Class: 10th

Subject: Biology

Chapter 14: Reproduction

Important MCQs:

1. Which of the following is not an essential life process?

(a) Respiration

(b) Nutrition

(c) Reproduction ✅

(d) Excretion

2. What does reproduction ensure?

(a) Production of enzymes

(b) Transmission of genetic material ✅

(c) Growth of cells

(d) Elimination of wastes

3. Asexual reproduction produces individuals that are:

(a) Genetically different from parent

(b) Genetically identical to parent ✅

(c) Morphologically variable

(d) Sterile organisms

4. Binary fission is commonly found in:

(a) Hydra

(b) Bacteria ✅

(c) Fungi

(d) Humans

5. The process in which the parent body splits into two is called:

(a) Fragmentation

(b) Budding

(c) Binary fission ✅

(d) Fertilization

6. During binary fission in bacteria, the new cell

wall is formed between:

(a) Two buds

(b) Two vacuoles

(c) Two cross membranes ✅

(d) Two nuclei only

7. Under unfavourable conditions, some unicellular organisms form a protective structure called:

(a) Bud

(b) Spore

(c) Cyst ✅

(d) Nucleus

8. Multiple fission results in:

(a) Two daughter cells

(b) Four daughter cells

(c) Many daughter cells ✅

(d) One large cell

9. Fragmentation is a type of asexual reproduction in which:

(a) A bud is formed

(b) The body breaks into many pieces ✅

(c) Gametes fuse

(d) Only cells divide

10. In which organism do buds remain attached to form colonies?

(a) Planaria

(b) Yeast

(c) Coral ✅

(d) Hydra

11. In Rhizopus, thick-walled spore sacs are called:

(a) Spores

(b) Sporangia ✅

(c) Corms

(d) Rhizoids

12. What helps fungal spores survive unfavourable conditions?

(a) Enzymes

(b) Chlorophyll

(c) Thick wall or cyst ✅

(d) Food vacuole

13. Spores formed inside bacterial cells are called:

(a) Mycelium

(b) Endospores ✅

(c) Exospores

(d) Corms

14. Parthenogenesis is the development of:

(a) A fertilized egg into offspring

(b) A spore into a plant

(c) An unfertilized egg into offspring ✅

(d) A leaf into a flower

15. In honeybees, unfertilized eggs become:

(a) Queen bees

(b) Worker bees

(c) Drones ✅

(d) Larvae only

16. Which of the following reproduces using bulbs?

(a) Ginger

(b) Tulip ✅

(c) Bryophyllum

(d) Dasheen

17. Which structure contains buds at nodes and grows horizontally underground?

(a) Corm

(b) Rhizome ✅

(c) Tuber

(d) Bulb

18. Which plant shows vegetative propagation through leaves?

(a) Mint

(b) Onion

(c) Bryophyllum ✅

(d) Ginger

19. Which method involves attaching a stem piece

to a plant with roots?

