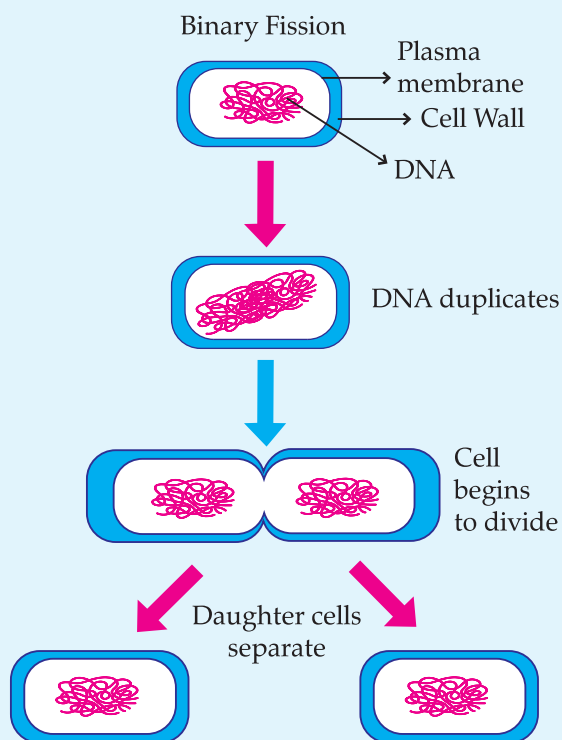
(c) Vegetative propagation is practiced for growing some type of plants because:

- Only one parent is required for reproduction; this eliminates the need of special mechanisms (pollination) and fusion of gametes i.e., fertilization.
- Many plants are able to tide over unfavourable conditions because of the presence of vegetative reproductive parts like tubers, corns and bulbs.
- Plants that do not produce seeds can be propagated by this method, e.g., sugarcane and potato.
- Vegetative propagation is a cheaper, easier and rapid method of reproduction in plants than growing plants from seeds. For example, lilies grow very slowly and take up to seven years to develop flowers when their seeds are grown, but when grown vegetatively, flowers are produced only after a year or two.
- The trait (character) of the parent plant is preserved and the offsprings are genetically identical. (Any two) 1+1=2

AI Q. 2. (i) Describe the various steps involved in the process of binary fission with the help of a diagram.

(ii) Why do multicellular organisms use complex way of reproduction? [Board SQP, 2020]

Ans. (i)



- (ii) Multicellular organisms cannot reproduce by cell because they are not simple random collection of cells. In them, specialized cells are organized as tissues which are organized into organs. Cell-by-cell division would be impractical. Multicellular organisms, therefore, require to use more complex ways of reproduction. 3 + 2

[CBSE Marking Scheme, 2020]

Q. 3. What is vegetative propagation? List with brief explanation three advantages of practising this process for growing same types of plants. Select two plants from the following which are grown by this process:

Banana, Wheat, Mustard, Jasmine, Gram.

[Board Term-II, Foreign I, 2016]

Ans. (a) Vegetative propagation is the development of a new plant from the vegetative parts / roots, stem and leaves of a plant. 1

- (b) **Advantages:** (i) Such plants can bear flowers and fruits earlier than those produced from seeds.
(ii) Allows propagation of plants (banana, orange etc) that have lost capacity to produce seeds.

- (iii) All plants produced are genetically similar to the parent plant and hence have all its characters.

$$3 \times 1 = 3$$

Jasmine, banana. $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2016]

Q. 4. Different organisms reproduce by different methods suitable to their body designs.

- (i) Justify the above statement using examples of three different organisms which reproduce by different methods of asexual reproduction.

- (ii) Differentiate between sexual and asexual modes of reproduction. [A] [Board Term II, 2015]

Ans. (i) *Amoeba*: Binary fission

Plasmodium: Multiple fission

Hydra: Budding

Planaria: Regeneration (Any three + Explain)

- (ii) Sexual two parents; Asexual single parent.

[CBSE Marking Scheme, 2015] 5

Detailed Answer:

- (i) (a) **Binary Fission in *Amoeba*:** In this method, the nucleus first divides mitotically into two, followed by the division of the cytoplasm. The cell finally splits into two daughter cells. So, from one *Amoeba* parent, two daughter amoebae are formed.
- (b) **Budding in *Hydra*:** In Budding, a small part of the body of the parents grows out as a 'bud' which then detaches and becomes a new organism. *Hydra* reproduces by budding using the regenerative cells. A bud develops as an outgrowth in *Hydra* due to repeated cell division at one specific site. When fully mature, the bud detaches itself from the parent body and develops into new independent individuals.
- (c) **Regeneration in *Planaria*:** In this method, small cut or broken parts of the organisms body grow or regenerate into separate individuals. *Planaria* can be cut into any number of pieces and each piece grows into a complete organism.

- (ii) **Differences between Sexual and Asexual Reproduction:**

S No.	Sexual Reproduction	Asexual Reproduction
(i)	Two parents are required.	Only one parent is required.
(ii)	Offsprings are genetically dissimilar from parents.	Offsprings are identical to parents.

3 + 2



TOPIC - 2

Sexual Reproduction in Plants



Revision Notes

Parts of Flower

- Flowers are main reproductive part of a plant. The main parts of a flower are: sepals, petals, stamens and carpels.
- Stamens and carpels are the reproductive parts of a flower which contain the germ cells. The male organ of a flower called '**stamen**' makes the male gamete which are present in the pollen grain. The female organ of a flower called '**carpel**' makes the female gamete, which are present in ovules of the plant.
- Flowers may be unisexual (*e.g.* papaya and watermelon) or bisexual (*e.g.* *Hibiscus* and mustard).
- **Pollination:** It is the transfer of pollen grain from the anther of a stamen to the stigma of a carpel. Pollination is of two types: self pollination and cross pollination.
- The transfer of pollens takes place by agent like wind, water or animals.
- After pollination, a pollen tube grows out of pollen grains, through which male germ cell reaches the ovary and fuses with the female germ cell.
- Fertilisation is the process of fusion of male and female gamete to produce zygote. It occurs inside the ovary.
- After fertilisation, ovary develops into fruit whereas ovules into the seed.
- **Double fertilisation:** It is a characteristic feature of flowering plants. In this process, out of the two sperm nuclei, one sperm nucleus fuses with the egg nucleus to form an embryo (process is called **syngamy**) and another fuses with the secondary nucleus to form an endosperm (process is called **triple fusion**).
- Because two kinds of fusion syngamy and triple fusion take place, the process is known as **double fertilisation**.



Mnemonics

Concept: Reproductive parts of Flower

Mnemonics: Stamina of MEN, Pistil vali MAA

Interpretation:

Stamen : Male part of a Flower

Pistil/Stigma : Female part of flower

How is it done on the GREENBOARD?

Q. Distinguish between pollination and fertilisation. Mention the site and the product of fertilisation in a flower.

3

Solution:

Difference between pollination and fertilisation is :

Step I: Pollination is the transfer of pollen grains from stamen/ anther to stigma.

Step II: Fertilization is the fusion of male and female gamete (or germ cells)

Step III: Ovary/ Ovule

The product of fertilisation is:

Step IV: Zygote.



Objective Type Questions

1 mark each

A Multiple Choice Questions

Q. 1. In a flower, the parts that produce male and female gametes (germ cells) are

- (a) stamen and anther
- (b) filament and stigma
- (c) anther and ovary
- (d) stamen and style

[NCERT Exemp.]

Ans. Correct option : (c)

Explanation : In a flower, pollen grains are formed inside the anther, which produces the male gametes while the ovary bears the female gamete.

Q. 2. Which of the following is the correct sequence of events of sexual reproduction in a flower?

- (a) Pollination, fertilisation, seedling, embryo
- (b) Seedling, embryo, fertilisation, pollination
- (c) Pollination, fertilisation, embryo, seedling
- (d) Embryo, seedling, pollination, fertilisation

[NCERT Exemp.]

Ans. Correct option : (c)

Explanation : The correct sequence of events of sexual reproduction in a flower is pollination, fertilization, embryo, seedling. Pollination is the process of transfer of pollens from stamen to stigma after which fertilization takes place, during which germ cells fuse together to form zygote which in turn leads to embryo formation within the ovule. Fertilized ovule becomes seed and seeds germinate to produce seedling.

Q. 3. The correct sequence of reproductive stages seen in flowering plants is

- (a) gametes, zygote, embryo, seedling
- (b) zygote, gametes, embryo, seedling
- (c) seedling, embryo, zygote, gametes
- (d) gametes, embryo, zygote, seedling

[NCERT Exemp.]

Ans. Correct option : (a)

Explanation : Gamete formation is followed by pollination and fertilization to produce zygote which in turn leads to embryo formation. Fertilized ovule become seed and seeds germinate to produce seedling.

