SAMPLE CONTENT

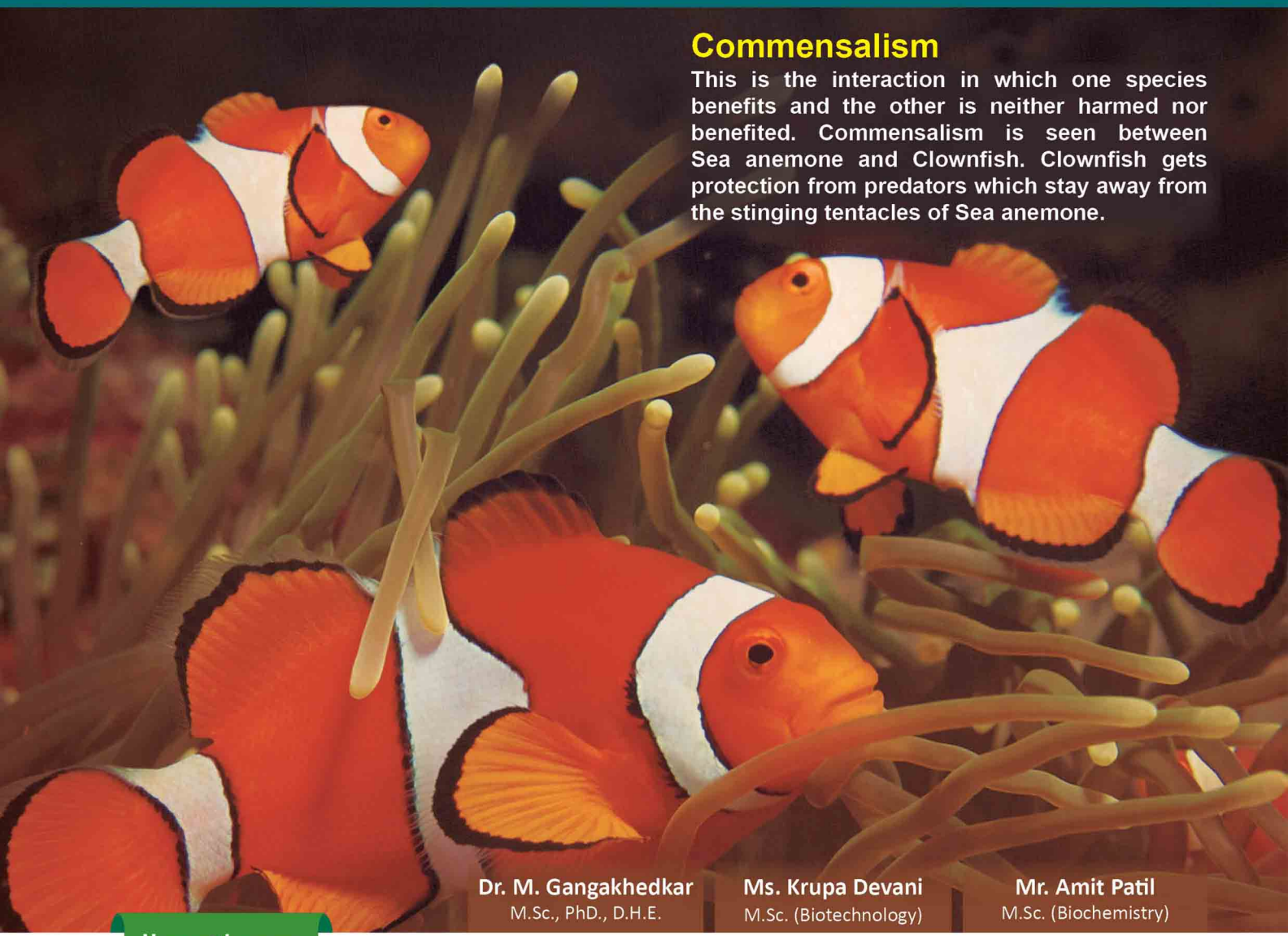
Challenger

NEET - UG
BIOLOGY Vol - II

As per latest syllabus issued by NMC

2253 MCQs with Hints

For all Medical Entrance Examinations held across India.



Commensalism

This is the interaction in which one species benefits and the other is neither harmed nor benefited. Commensalism is seen between Sea anemone and Clownfish. Clownfish gets protection from predators which stay away from the stinging tentacles of Sea anemone.