(a) Cutting

(b) Budding

(c) Grafting ✅

(d) Layering

20. What is the major disadvantage of vegetative propagation?

(a) Low reproduction rate

(b) Weak root development

(c) No genetic variation ✅

(d) Reduced flowering

21. Sexual reproduction in plants involves:

(a) Only spore formation

(b) Formation and fusion of gametes ✅

(c) Vegetative parts only

(d) Budding and fragmentation

22. Which plant group requires water for fertilization?

(a) Angiosperms

(b) Gymnosperms

(c) Mosses and ferns ✅

(d) Seed plants

23. In which plants are the sperms motile and can swim to the egg?

(a) Ferns ✅

(b) Roses

(c) Corn

(d) Sunflower

24. Alternation of generations in plants refers to:

(a) Only gametes producing gametes

(b) Switching between diploid and haploid generations ✅

(c) Changing from flowers to fruits

(d) Only vegetative reproduction

25. The diploid generation in plants is called:

(a) Gametophyte

(b) Zygote

(c) Sporophyte ✅

(d) Endosperm

26. Which structure in angiosperms produces microspores?

(a) Ovule

(b) Style

(c) Anther ✅

(d) Ovary

27. The male reproductive part of a flower is:

(a) Corolla

(b) Gynoecium

(c) Androecium ✅

(d) Sepal

28. How many sperms are formed in a germinated microspore?

(a) One

(b) Two ✅

(c) Three

(d) Four

29. What is the female reproductive part of a flower called?

(a) Sepals

(b) Petals

(c) Gynoecium ✅

(d) Anther

30. Inside each ovule, which structure is formed after meiosis?

(a) Microspore

(b) Ovary

(c) Macrospore ✅

(d) Endosperm

31. The process of transferring pollen grains to the stigma is called:

(a) Fertilization

(b) Germination

(c) Pollination ✅

(d) Reproduction

32. The formation of a diploid zygote and a triploid endosperm nucleus is called:

(a) Simple fertilization

(b) Gametogenesis

(c) Double fertilization ✅

(d) Seed dispersal

33. Endosperm tissue in seed provides:

(a) Protection

(b) Reproduction

(c) Energy for embryo ✅

(d) Hormones

34. Which of the following is an example of wind pollinated plant?

(a) Sunflower

(b) Rose

(c) Corn ✅

(d) Orchid

35. Which one is an insect pollinated flower?

(a) Willow

(b) Buttercup ✅

(c) Grass

(d) Hazel

36. Which part of the seed develops into the root?

(a) Cotyledon

(b) Plumule

(c) Epicotyl

(d) Radicle ✅

37. What is the function of the seed coat?

(a) Absorb oxygen

(b) Provide energy

(c) Protect the embryo ✅

(d) Form new leaves

38. In epigeal germination, which part of the seed elongates and pulls the cotyledons above the

ground?

(a) Epicotyl

(b) Plumule

(c) Hypocotyl ✅

(d) Radicle

39. Which of the following is not an external condition required for seed germination?

(a) Water

(b) Oxygen

(c) Live embryo ✅

(d) Temperature

40. What is the first structure that emerges from a germinating seed?

(a) Cotyledon

(b) Shoot

(c) Plumule

(d) Root (from radicle) ✅

41. The process of gamete formation is called:

(a) Fertilization

(b) Gametogenesis ✅

(c) Mitosis

(d) Meiosis

42. Which organ produces sperms in animals?

(a) Ovaries

(b) Scrotum

(c) Testes ✅

(d) Seminal vesicle

43. The egg cells in animals are produced in:

(a) Uterus

(b) Fallopian tubes

(c) Ovaries ✅

(d) Cervix

44. The production of sperms is called:

(a) Oogenesis

(b) Zygogenesis

(c) Spermatogenesis ✅

(d) Meiotogenesis

45. Which of the following is non-motile before becoming a sperm?

(a) Spermatocyte

(b) Spermatid ✅

(c) Zygote

(d) Acrosome

46. The smaller cell produced during meiosis-I in oogenesis is called:

(a) Egg cell

(b) First polar body ✅

(c) Zygote

(d) Embryo

47. In external fertilization, the gametes are fused:

(a) Inside the female body

(b) In water/outside the body ✅

(c) Inside the egg shell

(d) Inside uterus

48. Internal fertilization takes place in:

(a) Amphibians

(b) Fishes

(c) Mammals ✅

(d) Insects only

49. In rabbits, sperms mature in which part of male reproductive system?

(a) Testes

(b) Scrotum

(c) Epididymis ✅

(d) Urethra

50. Which gland in rabbits provides nutrients for sperms?

(a) Prostate gland

(b) Cowper's gland

(c) Seminal vesicle ✅

(d) Pituitary gland

51. In female rabbit, fertilization occurs in:

(a) Vagina

(b) Uterus

(c) Ovary

(d) Fallopian tube ✅

52. What is the function of placenta in rabbits?

(a) Fertilization site

(b) Produces eggs

(c) Connects embryo to uterus ✅

(d) Transfers sperms

53. AIDS is caused by:

(a) Bacteria

(b) HIV virus ✅

(c) Fungi

(d) Mosquito

54. AIDS mainly affects:

(a) Red blood cells

(b) Platelets

(c) White blood cells ✅

(d) Bones

55. Overpopulation causes all of the following except:

(a) Deforestation

(b) Global warming

(c) Increase in biodiversity ✅

(d) Fresh water shortage

Exercise Short Questions:

1. How are the natural and artificial vegetative propagations the methods of asexual reproduction in plants?

Answer:

Both natural and artificial vegetative propagation involve the production of new plants without gamete fusion. In these methods, new individuals are genetically identical to the parent plant.

- **Natural propagation** occurs through roots, stems, or leaves (e.g. bulbs, rhizomes).

- **Artificial propagation** is done by humans through cuttings or grafting, making it a type of asexual reproduction.

2. Why do gardeners use the methods of cutting and grafting?

Answer:

Gardeners use cutting and grafting to:

- Increase the number of plants rapidly
- Preserve desirable characteristics of parent plants (e.g. fruit size, seedlessness)
- Produce genetically identical plants
- These methods are reliable, easy to apply, and help in commercial plant propagation like in roses, sugarcane, and grapes.

3. "Parthenogenesis is a type of asexual reproduction". Give comments on this statement.

Answer:

Yes, parthenogenesis is a form of asexual reproduction in which an unfertilized egg develops

into a new individual.

It occurs in some insects, fishes, and amphibians.

Example: In honeybees, unfertilized eggs develop into haploid males (drones).

Since no fusion of gametes occurs, it is classified as asexual reproduction.

4. Outline the life cycle of a flowering plant.

Answer:

The life cycle of a flowering plant includes the following stages:

1. Sporophyte generation (diploid) produces haploid spores via meiosis.

2. Spores grow into gametophyte generation (haploid) which forms gametes.

3. Male and female gametes fuse (fertilization) to form a zygote (diploid).

4. Zygote grows into a new sporophyte through mitosis.

This process is called alternation of generations.

5. What structural adaptations will you find in a wind-pollinated flower?

Answer:

Wind-pollinated flowers have the following adaptations:

- Small, dull-colored petals (not showy)
- Large number of light, dry pollen grains
- Long, exposed stamens and feathery stigmas
- No scent or nectar
- These features help in the efficient transfer of pollen by wind.

Important Short Questions:

1. What is reproduction?

Answer:

Reproduction is the biological process in which living organisms produce new individuals of the same species to ensure the continuation of their

kind.

2. Why is reproduction not considered an essential life process?

Answer:

Because an individual can live without reproducing; however, reproduction is essential for the survival of the species.

3. What is asexual reproduction?

Answer:

Asexual reproduction is a type of reproduction that does not involve the fusion of gametes and results in genetically identical offspring from a single parent.

4. Define binary fission.

Answer:

Binary fission is the simplest and most common method of asexual reproduction in which an organism divides into two equal parts, forming two daughter organisms.

5. How does binary fission occur in bacteria?

Answer:

In bacteria, the DNA is duplicated, and the cell membrane invaginates in the center, dividing the cytoplasm and forming two daughter cells.

6. What is multiple fission?

Answer:

Multiple fission is a type of asexual reproduction where a single cell divides into many daughter cells simultaneously, often under favorable conditions.

7. What is fragmentation?

Answer:

Fragmentation is a form of asexual reproduction in which an organism breaks into two or more pieces, and each piece grows into a new complete organism.

8. Name two organisms that reproduce through fragmentation.

Answer:

Planaria and certain worms reproduce by fragmentation.

9. Describe budding in yeast.

Answer:

In yeast, a small bud forms on the parent cell, receives a nucleus after division, and eventually separates to grow into a new organism.

10. What are spores and how are they formed?

Answer:

Spores are small, thick-walled structures formed inside sporangia. They can survive harsh conditions and germinate into new organisms under favorable conditions.