Q. 4. Which of the following statements are true for flowers?

- (i) Flowers are always bisexual.
- (ii) They are the sexual reproductive organs.
- (iii) They are produced in all groups of plants.
- (iv) After fertilisation they give rise to fruits.

- (a) (i) and (iv)
- (b) (ii) and (iii)
- (c) (i) and (iii)
- (d) (ii) and (iv)

[NCERT Exemp.]

Ans. Correct option : (d)

Explanation : Flowers are the sexual reproductive organs of a plant and a fertilized flower gives rise to fruit.

Q. 5. A student while observing an embryo of a gram seed listed various parts of the embryo as listed below: Testa, Micropyle, Cotyledon, Tegmen, Plumule, Radicle.

On examining the list the teacher commented that only three parts are correct. Select these three correct parts:

- (a) Cotyledon, Testa, Plumule
- (b) Cotyledon, Plumule, Radicle
- (c) Cotyledon, Tegmen, Radicle
- (d) Cotyledon, Micropyle, Plumule

[CBSE Board, Delhi Region, 2016]

Ans. Correct option : (b)

Explanation : When a plant produces a seed, it has 3 basic parts: plumule (the future shoot), radicle (the future root) and the cotyledons which may be 2 or 1 based on the type of plant being it dicot or monocot, respectively.

B Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A): An embryo is formed from fertilized egg.

Reason (R): A monocot embryo comprises embryonal axis with two cotyledons.

Ans. Correct option : (c)

Explanation: Zygote, a fertilized egg give rise to an embryo, which has the ability to develop into a complete plant. A typical dicot embryo comprises an embryonal axis with two cotyledons.

Q. 2. Assertion (A): Unisexual flowers have separate male and female flowers whereas a typical monocot embryo comprises an embryonal axis with single cotyledon.

Reason (R): Cucumber, pumpkin and water melon are example of unisexual flowers.

Ans. Correct option : (b)

Explanation : Unisexual flowers have separate male and female flowers. The example includes cucumber, pumpkin and watermelon.

Q. 3. Assertion (A): Double fertilisation is unique to angiosperms.

Reason (R): Triple fusion occurs in asexual reproduction.

Ans. Correct option : (c)

Explanation : Double fertilization is a characteristic feature of flowering plants. In this process, out of the two sperm nuclei, one sperm nucleus fuses with the egg nucleus to form an embryo (process is called **syngamy**) and another fuses with the secondary nucleus to form an endosperm (process is called **triple fusion**). Because two kinds of fusion—syngamy and triple fusion—take place, the process is known as **double fertilisation**.

Very Short Answer Type Questions

Q. 1. List two unisexual flowers.

 [Board Term-II, Foreign Set II, 2016]

Ans. Watermelon, papaya. $\frac{1}{2} + \frac{1}{2}$
[CBSE Marking Scheme, 2016]

 **Q. 2.** Why is fertilization not possible without pollination?  [Board Term-II, Foreign III, 2016]

Ans. Pollination allows pollen grains that produce male germ cell to reach the carpel which contain the female germ cell, egg.

Thus, fertilization which involves fusion of male and female germ cells can only occur after pollination. [CBSE Marking Scheme, 2016] 1

Q. 3. Name the parts of a bisexual flower that are not directly involved in reproduction.

 [Board Term-II, Foreign Set III, 2015]

Ans. Sepals/calyx
Petals/corolla
Thalamus

(Any two) $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2015]



Short Answer Type Questions-I

2 marks each

 **Q. 1.** In a flowering plant, summarize the events that take place after fertilization.  [CBSE, SQP, 2019]

Ans. Fertilization results in formation of zygote.

Zygote divides several times to form an embryo. The ovule develops a thick coat and changes into seed. The ovary grows rapidly and ripens to form the fruit. [CBSE Marking Scheme, 2019] 2

 **Q. 2.** Give one example of each, the unisexual and bisexual flowers. 

Ans. Unisexual flowers contain either stamens or carpels but never both.

Example: Papaya, watermelon.

Bisexual flowers contain both stamens and carpels.

Example: *Hibiscus*, Mustard. 1+1

 **Q. 3. (i)** What is the fate of the ovules and the ovary in a flower after fertilization?

(ii) How is the process of pollination different from fertilization? 

Ans. (i) After fertilization, ovules become seeds and ovary forms the fruit. $\frac{1}{2} + \frac{1}{2}$

(ii) Pollination is the transfer of pollen grains from anther to the stigma of a flower. $\frac{1}{2}$

Fertilization is the fusion of male and female gametes. $\frac{1}{2}$



Short Answer Type Questions-II

3 marks each

 **Q. 1.** Define the term pollination. Differentiate between self pollination and cross pollination. What is the significance of pollination?

 [Delhi, Set- I, 2020]

Ans. The transfer of pollen grains from the anther to the stigma of a flower is known as pollination.

The two types of pollination are:

(a) **Self pollination:** When the pollen grains from the stamens of a flower fall on the stigma of the same flower, then it is called self pollination.

(b) **Cross pollination:** When pollen grains from the stamens of a flower fall on the stigma of another flower, it is called cross pollination.

Significance of pollination:

(i) It is a significant event because it precedes fertilization.

(ii) It brings the male and female gametes closer for the process of fertilization.

(iii) Cross-pollination introduces variations in plants because of the mixing of different genes. These variations further increase the adaptability of plants towards the environment or surroundings. (Any one) 1+1+1=3

Q. 2. Distinguish between pollination and fertilisation. Mention the site and the product of fertilisation in a flower.  [Board Outside Delhi, Set- II, 2019]

Ans. Pollination: Transfer of pollen grains from stamen/anther to stigma. 1

Fertilization: Fusion of male & female gamete (or germ cells) 1

Site of fertilisation: Ovary/ Ovule $\frac{1}{2}$

Product: Zygote. $\frac{1}{2}$

[CBSE Marking Scheme, 2019]

AI Q. 3. What is carpel? Write the function of its various parts. **R** [Board Outside Delhi, Set-I, 2019]

Ans. Female reproductive part of the plant. 1
 (i) **Stigma:** Receive pollen grains
 (ii) **Style:** Passage for the growth of pollen tube
 (iii) **Ovary:** Site for fertilization 1 + 1
If any two parts with function attempted award marks only 1½
[CBSE Marking Scheme, 2019]

Detailed Answer:

Carpel is the female reproductive part that produces egg cells.

Main parts of carpel are:

- (i) Stigma being sticky in nature receives pollen grains during pollination.
- (ii) Style connects the stigma and ovary thus, helping with the transfer of pollen through style to the ovary.
- (iii) Ovary is the reproductive organ of carpel which produces the female gamete ovule.

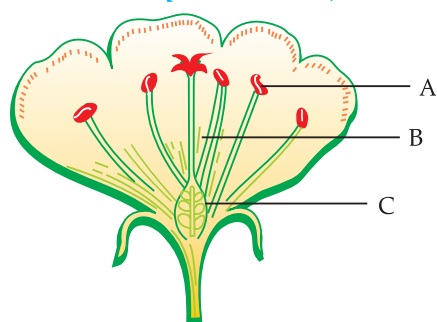
1+1+1

Q. 4. What is sexual reproduction? List its four significance. **R** [Board Term II, Foreign Set I, 2016]

Ans. Two major processes namely formation of gametes and fusion of gametes constitute sexual reproduction. 1
Significance—(i) Incorporates the process of combining DNA from two different individuals during reproduction.
 (ii) Increases genetic variation.
 (iii) Promotes diversity in the offsprings.
 (iv) Plays a role in the origin of new species. $4 \times \frac{1}{2} = 2$
[CBSE Marking Scheme, 2016]

AI Q. 5. Name the parts A, B and C shown in the following diagram and state one function of each.

U [Board Term- II, Delhi Set I, 2016]



Ans. A. Anther: It produces pollen grains. $\frac{1}{2} + \frac{1}{2}$
B. Style: It provides the path through which the pollen tube grows and reaches the ovary. $\frac{1}{2} + \frac{1}{2}$
C. Ovary: It contains ovules. And each ovule has an egg cell/female gamete. It develops into fruit after fertilization.
[CBSE Marking Scheme, 2016] $\frac{1}{2} + \frac{1}{2}$

Q. 6. In a germinating seed, which parts are known as future shoot and future root? Mention the function of cotyledon. **R** [Board Term II, SQP, 2016]

Ans. Future shoot—Plumule
 Future root—Radicle
Function of cotyledon—It stores food for the future plant or embryo. $1+1+1=3$
[CBSE Marking Scheme, 2016]

Q. 7. Name the reproductive parts of an angiosperm. Where are these parts located? Explain in brief the structure of its female reproductive parts.