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Challenger
NEET (UG)
Biology Vol. II

Now with more study techniques

Updated as per latest syllabus prescribed for
NEET (UG) 2024 issued by **NMC on 6th October, 2023**

Salient Features

- Concise theory for every topic
- Eclectic coverage of MCQs under each sub-topic
- Exhaustive coverage of questions including selective questions from previous years' NEET (UG) examinations updated upto year 2023:
  - **2253** MCQs
  - Solutions to the questions are provided for better understanding
- Inclusion of '**Problems To Ponder**' to engage students in scientific enquiry.
- Multiple Study Techniques to Enhance Understanding and Problem Solving.
- Includes Question Papers and Answer Keys (Solutions through Q.R. code) of:
  - NEET (UG) 2022
  - NEET (UG) 2023
  - NEET (UG) 2023 (Manipur)
- Q.R. codes provide:
  - Video links for boosting conceptual retention
  - Solutions to previous exam papers of year 2022 and 2023
- Separate list of questions excluded from the NEET (UG) 2024 syllabus

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PREFACE

'Challenger Biology Vol - II' is a compact guidebook, extremely handy for preparation of NEET-UG exam. This edition provides an unmatched comprehensive amalgamation of theory with MCQs. The chapters are completely based on syllabus prescribed for the NEET. The book provides the students with scientifically accurate context and relevant supporting details essential for a better understanding of biology.

In this book the Theoretical Concepts are presented in the form of pointers, tables, charts and diagrams that form a vital part of preparation any competitive examination.

Multiple Choice Questions have been specially created and compiled with the following objective in mind – to help students solve complex problems which require strenuous effort and understanding of multiple-concepts. The assortment of MCQs is a beautiful blend of questions based on higher order thinking, theory, and multiple concepts.

MCQs in each chapter are segregated into following sections.

- **Concept Building Problems:** Contains questions of various difficulty range and pattern.
- **Practice Problems**: Contains ample questions for thorough revision. The quality of questions challenges students to apply their scientific knowledge and skills to interpret data while solving the questions.
- **Problems to Ponder**: MCQs of different pattern created with the primary objective of helping students to understand the application of various concepts of Biology.

All the features of this book pave the path of a student to excel in examination. The features are designed keeping the following elements in mind: Time management, easy memorization or revision and non-conventional yet simple methods for MCQ solving.

Previous Years' Question Papers:

To keep students updated, Question Papers along with Answers and Solutions (through Q.R. code) of following papers have been provided to offer students glimpse of the complexity of questions asked in entrance examination. These papers of latest competitive examinations have been provided and split unit-wise to let the students know which of the units were more relevant as per latest Question paper.

- NEET (UG) **2021, 2022, 2023** and **2023 (Manipur)**

Considering the latest modifications in the syllabus of NEET (UG) examinations, a list of questions based on the concepts excluded from the syllabus is provided. The purpose of providing these questions is to display various question types and their level of difficulty that have been asked in previous examinations.

We hope that this book serves as exceptional tool for student!

A book affects eternity; one can never tell where its influence stops.