11. What is parthenogenesis?

Answer:

Parthenogenesis is a special type of asexual reproduction in which a new individual is formed from an unfertilized egg cell, without the involvement of male gametes (sperms).

12. Name any two animals that reproduce by parthenogenesis.

Answer:

Some fishes and insects like honeybee and frogs reproduce through parthenogenesis.

13. What are drones in honeybee colony and how are they formed?

Answer:

Drones are haploid male bees formed from unfertilized eggs by parthenogenesis.

14. What is vegetative propagation?

Answer:

Vegetative propagation is a form of asexual reproduction in which new plants grow from roots, stems, or leaves of the parent plant.

15. What is the difference between natural and artificial vegetative propagation?

Answer:

In natural vegetative propagation, plants reproduce

on their own using body parts, while in artificial vegetative propagation, gardeners or farmers use techniques like cuttings and grafting to grow new plants.

16. Name two plants that reproduce through stem tubers.

Answer:

Potato and yam reproduce through stem tubers.

17. How does Bryophyllum reproduce vegetatively?

Answer:

Bryophyllum reproduces through adventitious buds present on the margins of leaves, which grow into new plants when the leaf falls on the ground.

18. What is grafting in artificial propagation?

Answer:

Grafting is a method in which a stem piece from one plant is attached to another plant with an established root system to grow together.

19. Give one advantage and one disadvantage of

vegetative propagation.

Answer:

Advantage: Offspring are genetically identical, preserving beneficial traits.

Disadvantage: No genetic variation, so diseases can destroy entire crop.

20. What is tissue culture or micropropagation?

Answer:

Tissue culture is a method of cloning where plant tissues are grown in a nutrient medium to produce new identical plants.

21. What is sexual reproduction in plants?

Answer:

Sexual reproduction in plants involves the formation and fusion of male (sperm) and female (egg) gametes to form a zygote.

22. What are the two main types of generations in plant life cycle?

Answer:

The two generations are:

1. Sporophyte (diploid)
2. Gametophyte (haploid)

23. Define alternation of generations.

Answer:

The phenomenon in which sporophyte and gametophyte generations alternate with each other in a plant's life cycle is called alternation of generations.

24. What is the function of calyx in a flower?

Answer:

Calyx (sepals) protects the inner parts of flower during the bud stage.

25. What is androecium?

Answer:

Androecium is the male reproductive whorl of a flower, consisting of stamens that produce pollen grains.

26. What are the components of gynoecium?

Answer:

Gynoecium is made of carpels (or pistils), each having a stigma, style, and ovary.

27. What is double fertilization in flowering plants?

Answer:

Double fertilization is the process in which one sperm fuses with egg to form zygote, and the other fuses with fusion nucleus to form endosperm.

28. What is pollination?

Answer:

Pollination is the transfer of pollen grains from the anther to the stigma of a flower.

29. Differentiate between self and cross pollination.

Answer:

Self pollination: Pollen transfers within the same flower or plant.

Cross pollination: Pollen transfers between two different plants of the same species.

30. Name any two insect-pollinated and two wind-pollinated flowers.

Answer:

- Insect-pollinated: Rose, Sunflower
- Wind-pollinated: Grass, Corn

31. What are the three main parts of an angiosperm seed?

Answer:

An angiosperm seed consists of:

- Embryo (from zygote)
- Endosperm tissue (from endosperm nucleus)
- Seed coat (from ovule wall)

32. What is the function of seed coat?

Answer:

Seed coat protects the embryo from mechanical injury and drying out.

33. What is epigeal germination? Give one example.

Answer:

In epigeal germination, the hypocotyl elongates and pulls the cotyledons above ground.

Example: Bean

34. What conditions are necessary for seed germination?

Answer:

- Water (moisture)
- Oxygen
- Favourable temperature (25–30°C)

35. What is the function of radicle and plumule in a seed?

Answer:

- Radicle develops into root
- Plumule develops into shoot

36. What is gametogenesis?

Answer:

The formation of gametes (sperms and egg cells) is called gametogenesis.