R [Board Term-I, Foreign Set II, 2016]

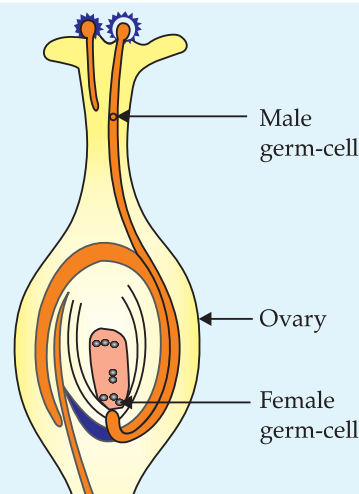
Ans. (i) Stamen and Carpel. 1
 (ii) Located in the flower. $\frac{1}{2}$
 (iii) The female reproductive part is Carpel. It is made up of three parts—the bottom swollen part is ovary, middle elongated part is the style, terminal sticky part is stigma. $\frac{1}{2} \times 3 = 1\frac{1}{2}$
[CBSE Marking Scheme, 2016]

AI Q. 8. Draw a diagram of the longitudinal section of a flower exhibiting germination of pollen on stigma and label.

(i) Ovary, (ii) Male germ-cell, (iii) Female-germ cell and (iv) ovule on it.

AE [Board Term-II, Foreign Set-III, 2015]

Ans.



(Drawing) 1

Four correct labelling, viz., ovary, male germ cell, female germ cell and ovule. $\frac{1}{2} \times 4$

[CBSE Marking Scheme, 2015]

COMMONLY MADE ERROR

- ➡ There is not one, but two germ cells in the pollen tube. They are male gametes formed by the division of generative cell.

ANSWERING TIP

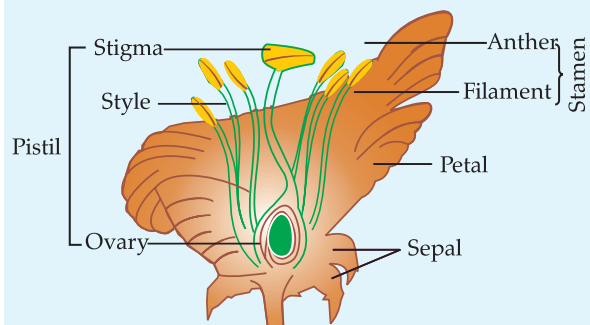
- ➡ Practice self-explanatory diagrams with proper labelling, arrows and headings.

Q. 9. Draw longitudinal section of a bisexual flower and label the following parts on it:

(i) Anther, (ii) Ovary, (iii) Stigma, (iv) Style.

U [Board Term-II, Foreign Set II, 2015]

Ans.

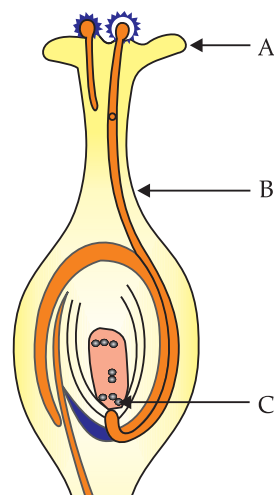


4 correct labellings (i) Anther (ii) Ovary (iii) Stigma (iv) Style $\frac{1}{2} \times 4$

[CBSE Marking Scheme, 2015]

Q. 10. Name the parts A, B and C shown in the diagram and write their functions.

A [Board Term-II, Delhi III, 2015]



Ans. Part A is Stigma.

Function: It is the terminal part of carpel, which may be sticky and helps in receiving the pollen grains from the anther of stamen during pollination.

Part B is Pollen tube.

Function: The pollen tube grows out of the pollen grain through the style to reach the ovary. It carries male gametes into the embryo sac in ovule.

Part C is Female Germ Cell.

Function: It is a female gamete which fuses with male gamete to form a diploid cell known as **zygote**.

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

✓ Long Answer Type Questions

5 marks each

Q. 1. (a) Draw a diagram showing germination of pollen on stigma of a flower and mark on it the following organs/parts:

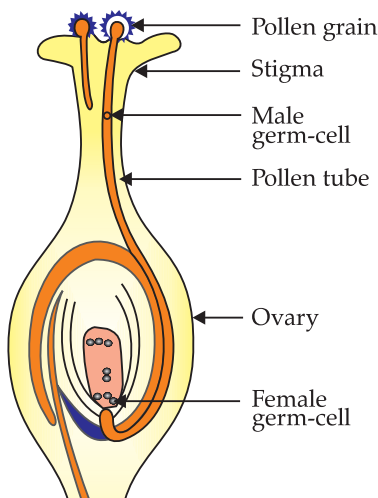
(i) Pollen grain (ii) Pollen tube (iii) Stigma (iv) Female germ cell

(b) State the significance of pollen tube.

(c) Name the parts of flower that develop after fertilization into: (i) Seed (ii) Fruit.

U [Outside Delhi, Set-I, 2020]

Ans. (a)



(b) Pollen tube carries male gametes to ovule present inside the ovary leading to fertilization.

(c) After fertilization, ovary develops into fruit whereas ovules into the seed. $3+1+1=5$

AI Q. 2. Define pollination. Explain the different types of pollination. List two agents of pollination. How does suitable pollination lead to fertilization?

R [CBSE Board Delhi, Set-I, 2019]

Ans. **Pollination:** Transfer of pollen from anther / stamen to stigma of the flower

Types of Pollination:

(a) **Self pollination:** Transfer of pollen from anther / stamen to stigma occurs in the same flower

(b) **Cross pollination:** Pollen is transferred from anther stamen of one flower to stigma of another flower

Agents of pollination: Wind, Water, Insects and Animals (Any two)

A tube grows out of the pollen grain and travels through the style, to reach the female germ cell in the ovary to cause fertilization. $1+1+1+1+1$

[CBSE Marking Scheme, 2019]

Q. 3. Give one example each of unisexual and bisexual flowers. Differentiate between the two types of pollination that occur in flowers. What happens

when a pollen lands on a suitable stigma? Write about the events that occur till the seed formation in the ovary. [Foreign 31/2/1, 2017]

Ans. Unisexual Flower: Papaya/Water-melon/ any other (any one) $\frac{1}{2}$

Bisexual Flower: *Hibiscus*/Rose/ any other (any one) $\frac{1}{2}$

Self pollination: The pollen grains are transferred from the anther to the stigma of the same flower or to the flower of the same plant. 1

Cross pollination: The pollen grains are transferred from the anther to the stigma of a flower of a different plant. 1

- After pollen lands on a suitable stigma, a pollen tube grows out of pollen grain and travels through the style to reach the ovary. $\frac{1}{2}$
- The male germ cell fuses with the female germ cell to form a zygote. $\frac{1}{2}$
- Zygote divides several times to form an embryo within the ovule. $\frac{1}{2}$
- The ovule develops tough coat and gradually gets converted into a seed. $\frac{1}{2}$

[CBSE Marking Scheme, 2017]

Q. 4. (a) What is pollination? Give its two types.

(b) Draw a longitudinal section of female reproductive part of a flower showing germination of pollen grain. Label on it the following:

(i) Stigma;

(ii) Pollen tube with a male germ cell;

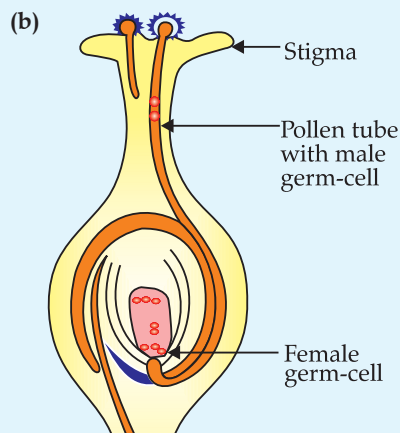
(iii) Female germ cell.

[Delhi Comptt. 31/1/1, 2017]

Ans. (a) Pollination: Process of transfer of pollen grains from the anther to the stigma of the flower. 1

Two types: Self-pollination and Cross pollination

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



Diagram

$1\frac{1}{2}$

Three labellings

$\frac{1}{2} \times 3$

[CBSE Marking Scheme, 2017]



TOPIC - 3

Reproduction in Human Being



Revision Notes

- Humans have sexual mode of reproduction.
- It needs sexual maturation, which is the period of life when production of germ cells *i.e.*, ova (female) and sperm (male) start in the body. This period of sexual maturity is called **puberty**.
- **Changes at Puberty are:**
 - (a) **Common in male and female**
 - Thick hair growth in armpits and genital area.
 - Skin becomes oily, may result in pimples.
 - (b) **In girls:**
 - Breast size begins to increase.
 - Girls begin to menstruate.
 - (c) **In boys:**
 - Thick hair grows on face.
 - Voice begins to crack.
 - These changes signals that sexual maturity is taking place.
- **Male Reproductive System**
 - (a) **Testes:** A pair of testes are located inside scrotum which is present outside the abdominal cavity. Scrotum has a relatively lower temperature needed for the production of sperms.
 - Functions of testes:**
 - Produce male germ cells *i.e.*, sperms are formed here.
 - Testes release male sex hormone (testosterone). Its function is to:
 - (i) Regulate production of sperms.
 - (ii) Bring changes at puberty.