Publisher

Edition: Fifth

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

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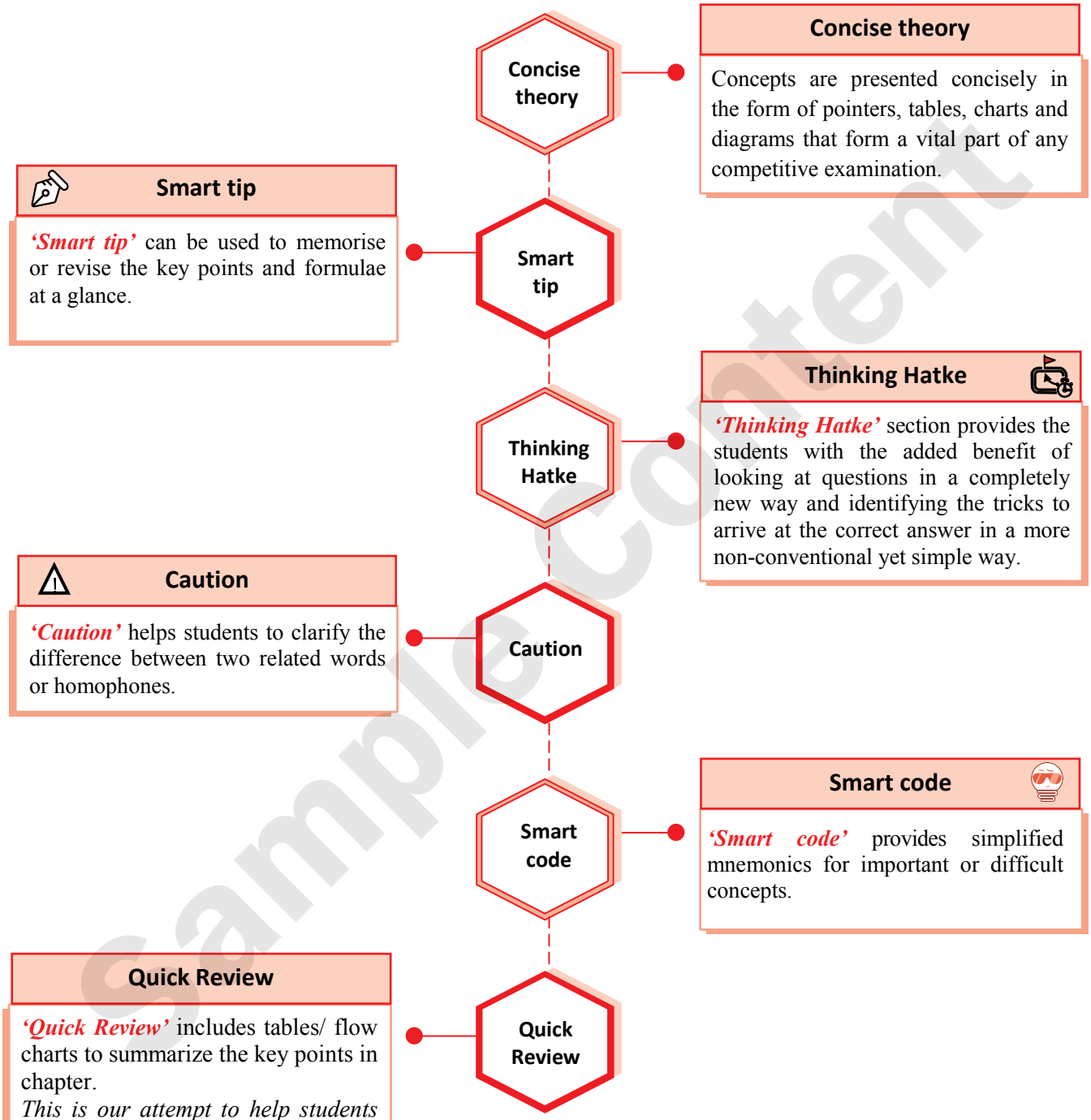
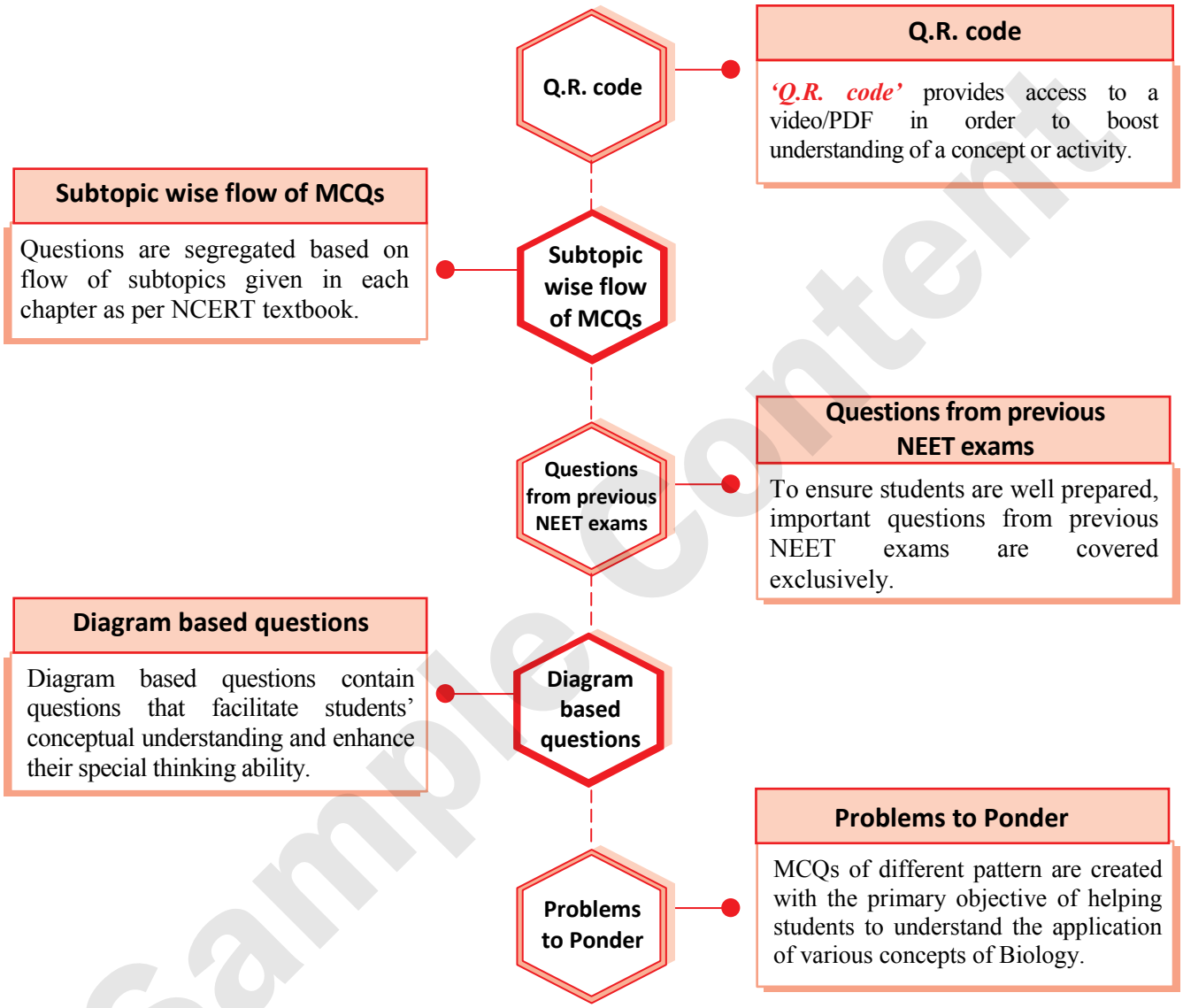
KEY FEATURES