37. What are gonads? Name male and female gonads.

Answer:

Gonads are organs that produce gametes.

Male gonads: Testes

Female gonads: Ovaries

38. What is spermatogenesis?

Answer:

The process of sperm production in testes is called spermatogenesis.

39. What is oogenesis?

Answer:

The process of egg cell production in ovaries is called oogenesis.

40. What is the function of acrosome in a sperm?

Answer:

Acrosome helps the sperm to penetrate the egg during fertilization.

41. Define external fertilization.

Answer:

When fertilization occurs outside the body, it is called external fertilization.

42. In which animals does external fertilization occur?

Answer:

It occurs in fishes, amphibians, and many invertebrates.

43. What is internal fertilization?

Answer:

Fertilization that occurs inside the female body is called internal fertilization.

44. What is the function of seminal vesicles in male rabbit?

Answer:

They produce secretions that provide nutrients for sperms.

45. What is the role of prostate gland in rabbits?

Answer:

It produces a secretion that neutralizes the acidity of the fluid.

46. Where does fertilization occur in female rabbit?

Answer:

Fertilization occurs in the fallopian tubes of female rabbit.

47. What is placenta?

Answer:

Placenta is a connection between embryo and uterus wall for supply of nutrients and protection.

48. What is overpopulation?

Answer:

Overpopulation is when the population exceeds the carrying capacity of an area or environment.

49. What is AIDS? Name its causative agent.

Answer:

AIDS is a sexually transmitted disease caused by HIV (Human Immunodeficiency Virus).

50. What are the main objectives of National AIDS Control Programme (NACP)?

Answer:

To prevent HIV transmission, ensure safe blood transfusions, and reduce STDs.

Important Long Questions:

Q1: What is reproduction? Write its importance and explain the two main types of reproduction.

🌱 **Definition of Reproduction:**

Reproduction is the biological process through which living organisms produce individuals of their own kind (offspring), thereby ensuring the continuation of their species.

🔄 **Importance of Reproduction:**

- It ensures the survival and continuity of species from one generation to the next.
- It allows genetic material to pass on to

offspring.

- It increases the population of organisms.
- It helps in the evolution of species by enabling beneficial traits to pass on.

Types of Reproduction:

There are two main types of reproduction:

1. Asexual Reproduction:

- In this method, only one parent is involved.
- No fusion of gametes takes place.
- Offspring are genetically identical (clones) to the parent.

Examples: Binary fission in bacteria, budding in yeast, spore formation in Rhizopus.

2. Sexual Reproduction:

- Involves two parents (male and female).
- Male and female gametes fuse to form a zygote.
- Offspring show genetic variation.

Examples: Humans, flowering plants, animals like rabbits.

🌟 **Q2: What is asexual reproduction? Describe binary fission with examples.**

🧬 **Definition of Asexual Reproduction:**

Asexual reproduction is a type of reproduction in which a single parent produces offspring without the fusion of gametes. The offspring are genetically identical to the parent.

🔬 **Binary Fission:**

- Binary fission means “division into two”.
- It is the simplest and most common type of asexual reproduction.
- The parent cell divides into two equal daughter cells.

📌 **Examples of Binary Fission:**

1. In Bacteria (Prokaryotes):

- DNA replicates.
- Cell membrane invaginates.

- Cytoplasm divides ⇒ 2 daughter bacteria.

2. In Unicellular Eukaryotes (e.g., Amoeba, Paramecium):

- Nucleus divides (mitosis).
- Cytoplasm divides equally ⇒ 2 new cells.

3. In Some Invertebrates (e.g., Planaria):

Body splits into two parts.

Each part regenerates into a new organism.

🌟 Q3: Explain different types of asexual reproduction with examples.

Asexual reproduction can occur in several forms. Below are the main types with examples:

1. Binary Fission:

Parent cell divides into two equal parts.

Examples: Bacteria, Amoeba, Paramecium, Planaria.