- (b) **Vas deferens:** It passes sperms from testes towards the urethra.
- (c) **Urethra:** It is a common passage for both sperms and urine. Its outer covering is called **penis**. It is like a fibromuscular long tube which travels through penis.
- (d) **Associated glands:** Seminal vesicles and prostate gland add their secretion to the sperms. This fluid provide nourishment to sperms and make their transport easy. Sperm along with secretion of glands form semen.

➤ **Female Reproductive System**

- (a) **Ovary:** A pair of ovary is located in both sides of abdomen.
 - Female germ cells *i.e.*, eggs are produced here.
 - At the time of birth of a girl, thousands of immature eggs are present in the ovary.
 - At the onset of puberty, some of these eggs start maturing.
- (b) **Oviduct or Fallopian tube**
 - Receives the egg produced by the ovary and transfer it to the uterus.
 - Fertilisation *i.e.*, fusion of gametes takes place here.
- (c) **Uterus:** It is a bag-like structure where development of the foetus takes place.
 - Uterus opens into vagina through cervix.
 - The embryo moves down to reach the uterus. The embedding of the embryo in the thick inner lining of the uterus is called **implantation**.

➤ The time period from the development of foetus inside the uterus till birth is called **gestation period**. The act of giving birth to the fully developed foetus at the end of gestation period is termed as **parturition**.

➤ The breakdown and removal of the inner, thick and soft lining of the uterus along with its blood vessels in the form of vaginal bleeding is called **menstrual flow** or **menstruation**.

➤ Reproductive health is all those aspects of general health which help a person to lead a normal, safe and satisfying reproductive life.

➤ **Sexually Transmitted Diseases (STDs)** are the diseases which spread by sexual contact from an infected person to a healthy person. Some common STDs are Gonorrhoea, syphilis, trichomoniasis, AIDS.

➤ There are different methods which are developed to prevent and control pregnancy such as mechanical methods, chemical methods, oral pills and surgical methods.

➤ **Contraception:** It is the avoidance of pregnancy, which can be achieved by preventing the fertilisation of ova.

➤ **Methods of contraception**

- (a) **Physical barrier**
 - To prevent union of egg and sperm.
 - Use of condoms, cervical caps and diaphragm.
- (b) **Chemical methods**
 - Use of oral pills.
 - These change hormonal balance of body so that eggs are not released.
 - May have side effects.
- (c) **Intrauterine contraceptive device (IUCD)**
 - Copper-T or loop is placed in uterus to prevent pregnancy.
- (d) **Surgical methods**
 - In males the vas deferens is blocked to prevent sperm transfer called **vasectomy**.
 - In females, the fallopian tube is blocked to prevent egg transfer called **tubectomy**.



Mnemonics

Concept: Parts of Male Reproductive System	Concept: Accessory glands in Males
Mnemonics: SEVEN UP	Mnemonics: Saint Peters
Interpretation: S- Seminiferous tubules E- Epididymis V- Vas deferens E- Ejaculatory duct U - Urethra P - Penis	Interpretation: Seminal vesicle, Prostate gland

Concept: Accessory Ducts in Females	Concept: Birth Control Methods
Mnemonics: Our United Villages	Mnemonics: Swiss National Bank's Indian Office
Interpretation: Oviduct, Uterus, Vagina	Interpretation: Surgical, Natural, Barrier, IUD, Oral contraceptive
Concept: Barrier Methods	
Mnemonics: CDC Volunteered Student's Junior Fellowship	
Interpretation: Condoms, Diaphragm, Cervical caps, vaults, Spermicidal creams, jellies, foams	

How is it done on the **GREENBOARD?**

Q. (a) "Use of a condom is beneficial for both the sexes involved in a sexual act," Justify this statement giving two reasons.

(b) How do oral contraceptive help in avoiding pregnancies ?

(c) What is sex selective abortion? How does it affect a healthy society ? (State any one consequence) 3

Solution:

The two reasons are :

Step I: (a) Prevents meeting of sperm and ova

Step II: Protects against sexually transmitted diseases

Step III: (b) Oral pills contain hormones which prevent the ovaries from releasing ovum into the oviduct.

Step IV: (c) Sex selective abortion is the term referred to abortion (termination) of pregnancy, especially female foeticide.

Effect of sex selective abortion is:

Step V: Society will have imbalance in the male female ratio.

✓ Objective Type Questions

1 mark each

A Multiple Choice Questions

Q. 1. During adolescence, several changes occur in the human body. Mark one change associated with sexual maturation in boys.

- (a) Loss of milk teeth (b) Increase in height
(c) Cracking of voice (d) Weight gain

[NCERT Exemp.]

Ans. Correct option : (c)

Explanation: Cracking of voice is one of the secondary sexual characters of human males observed during adolescence.

Q. 2. In human females, an event that reflects onset of reproductive phase is

- (a) growth of body
(b) changes in hair pattern
(c) change in voice
(d) menstruation

[NCERT Exemp.]

Ans. Correct option : (d)

Explanation: Development of female secondary sexual characters marks onset of puberty and initiation of menstrual cycle reflects onset of reproductive phase.

Q. 3. In human males, the testes lie in the scrotum, because it helps in the

- (a) process of mating.
(b) formation of sperm.

- (c) easy transfer of gametes.
(d) all of the above.

[NCERT Exemp.]

Ans. Correct option : (b)

Explanation: Scrotum provides lower temperature needed for sperm formation.

Q. 4. Which among the following is not the function of testes at puberty?

- (i) Formation of germ cells
(ii) Secretion of testosterone
(iii) Development of placenta
(iv) Secretion of estrogen
(a) (i) and (ii) (b) (ii) and (iii)
(c) (iii) and (iv) (d) (i) and (iv)

[NCERT Exemp.]

Ans. Correct option : (c)

Explanation: Development of placenta and secretion of estrogen are female reproductive functions.

B Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R), Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A): Sexual reproduction increases genetic diversities and plays a role in origin of new species.

Reason (R): Sexual reproduction involves formation of gametes and fusion of gametes.

Ans. Correct option : (a)

Explanation: Sexual reproduction involves two parents that results in the offsprings that are not identical to the parents. It causes variations; which are essential for evolution as well as survival of species under unfavourable conditions.

Q. 2. Assertion (A): In human male, testes are extra-abdominal organs which are present inside scrotum.

Reason (R): Scrotum has a relatively lower temperature needed for the production and storage of sperms.

Ans. Correct option : (a)

Explanation: Formation of sperms needs lower temperature than the normal body temperature. Hence, testes lie outside the body cavity in the scrotum.

Q. 3. Assertion (A): At puberty, in boys, voice begins to crack and thick hair grows on face.

Reason (R): At puberty, there is decreased secretion of testosterone in boys.

Ans. Correct option : (c)

Explanation: Puberty in boys is regulated by male sex hormone called **testosterone**, which are secreted by testes. In puberty, secondary sexual characters like growth of hair on face, chest, broadening of shoulders and deepening of voice occurs.

Q. 4. Assertion (A): Surgical methods are most effective methods of contraception.

Reason (R): Surgical method blocks gametes transport and hence prevent fertilisation.

Ans. Correct option: (a)

Explanation: Surgical method like vasectomy in male and tubectomy in female prevent pregnancy. These methods block gamete transport and hence prevent fertilisation. They are very effective but reversibility is very poor.

C Very Short Answer Type Questions

Q. 1. What is fertilisation? Where does it occur in a human female? [R] [Foreign 31/2/3, 2017]

Ans. Fusion of male and female gamete is known as fertilization. It occurs in fallopian tube. $\frac{1}{2} + \frac{1}{2}$

[AI] Q. 2. Name the organs producing sperms and ova respectively in humans.

[R] [Foreign 31/2/3, 2017]

Ans. Testis: Sperms, Ovary: Ova. $\frac{1}{2} + \frac{1}{2}$

Q. 3. List two functions of ovary of human female reproductive system.

[R] [Board Term-II, O.D. Set III, 2016]

Ans. Two functions of Ovary:

- (i) To produce female gamete / ovum.
(ii) To secrete female hormones / estrogen and progesterone.

[CBSE Marking Scheme, 2016] $\frac{1}{2} + \frac{1}{2}$

Q. 4. Give reason for the statement— Since the ovary releases one egg every month, the uterus also prepares itself every month by making its lining thick and spongy. [A] [Board Term-II, SQP, 2016]

Ans. It is required for nourishing the embryo if fertilization takes place and reaches the uterus.

[CBSE Marking Scheme, 2016] 1

Q. 5. In the human female reproductive system where does fertilization occur? [R] [Board Term II, 2015]

Ans. Oviduct or Fallopian tube.

1

[CBSE Marking Scheme, 2015]

Q. 6. Write the role of testes in male reproductive system. [R] [Board Term II, 2015]

Ans. Formation of sperms and to secrete hormone called testosterone.

[CBSE Marking Scheme, 2015] $\frac{1}{2} + \frac{1}{2}$



Short Answer Type Questions-I

2 marks each

Q. 1. What is the main difference between sperms and eggs of humans? Write the importance of this difference. [U]

Ans. Sperms contain one of the two types of sex chromosomes i.e., X—chromosomes and Y—chromosomes.

Egg contains one type of sex chromosomes only i.e., X—chromosome.

This chromosomal difference helps in determination of sex. If sperm carrying Y-chromosome fuses with egg, the resultant zygote will develop in male. If sperm with X chromosome fuses with egg, the zygote will develop into a female child. 2

Q. 2. Write two functions of each (i) Testis, (ii) Ovaries. [A]

Ans. (i) Testis: It produces sperms and secretes male sex hormones called testosterone. 1

(ii) Ovary: It produces ovum and secretes female sex hormones called estrogen and progesterone. 1

Q. 3. Mention the functions of (a) placenta, (b) fallopian tube in the human female reproductive system. [U]

Ans. (a) Placenta: (i) Helps in the transportation of glucose and oxygen from the mother to the embryo. $\frac{1}{2}$

(ii) Waste generated by the embryo is removed by transferring it to the mother's blood. $\frac{1}{2}$

(b) Fallopian tube: (i) Egg is carried from the ovary to the uterus. $\frac{1}{2}$

(ii) Fertilization occurs here. $\frac{1}{2}$

Q. 4. List any two contraceptive methods practised only by women. Mention how these methods work? [R]

Ans. (i) Oral pills: Change hormonal balance so eggs are not released. 1

(ii) Loop / Copper-T: Placed in the uterus. Prevent pregnancy by checking the entry of sperms through the vagina. 1



Short Answer Type Questions-II

3 marks each

Q. 1. State the basic requirement for sexual reproduction? Write the importance of such reproductions in nature. [A] [Delhi 31/1/2017]

Ans. Formation of male and female gametes, fusion of gametes/syngamy $\frac{1}{2} + \frac{1}{2}$

Importance: Combination of DNA from two different individuals lead to increase in genetic variation in the organism. 1

This leads to diversity in the population which helps in natural selection.

[CBSE Marking Scheme, 2017] 1

Detailed Answer:

Basic requirements in sexual reproduction are:

(i) Formation of gametes through meiosis.

(ii) Transfer of male gametes into the female body.

(iii) Fusion of male and female gametes. Process is fertilization.

(iv) Formation of offspring from a single celled zygote- Post fertilization changes.

The basic requirements for sexual reproduction to take place are involvement of two parents and fusion of haploid gametes.

Importance of sexual reproduction:

Fusion of gametes results in genetic variations in the offspring. This promotes diversity of characters in offspring. These genetic variations, thus, lead to evolution of species as well as allow the organisms to become better adapted in the changing environment. 3

Q. 2. Mention the total number of chromosomes along with the sex chromosomes that are present in a human female and a human male. Explain how in sexually producing organisms the number of chromosomes in the progeny remains the same as that of the parents. [U] [Delhi 31/1/2017]

Ans. Total number of chromosomes is 46. In human male, two sex chromosomes i.e., X or Y are present, while in human female, both sex chromosomes are X.

During sexual reproduction, a female gamete or egg cell fuses with a male gamete or sperm cell which are haploid to form zygote. Zygote is diploid (2n) which contains 46 chromosomes, 23 chromosomes from mother and 23 from father. In this way, an equal genetic contribution of male and female parents is ensured in the progeny. 2 + 1

Q. 3. State the changes that take place in the uterus when:

(i) Implantation of embryo has occurred.

(ii) Female gamete/egg is not fertilised.

[U] [Delhi 31/1/2017]

Ans. (a) When implantation of embryo has occurred, the uterine wall thickens and is richly supplied with blood to nourish the growing embryo. $1\frac{1}{2}$

(b) The thick and spongy lining of the uterus slowly breaks and comes out through the vagina as blood and mucus. [CBSE Marking Scheme, 2017] $1\frac{1}{2}$

Detailed Answer:

- (i) When implantation has occurred in uterus of mother, the inner lining of the uterus thickens and is richly supplied with the blood vessels to provide nourishment to the growing embryo.
- (ii) If the egg is not fertilised, it lives for one day. Since, the thickened uterus lining is no more required; it slowly breaks down and comes out of the vagina as blood and mucous, known as **menstruation**, which lasts for about two to eight days.

AI Q. 4. Write the functions of the following parts of human female reproductive system:

(i) Ovary, (ii) Fallopian tube (iii) Uterus.

C [Delhi Comptt. 31/1/2, 2017]

Ans. (i) Ovary: Produces egg or female gamete, female sex hormone/ estrogen. $\frac{1}{2} + \frac{1}{2}$

(ii) Fallopian tube: Transfer of ovum to the uterus, site for fertilization $\frac{1}{2} + \frac{1}{2}$

(iii) Uterus: Site of implantation of zygote, development of embryo. $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2017]

Detailed Answer:

AI Q. 6. List three techniques that have been developed to prevent pregnancy. Which one of these techniques is not meant for males? How does the use of these techniques have a direct impact on the health and prosperity of a family?

A [CBSE OD, Set-1-2017]

(i) Ovary: It produces eggs (ova) and female sex hormone estrogen and progesterone.

(ii) Fallopian Tube: The fallopian tube provides passage for the eggs (ova) to pass into the uterus by ciliary action. It is the site for fertilisation.

(iii) Uterus: Uterus is the site of implantation of zygote and site of development of embryo.

AI Q. 5. State briefly the changes that take place in a fertilized egg till birth of the child in the human female reproductive system. What happens to the egg when it is not fertilized?

U [Delhi Comptt. 31/1/3, 2017]

Ans. Changes in fertilized egg:

(a) Zygote/fertilized egg starts dividing.

(b) Implantation of zygote in the inner uterine wall.

(c) Embryo starts growing with the help of the placenta which results in the development of the child.

(d) Birth of a child as a result of rhythmic contraction of the muscles in the uterus. $\frac{1}{2} \times 4$

When egg is not fertilized, the inner lining of the uterus slowly breaks and comes out through the vagina as blood and mucous (Menstruation) 1

[CBSE Marking Scheme, 2017]



Topper Answer, 2017

Ans.

Pregnancy prevention techniques :

- 1) Mechanical barriers like cervical cap, condoms etc.
- 2) Surgical methods like tubectomy, vasectomy.
- 3) Using IUCB's like loop, Copper-T.

Using IUCB's (like loop & copper-T) & also oral contraceptives are not meant for males.

Impact on health & prosperity of a family :

- 1) Better standard of living.
- 2) Better and improved resources.
- 3) More focus on children who have already born.
- 4) Prevention from STDs like HIV AIDS, syphilis etc.

Detailed Answer:

Three techniques that have been developed to prevent pregnancy are:

- (i) **Barrier method:** Physical methods such as condom, diaphragm and cervical caps are used to prevent entry of sperms in females.
- (ii) **Chemical methods:** Drugs such as oral pills and vaginal pills are used by females.
- (iii) **Surgical methods** such as vasectomy in males and tubectomy in females.

Chemical methods are not meant for males.

The use of these techniques helps in controlling population explosion thus providing better living conditions.

It helps in keeping proper gap between siblings thus gives better health to mother as well as children. 1+1+1

Q. 7. What is contraception? Name any two methods. How does the use of these methods have a direct effect on the health and prosperity of a family? State any three points. [U] [Foreign 31/2/1, 2017]

Ans. (i) **Contraception:** Any method which prevents conception/ pregnancy is called **contraception**. $\frac{1}{2}$

(ii) Barrier Method, Chemical Method, Surgical Method. (Any two) $\frac{1}{2} + \frac{1}{2}$

(iii) Health of women (mother) is maintained, Parents can give more attention to their children/ family, More resources may be made available for improvement of standard of living. (or any other relevant point) (Any three) $\frac{1}{2} \times 3$

[CBSE Marking Scheme, 2017]

Q. 8. Name the two types of mammalian gametes. How are these different from each other? Name the type of reproduction they are involved in. Write the advantage of this type of reproduction.