2. Fragmentation:

- Body breaks into pieces (fragments).
- Each fragment develops into a new organism.

- **Examples**: Worms, Planaria, Sea stars.

3. **Budding:**

- A small outgrowth (bud) develops on the parent.
- Bud may detach or stay attached.
- **Examples**: Yeast, Hydra, Corals.

4. **Spore Formation:**

- Thick-walled spores are formed inside sporangia.
- Spores germinate under favourable conditions.
- **Examples**: Rhizopus (bread mould), Fungi, Bacteria (endospores).

5. **Parthenogenesis:**

- Offspring develop from unfertilized egg.
- No male gamete required.
- **Examples**: Honeybee (drones), some frogs, fishes, and insects.

🌟 Q4: What are advantages and disadvantages of vegetative propagation in plants?

🌿 Vegetative Propagation:

It is a type of asexual reproduction in plants where new plants grow from vegetative parts like roots, stems, or leaves.

✅ Advantages of Vegetative Propagation:

1. Rapid multiplication of plants.
2. Genetically identical plants (uniform traits).
3. No need for pollination or seeds.
4. Seedless fruits (e.g., banana, grapes) can be produced.
5. Can grow plants in unfavourable seed-producing conditions.

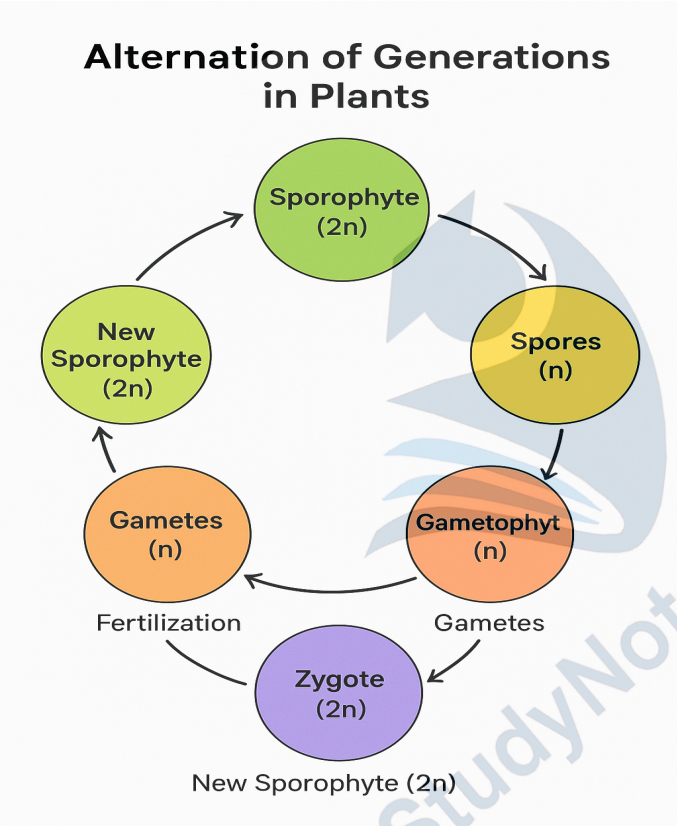
❌ Disadvantages of Vegetative Propagation:

1. No genetic variation – all plants are clones.
2. Susceptible to diseases – if one gets infected, all are at risk.

3. Risk of total crop failure.

4. Not suitable for improving plant varieties through evolution.

🌟 **Q5: What is sexual reproduction in plants? Explain alternation of generations with diagram.**



❖ **Definition:**

Sexual reproduction in plants is a biological process in which male and female gametes (sperms and egg cells) are formed and fuse together to produce a new organism. This fusion is called fertilization, and it leads to the formation of a zygote, which

eventually grows into a new plant.

➤ **Importance of Sexual Reproduction:**

- It ensures the continuation of the species.
- Produces genetic variation, which is important for adaptation and evolution.
- Allows the transmission of hereditary traits from parents to offspring.

➤ **Alternation of Generations:**

In plants, there are two distinct phases in the life cycle which alternate with each other. This process is called alternation of generations.

1. Sporophyte Generation (Diploid - 2n):

- This generation is dominant in most plants.
- It produces haploid spores by meiosis.
- These spores grow into the gametophyte generation.

2. Gametophyte Generation (Haploid - n):

- It develops from spores.
- It produces gametes (male and female)

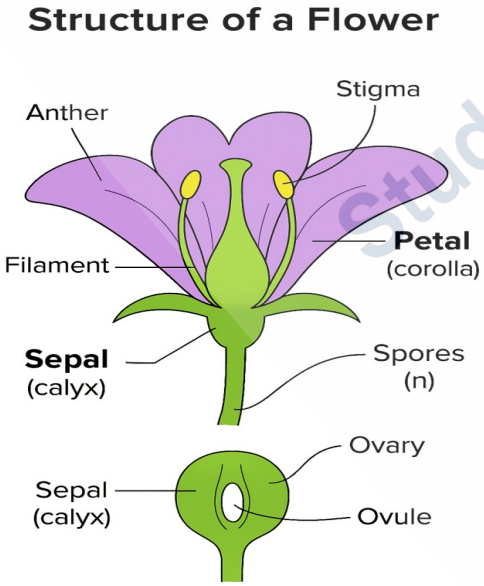
through mitosis.

- The fusion of gametes (fertilization) results in the formation of a diploid zygote.
- This zygote grows into a new sporophyte, completing the cycle.

🔄 **Life Cycle Summary:**

Sporophyte (2n) ⇒ Meiosis ⇒ Spores (n) ⇒ Gametophyte (n) ⇒ Gametes (n) ⇒ Fertilization ’n Zygote (2n) ⇒ Sporophyte (2n)

🌟 **Q6: Describe the structure and function of different floral parts in sexual reproduction.**



❖ **Introduction:**

In flowering plants (angiosperms), the flower is the reproductive organ that plays a central role in sexual reproduction. It contains all the necessary structures for the production of gametes and the process of fertilization.

🔹 Whorls of a Flower:

Flowers are made of four main parts, also called whorls, arranged in circles on the floral axis.

1. Calyx (Sepals):

- It is the outermost whorl.
- Usually green in color and leaf-like.
- **Function**: Protects the inner parts of the flower during the bud stage.

2. Corolla (Petals):

- Located just inside the calyx.
- Usually brightly colored and sometimes scented.
- **Function**: Attracts pollinators like bees, birds, and insects.

3. Androecium (Male Reproductive Part):

Made of units called stamens.

Each stamen consists of:

- A filament (thin stalk),
- An anther (at the tip) which contains pollen sacs.

Function: Produces pollen grains, each containing:

- A tube nucleus
- A generative nucleus (which divides into two male gametes/sperms).
- This entire structure forms the male gametophyte.

4. Gynoecium (Female Reproductive Part):

Made of one or more carpels or pistils.

Each carpel consists of:

Ovary (base): contains one or more ovules.

- Style (middle stalk)

- Stigma (top sticky surface for pollen).
- Inside the ovule, a macrospore forms the female gametophyte, which contains the egg cell and fusion nucleus.

🔹 **Fertilization Process:**

- Pollination brings pollen to the stigma.
- The pollen tube grows through the style into the ovule.

Double fertilization occurs:

One sperm fuses with the egg cell ⇒ forms zygote.

Other sperm fuses with the fusion nucleus ⇒ forms endosperm nucleus (3n), which provides nutrition to the embryo.

🌟 **Q7: What is gametogenesis? Explain the process of spermatogenesis and oogenesis in animals.**

❖ **Definition of Gametogenesis:**

Gametogenesis is the biological process through which haploid gametes (sperms in males and egg

cells in females) are formed from diploid (2N) gamete mother cells through meiosis.

It occurs in specialized reproductive organs called gonads:

In males ⇒ Testes

In females ⇒ Ovaries

🔹 Role of Meiosis in Gametogenesis:

- Meiosis reduces the chromosome number from diploid (2N) to haploid (1N).
- It ensures genetic variation and maintains chromosome number across generations.