[U] [Foreign 31/2/3, 2017]

Ans. Male gamete: sperm $\frac{1}{2}$

Female gamete: ovum/egg $\frac{1}{2}$

Sperms are motile and produced by male individual, ova/eggs are non-motile and produced by female individual. 1

Type of reproduction is Sexual reproduction $\frac{1}{2}$

Advantage: Generates more variations $\frac{1}{2}$

[CBSE Marking Scheme, 2017]

Q. 9. What are the functions of testis in the human male reproductive system? Why are these located outside the abdominal cavity? Who is responsible for bringing about changes in appearance seen in boys at the time of puberty?

[U] [Board Term-II, Delhi Set II, 2016]

Ans. Functions of testis:

(i) Produce sperms. $\frac{1}{2}$

(ii) Produces male hormone/ testosterone. $\frac{1}{2}$

These are located outside the human body, as sperms need lower temperature than the normal body temperature to mature. 1

Testosterone. [CBSE Marking Scheme, 2016] 1

Q. 10. What is placenta? Write any two major functions of placenta. [R] [Board Term-II, SQP, 2016]

Ans. **Placenta:** A disc shaped organ or special tissue in the uterus of pregnant mammal, nourishing and maintaining the foetus through the umbilical cord.

Functions of Placenta:

(i) Provides large surface area for glucose and oxygen to pass from mother to the embryo.

(ii) Removal of waste generated in the developing embryo into the mother's blood. 1 + 1 + 1

[CBSE Marking Scheme, 2016]

Q. 11. (a) Mention the role of the following organs of human male reproductive system:

(i) Testis; (ii) Scrotum; (iii) Vas deferens;

(iv) Prostate glands.

(b) What are the two roles of testosterone?

[U] [Board Term-II, Foreign Set III, 2016]

Ans. (a) (i) **Testis:** To produce male gametes / sperm or male hormone / testosterone.

(ii) **Scrotum:** To provide optimal temperature to testis for the formation of sperms.

(iii) **Vas deferens:** To deliver the sperms to the urinary bladder.

(iv) **Prostate glands:** To secrete the fluid which provides nutrition and medium for transport of sperms. $4 \times \frac{1}{2}$

(b) (i) Regulates formation of sperms, (ii) Brings about the changes in boys during adolescence

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

[CBSE Marking Scheme, 2016]

✓ Long Answer Type Questions

5 marks each

Q. 1. (a) "Use of a condom is beneficial for both the sexes involved in a sexual act," Justify this statement giving two reasons.

(b) How do oral contraceptive help in avoiding pregnancies?

(c) What is sex selective abortion? How does it affect a healthy society? (State any one consequence)

[AE] [Outside Delhi, Set-I, 2020]

Ans. (a) (i) Prevents meeting of sperm and ova

(ii) Protects against sexually transmitted diseases

(b) Oral pills contain hormones which prevent the ovaries from releasing ovum into the oviduct. (c) Selective abortion means abortion (termination) of pregnancy, especially female foeticide. Effect: Society will have imbalance in the male female ratio. 2+1+2=5

Q. 2. (a) Suggest any two categories of contraceptive methods to control the size of human population which is essential for the prosperity of a country. Also explain about each method briefly.

(b) Name two bacterial and two viral infections each that can get sexually transmitted.

(c) List two advantages of using condom during sexual act. [U] [Outside Delhi, Set-III, 2020]

Ans. (a) **Methods of contraception:**

(i) Barrier method or mechanical method/ Condom/ Diaphragm, to prevent the meeting of sperms and ova.

(ii) **Chemical method/ Oral pills:** Changes the hormonal balance of the female partner so that the eggs are not released.

(iii) Surgical method: to block the vas deferens in males/vasectomy or the fallopian tube (oviduct) in females/tubectomy, to prevent the transfer of sperms or egg and hence no fertilization takes place. (Any two)

(b) **Bacterial infections:** Syphilis and Gonorrhea
Viral infections: Human papilloma virus (HPV), HIV

- (c) (i) Prevents meeting of sperm and ova
(ii) Protects against sexually transmitted diseases

2+2+1

Q. 3. (i) Describe the role of prostate gland, seminal vesicle and testes in the human male reproductive system.

(ii) How is the surgical removal of unwanted pregnancies misused?

Q. 4. (a) Draw a diagram of human female reproductive system and label the parts:

(i) Which produce an egg.

(ii) Where fertilization takes place.

(b) List two bacterial diseases which are transmitted sexually.

(c) What are contraceptive devices? Give two reasons for adopting contraceptive devices in humans.

[CBSE Board, 2019]

(iii) Explain the role of oral contraceptive pills in preventing conception. [CBSE SQP, 2020]

Ans. (i) Prostate glands and seminal vesicle add their secretions so that the sperms are in a fluid and it makes their transport easier and also provides nutrition. Testes secrete testosterone which brings about changes in the appearances in the boys at the time of puberty.

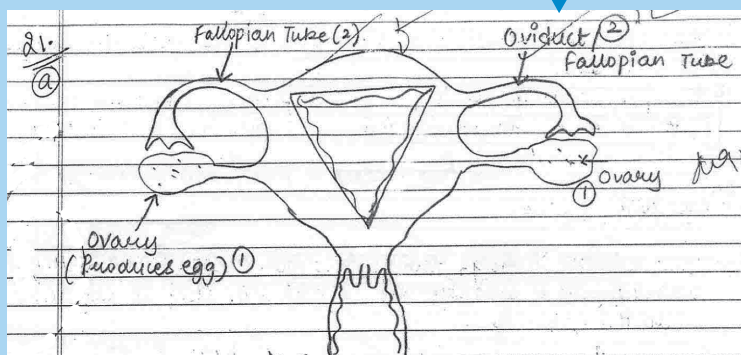
(ii) Female foeticides/illegal sex selected abortion of female foeticide.

(iii) Interfere in release of egg and eggs are not released.
[CBSE Marking Scheme, 2020] 3+2



Topper Answer, 2017

Ans.



(b) Gonorrhoea and Syphilis are bacterial diseases transmitted sexually.

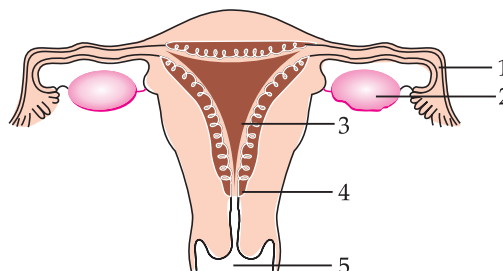
(c) The devices used to prevent ~~for~~ fertilisation in human females are known as contraceptive devices.

(1) They are adopted to prevent unwanted pregnancies.

(2) They help to maintain the reproductive health of women & includes to control birth & death rate.

Q. 5. (a) Identify the given diagram. Name the parts 1 to 5.

(b) What is contraception? List three advantages of adopting contraceptive measures.



[CBSE Board Delhi, Set-I, 2019]

Ans. (a) Female reproductive system

Name of parts –

1: Fallopian tube/Oviduct

2: Ovary

3: Uterus

4: Cervix

5: Vagina $\frac{1}{2} + \frac{1}{2} \times 5$

(b) Contraception: Method to avoid pregnancy $\frac{1}{2}$

Advantages:

(i) Proper gap between two pregnancies

(ii) Avoiding unwanted pregnancy

(iii) Keeping population under control $\frac{1}{2} \times 3$

[CBSE Marking Scheme, 2019]

Q. 6. What is sexual reproduction? Explain how this mode of reproduction give rise to more viable variations than asexual reproduction? How does this affect the evolution?

[Board Outside Delhi, Set- III, 2019]

Ans. When male and female organisms are involved in producing young ones, is known as **sexual reproduction** / Gametes from two organisms of opposite sex must fuse to produce young ones. 1

- Gametes (germs cells) produced are the products of meiosis / due to combining of DNA from two individuals, this results in mixing of characters and causes variations. 1 + 1

- In asexual reproduction, single parent produces young ones. There is no mixing of characters. 1

- More variations help in the process of evolution. Helpful variations accumulate over time and produce new species and result in evolution. [CBSE Marking Scheme, 2019] 1

Detailed Answer:

Sexual reproduction is a natural mode of reproduction which involves two individuals and gamete formation.

During sexual reproduction, at the time of gamete formation, meiotic cell division takes place. During meiosis, crossing over between fragments of homologous chromosomes occurs which brings about new gene combinations to be transferred to new generation. Crossing over is the fundamental cause of origin of variations in sexually reproducing organisms.

Whereas in asexual reproduction, chance variations can only occur when there is inaccurate copying of DNA as only one individual is involved. The variations caused by crossing over in sexually reproducing organisms are subjected to the selection process. Natural selection selects those

variations which have more adaptive value and guide them towards evolution of new species. In this way, sexual reproduction gives rise to more viable variations for evolution.

Q. 7. (a) Draw the diagram of female reproductive system and match and mark the part(s):

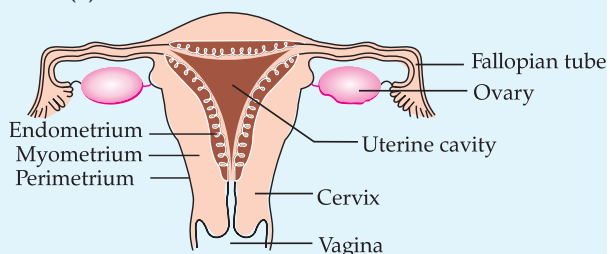
(i) Where block is created surgically to prevent fertilization.

(ii) Where CuT is inserted?

(iii) Inside which condom can be placed.

(b) Why do more and more people prefer to use condoms? What is the principle behind use of condoms? [CBSE, SQP-2018-19]

Ans. (a)



Correct diagram with correct labelling, correctly matched with the following parts:

(i) Fallopian Tube/Oviduct

(ii) Uterus

(iii) Vagina

(b) People prefer use of condoms as it prevents STDs/ gives privacy to the user. Condoms help create a mechanical barrier preventing meeting of sperms and ovum. [CBSE Marking Scheme, 2018] 5

Q. 8. (a) Write the functions of following parts in human female reproduction system:

(i) Ovary, (ii) Oviduct, (iii) Uterus

(b) Describe in brief the structure and function of placenta. [AE] [Board Delhi. OD. Set 2018]

[Board term II Delhi Set-1-2015 & 2016]

Ans. (a)(i) Ovary: Releases egg/ female gamete/ovum, Releases oestrogen/female hormones.

(any one)

(ii) Oviduct: Transportation of ovum/egg/ from ovary to the uterus/Site of fertilization.

(iii) Uterus: Development of embryo/foetus.

(b) Placenta: It is disc like tissue embedded in uterine wall which contains villi on the embryo side of the tissue and blood space on mother side.

Function of placenta: Provides nourishment to embryo from mother's blood / Removal of waste from embryo to mother's blood. 3 + 2

[CBSE Marking Scheme, 2018]



Topper Answer, 2018

Ans.

- (a)(i) Ovary has following functions :-
- It releases matured egg (female germ cell) once every month & thus, is responsible for produce & release (oogenesis & ovulation) of ovum.
 - It secretes oestrogen & progesterone. Oestrogen controls secondary sexual characteristics in females at time of puberty & also promotes release & maturation of egg.
- (ii) Oviduct / Fallopian tube carries the released egg to the uterus.
- Oviduct is also the site of fertilization.
- (iii) Uterus is a bag like structure where embryo is developed & implanted. It helps the embryo to grow into foetus & also, develops a thick lining of blood vessels every month.

- Q. 9. (a) Name the organ that produces sperms as well as secretes a hormone in human males. Name the hormone it secretes and write its functions.
- (b) Name the parts of the human female reproductive system where fertilisation occurs.
- (c) Explain how the embryo gets nourishment inside the mother's body. [R] [Delhi 31/1/1, 2017]

Ans. (a) Testes $\frac{1}{2}$
Testosterone $\frac{1}{2}$

Functions of Testosterone:

- (i) Formation of sperms
- (ii) Development of secondary sexual characters $\frac{1}{2} \times 2$
- (b) Fallopian Tubes/Oviduct $\frac{1}{2}$
- (c) Placenta, a special disc-like tissue embedded in the mother's uterine wall and is connected to the foetus/embryo. $\frac{1}{2} + 1$

Placenta provides a large surface area for glucose and oxygen/nutrients to pass from the mother's blood to the developing embryo/foetus. 1

[CBSE Marking Scheme, 2017]

- Q. 10. (a) Name the human male reproductive organ that produces sperms and also secretes a hormone. Write the functions of the secreted hormone.
- (b) Name the parts of the human female reproductive system where:
- (i) Fertilization takes place
- (ii) Implantation of the fertilised egg occurs.
- (c) Explain how the embryo gets nourishment inside the mother's body.

[R] [Board Term-II, O.D. Set I, 2015]

Ans. Refer Q.9 of Long Answer Types Questions



Visual Case-based Questions

4 marks each

- Q. 1. Read the following passage and answer any four questions from (a) to (e).
- The growing size of the human population is a cause of concern for all people. The rate of birth

and death in a given population will determine its size. Reproduction is the process by which organisms increase their population. The process of sexual maturation for reproduction is gradual

and takes place while general body growth is still going on. Some degree of sexual maturation does not necessarily mean that the mind or body is ready for sexual acts or for having and bringing up children. Various contraceptive devices are being used by human beings to control the size of population.

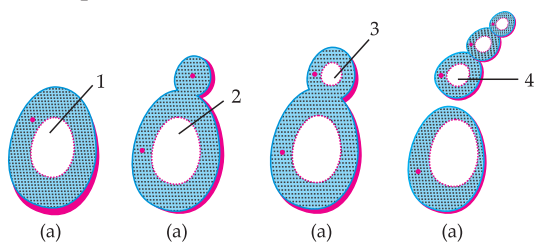
- List two common signs of sexual maturation in boys and girls.
- What is the result of reckless female foeticide?
- Which contraceptive method changes the hormonal balance of the body?
- Write two factors that determine the size of a population.
- What should be maintained for a healthy society?
 - rate of birth & death rate
 - male & female sex ratio
 - child sex ratio
 - None of these

[A] [Delhi- Set-I, 2020]

Ans. Common signs for sexual maturation in boys and girls are:

- (i) Broadening of shoulder and chest in boys and development of mammary gland or breast in girls. (ii) Appearance of hairs on body parts like pubic area, armpits and face.
- The number of females will become low in comparison to males. Hence, there will be huge imbalance between male and female ratio in the population.
- Chemical method of contraception e.g. Oral pills.
- Factors are: Birth rate and death rate. $1 \times 4 = 4$
- (i) Male & Female Sex ratio

Q. 2. Study the diagram given below and answer any four questions from (a) to (e).



- The above process.
 - Binary fission
 - Budding
 - Fragmentation
 - Regeneration
- Which organism uses the above method for reproduction?
 - Yeast
 - Amoeba
 - Spirogyra
 - Leishmania
- An organism capable of reproducing by two asexual reproduction methods one similar to the reproduction in yeast and the other similar to the reproduction in *Planaria* is:
 - Spirogyra
 - Hydra
 - Bryophyllum
 - Paramecium
- A *Planaria* worm is cut horizontally in the middle into two halves P and Q such that the part P contains the whole head of the worm. Another *Planaria* worm is cut vertically into two halves R

and S in such a way that both the cut pieces R and S contain half head each. Which of the cut pieces of the two *Planaria* worms could regenerate to form the complete respective worms?

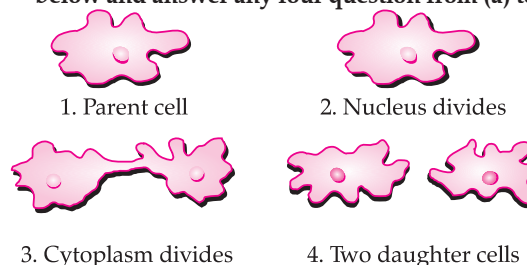
- Only P
 - Only R and S
 - P, R and S
 - P, Q, R and S
- (e) Among the following select the statements that are true regarding the sexual reproduction in flowering plants?
- Fertilisation is a compulsory event
 - It always results in the formation of zygote
 - Offsprings formed are clones
 - It requires two types of gametes
- (1) and (4)
 - (1), (2) and (3)
 - (1), (2) and (4)
 - (2), (3) and (4)

Ans. (a) (ii) Budding is a type of asexual reproduction wherein a daughter organism is formed from a small projection known as bud.

- (i) Yeast
- (ii) Hydra
- (iv) P, Q, R and S
- (iii) (1), (2) and (4)

1+1+1+1

Q. 3. Study the process depicted in the picture given below and answer any four question from (a) to (e):



- Which of these organisms divides by the above process?
 - Amoeba
 - Spirogyra
 - Leishmania
 - Yeast
- How the above process is different from multiple fission.
- Which of the following statement is correct about the above type of reproduction?
 - It involves two individuals.
 - It involves a mature parent cell.
 - It involves union of two types of gametes.
 - All of these
- Differentiate between fission in above organism and *Leishmania*.
- Which of these are the characteristics of vegetative reproduction?
 - Involves two individuals
 - Daughter cells are genetically identical to the parent.
 - The cell division is only mitotic.
 - I and II only
 - I, and III only
 - II and III only
 - All of these

Ans. (a) (i) Binary fission: *Amoeba*
 (b) Binary fission: Two daughter cells are produced.
 Multiple fission: Many daughter cells are formed simultaneously.