🧬 A. Spermatogenesis (Formation of Sperms):

Spermatogenesis occurs in the seminiferous tubules of testes.

Here is the step-by-step process:

1. Spermatogonia (2N):

These are diploid cells that divide by mitosis to form more spermatogonia.

2. Primary Spermatocyte (2N):

Some spermatogonia differentiate into primary spermatocytes, which undergo meiosis I.

3. Secondary Spermatocytes (1N):

Each primary spermatocyte divides into two haploid secondary spermatocytes.

4. Spermatids (1N):

Each secondary spermatocyte undergoes meiosis II to produce two spermatids.

So, 1 primary spermatocyte ⇒ 4 spermatids

5. Sperms:

- Spermatids undergo structural changes:
- Formation of acrosome, tail, and mitochondrial ring
- They become motile sperms

🧬 B. Oogenesis (Formation of Egg Cells):

Oogenesis takes place in the ovaries.

Here is the process:

1. Oogonia (2N):

These are diploid cells inside follicles, and they divide by mitosis to form more oogonia.

2. Primary Oocyte (2N):

Some oogonia grow into primary oocytes, which begin meiosis I.

3. Secondary Oocyte + First Polar Body (1N):

Meiosis I results in two unequal cells:

Large cell ⇒ Secondary oocyte

Small cell ⇒ First polar body

4. Egg Cell + Second Polar Body (1N):

The secondary oocyte completes meiosis II to form:

- One egg cell
- Second polar body

🔸 Note: Only one egg is produced from one primary oocyte, unlike spermatogenesis which produces four sperms.

🌟 **Q8: Describe external and internal fertilization with examples.**

❖ **Definition of Fertilization:**

Fertilization is the process of fusion of male (sperm) and female (egg) gametes to form a zygote.

🐠 A. External Fertilization:

In this type, gametes fuse outside the body in an external environment (usually water).

Common in aquatic animals like:

- Fishes
- Amphibians (frogs, toads)
- Requires both male and female to release gametes at the same time.
- Large number of gametes are produced because many are wasted or eaten by predators.

✅ **Example**:

Frog – lays eggs in water and male releases sperms over them.

🐢 B. Internal Fertilization:

- Fertilization takes place inside the female body.

- Seen in reptiles, birds, and mammals.
- Requires fewer gametes as it provides greater protection.
- Zygote develops inside body or in a protected shell (birds, reptiles).

✅ **Examples:**

- Humans (internal development)
- Birds (develop in shelled eggs)

🌟 **Q9: What is overpopulation? Describe its causes, consequences, and solutions.**

❖ **Definition of Overpopulation:**

- Overpopulation occurs when the population size exceeds the carrying capacity of the environment.
- It leads to strain on resources, environmental degradation, and poor quality of life.

🚼 **Causes of Overpopulation:**

1. High birth rate
2. Lack of awareness and use of family planning

methods

3. Poor education and health facilities

4. Cultural and religious beliefs encouraging large families

⚠ **Consequences of Overpopulation:**

1. Shortage of fresh water and food

2. Deforestation – More land needed for housing and farming

3. Pollution – Air, water, and soil pollution increase

4. Poverty – Not enough jobs and resources

5. Health Problems – Higher mortality, poor sanitation

6. Climate change – Due to increased pollution and urbanization

✅ **Solutions to Control Overpopulation:**

1. Public awareness campaigns about family planning

2. Government policies through Ministry of Population Welfares.

3. Education, especially of women

4. Free healthcare and contraception

5. Promote small family norms

Note:

This chapter is designed to provide a solid foundation of knowledge, with the goal of deepening understanding and encouraging further exploration of the subject. The content has been carefully selected to support effective learning and inspire students to engage with the topic more deeply.

Author: Muhammad Asghar

Purpose: To contribute to education by offering insightful, valuable content that enhances learning and understanding.

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