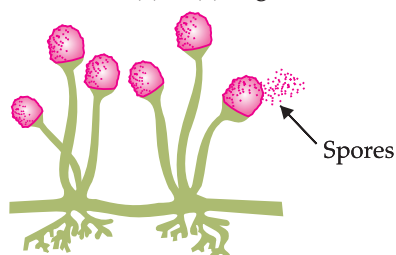
(c) (ii) The above type of reproduction is asexual. It involves a mature parent cell.

(d) In *Amoeba*, splitting into two cells during division can take place in any plane.

In *Leishmania*, binary fission occurs in a definite orientation in relation to the whip like structure.

(e) (iii) The characteristic features of vegetative reproduction are: cell division take place by mitosis and daughter cells formed are genetically identical to the parent. 1+1+1+1

Q. 4. Study the given diagram and answer any four questions from (a) to (e) as given below



(a) The above diagram depicts:

(i) Spore formation in *Rhizopus*

(ii) Fragmentation in *Spirogyra*

(iii) Binary fission in *Amoeba*

(iv) Spore formation in Yeast

(b) Name the following:

(i) Thread like non-reproductive structures present.

(ii) 'Blobs' that develop at the tips of the non-reproductive threads.

(c) How the labelled structure 'spores' protect themselves. Explain how these structures protect themselves

(d) What is the function of spores in these organisms?

(e) Which of these plants reproduces in the same way as the given process?

(i) Balsam

(ii) Fern

(iii) Mango

(iv) *Hibiscus*

Ans. (a) (i) Spore formation in *Rhizopus*

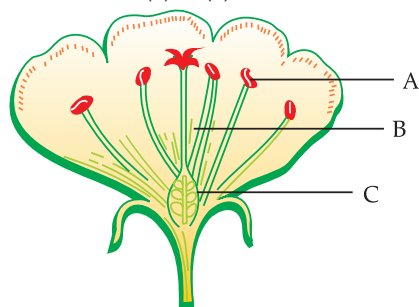
(b) (i) Hyphae, (ii) Sporangia

(c) Spores have an outer thick wall that protects them in adverse conditions until they come in contact with another moist surface and begin to grow.

(d) Functions: They germinate into new individuals under favourable conditions.

(e) (ii) Fern reproduces by spores. 1+1+1+1

Q. 5. The given diagram represent the structure of a flower. Study the structure and answer any four questions from (a) to (e).



(a) The labels A, B and C are

(i) Anther, Style and Ovary respectively.

(ii) Stamen, Stigma and Ovule respectively.

(iii) Anther, Style and Stigma respectively.

(iv) Stamen, Fragment and Ovary respectively.

(b) Which of these is the function of part labelled as C?

(i) Contains ovules which develop into seeds.

(ii) Attracts pollinators.

(iii) Protect rising buds.

(iv) Receive pollens

(c) When an insect sits on the flower of a plant then some particles from the little stalks in the flowers sticks to its body and when this insect sits on the flower of another plant, the particles get deposited in that flower. What are these particles?

(i) Dust

(ii) Pollens

(iii) Grains

(iv) Seeds

(d) A student decides to study the impact of removing certain flower parts on fruit formation in plant species X. He chooses three separate plants that are growing in the same plot under uniform conditions. The data is given in the table below.

Plants	Part Removed	Impact on formation
1.	Anther	30% less fruit formed than average plants in the plot
2.	Stigma	No fruit formed
3.	Petal	No significant impact

Which of the following can be inferred from the above data?

(i) Anthers and stigmas are crucial in sexual reproduction in species X.

(ii) Pollen grains are probably unable to germinate if they land on other parts of the carpel besides the stigma.

(iii) Species X is likely to be wind-pollinated.

(iv) Species X relies completely on cross-pollination.

(e) In a flowering plant, summarize the events that take place after fertilization.

Ans. (a) (i) Anther, Style and Ovary respectively.

(b) (i) The part labelled as C is Ovary. Ovary contains ovule which develops into seeds while ovary forms the fruit.

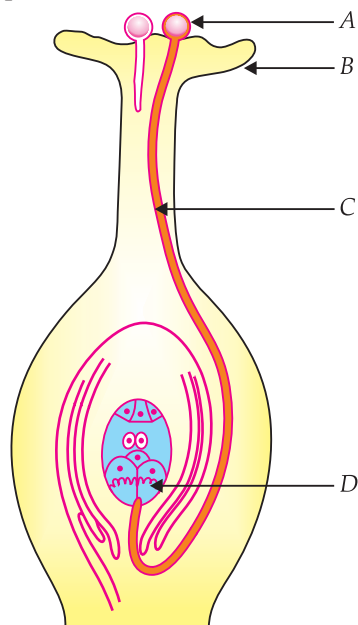
(c) (ii) These particles are pollen grains.

(d) (iii) The removal of anthers affects fruit formation in plant 1, this implies that species X relies partially on self-pollination. The removal of either anthers or stigmas affects rate of fruit formation significantly. No fruits are observed when the stigmas in plant 2 are removed. This shows that pollen grains are probably unable to germinate if they land on any other part of the

carpel besides the stigma. The petals do not seem to play a significant role in facilitating fruit formation. Species-X is therefore likely to be wind-pollinated with reduced petals.

- (e) Fertilization results in formation of zygote. Zygote divides several times, to form an embryo. The ovule develops a thick coat and is developed into seed. The ovary grows rapidly and ripens to form the fruit. 1+1+1+1

Q. 6. Study the diagram given below and answer any four questions from (a) to (e).



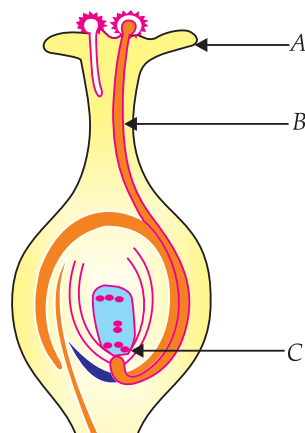
- (a) The part labelled as A in the diagram is:
 (i) Dust (ii) Germs
 (iii) Pollen (iv) Pollinators
- (b) How does 'A' reaches part 'B'?
- (c) State the importance of the part 'C'.
- (d) What happens to the part marked 'D' after fertilization is over?
- (e) Choose the incorrect statements about the reproductive system of a plant?
 (i) The male organs are the stamens.
 (ii) The anthers produce female gametes.
 (iii) The male gametes are present in the pollen grains.
 (iv) A male gamete from a pollen grain fertilize a female gamete in an ovule.

Ans. (a) (iii) Pollen/pollen grain.
 (b) By pollination/agents of pollination.
 (c) It (pollen tube) carries male gamete to reach egg in embryo sac in ovule
 (d) Converted into embryo.

- (e) (ii) In a flower, the male reproductive parts are anthers which produce the male gametes.

1+1+1+1

Q. 7. Study the diagram given below and answer any four questions from (a) to (e).



- (a) The part labelled as A is:
 (i) Dust (ii) Germs
 (iii) Pollen (iv) Pollinators
- (b) The role of part labelled as B is:
 (i) Transport of male gametes to the ovary.
 (ii) Transport of female gametes to the ovary
 (iii) Contains ovules which develop into seeds.
 (iv) All of these
- (c) How many male gametes are produced by each pollen grain?
 (i) One (ii) Two
 (iii) Three (iv) Four
- (d) What happens to the label A which falls on a suitable stigma.
- (e) List two reasons for the appearance of variations among the progeny formed by sexual reproduction. 4

Ans. (a) (iii) The part labelled as A is male germ cells (pollen grain).
 (b) (ii) Style facilitate the transport of the male gametes to the ovary.
 (c) (ii) Each pollen grain produces two male gametes.
 (d) The part labelled A is pollen. The pollen grain starts germinating and forms a pollen tube. The pollen tube grows into the style till it reaches the ovule through micropyle. The pollen tube then reaches the embryo sac into which it releases the two male gametes contained in it. The male gamete then fuses with the female gamete in the embryo sac.
 (e) (i) Involvement of two different individuals.
 (ii) Creation of new combination of variants.

1+1+1+1



Know the Terms

- **Vegetative method:** It is a method in which new plants are obtained from the vegetative parts of old plants such as stem, roots and leaves, without help of any reproductive organs.
- **Tissue culture:** It is the production or propagation of new plants from isolated plant cells or small pieces of plant tissue in a nutrient medium. This technique is also known as **micro propagation**, and in vitro culture because it takes place outside the body of the parent plant in a test tube in an artificial environment.
- **Sexual reproduction:** It is the process in which two sexes male and female are involved. The male sexual unit is known as **male gamete** or **sperm** while female sexual unit is termed as **female gamete** or **ovum**.
- **Zygote:** The cell which is formed by the fusion of a male gamete and female gamete is called **zygote**, *i.e.* it is a 'fertilized ovum' or 'fertilized egg.'
- **Embryo:** It is the stage of development between the zygote or fertilized egg and the newly formed offspring.