KEY FEATURES



Frequently Asked Questions

➢ Why Challenger Series?

Gradually, every year the nature of competitive entrance exams is inching towards conceptual understanding of topics. Moreover, it is time to bid adieu to the stereotypical approach of solving a problem using a single conventional method.

To be able to successfully crack the NEET examination, it is imperative to develop skills such as data interpretation, appropriate time management, knowing various methods to solve a problem, etc. With Challenger Series, we are sure, you'd develop all the aforementioned skills and take a more holistic approach towards problem solving. The way you'd tackle advanced level MCQs with the help of hints, Smart tips, Smart codes and Thinking Hatke section would give you the necessary practice that would be a game changer in your preparation for the competitive entrance examinations.

➢ What is the intention behind the launch of Challenger Series?

The sole objective behind the introduction of Challenger Series is to severely test the student's preparedness to take competitive entrance examinations. With an eclectic range of critical and advanced level MCQs, we intend to test a student's MCQ solving skills within a stipulated time period.

➢ What do I gain out of Challenger Series?

After using Challenger Series, students would be able to:

a. assimilate the given data and apply relevant concepts with utmost ease.

b. tackle MCQs of different pattern such as match the columns, diagram based questions, multiple concepts and assertion-reason efficiently.

c. garner the much needed confidence to appear for competitive exams.

d. easy and time saving methods to tackle tricky questions will help ensure that time consuming questions do not occupy more time than you can allot per question.

➢ Can the Questions presented in Problems to Ponder section be a part of the NEET Examination?

No, the questions would not appear as it is in the NEET Examination. However, there are fair chances that these questions could be covered in parts or with a novel question construction.

Best of luck to all the aspirants!

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Note: ☒ *Complete chapter excluded from the NEET (UG) 2024 syllabus (in index)*

◑ *Part of the chapter excluded from the NEET (UG) 2024 syllabus (in index)*

 *Symbol along with the question indicates there exists either an unconventional way or use of either Smart tip / Thinking hatke / Smart Code / any other short ways of solving that MCQ.*

Questions based on the concepts excluded from the NEET (UG) 2024 Syllabus

Chapter Name	Sub-topic Name	Questions excluded from NEET (UG) 2024 Syllabus	Page No.
1. Reproduction in Organisms	Entire Chapter Deleted		1 to 19
9. Strategies for Enhancement in Food Production	Entire Chapter Deleted		249 to 269
13. Organisms and Populations			
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Practice Problems	13.2 Population and Ecological Adaptations		347
14. Ecosystem			
Theory	14.6 Ecological Succession		361 and 362
	14.7 Nutrient Cycling		363 and 364
	14.8 Ecosystem Services		364 and 365
Concept Building	14.6 Ecological Succession	All Questions	369
	14.7 Nutrient Cycling		369 and 370
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Practice Problems	14.6 Ecological Succession		373 and 374
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	14.8 Ecosystem Services		374
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Note: i. *The above table contains the list of chapters/subtopics/question numbers that are excluded from the latest syllabus of NEET (UG) 2024.*

ii. *These questions are covered to give an idea about the variety and difficulty levels of questions asked in the examination over the years.*

1 Reproduction in Organisms

1.0 Introduction

➢ **Reproduction:**

i. The ability of living organism to give rise to the young ones of its own kind is called **reproduction.**
ii. It is a characteristic feature of all organisms for continuation of species.
iii. Reproduction is a process of organic evolution by transmitting advantageous variations to the offsprings.
iv. The period from birth to the natural death of an organism is called Life span.

➢ **Types of Reproduction:**

Reproduction
- Asexual → Offspring produced by a single parent with/without gamete formation.
- Sexual → Offspring produced by two parents (of opposite sex) and fusion of male and female gamete is involved.

1.1 Asexual Reproduction

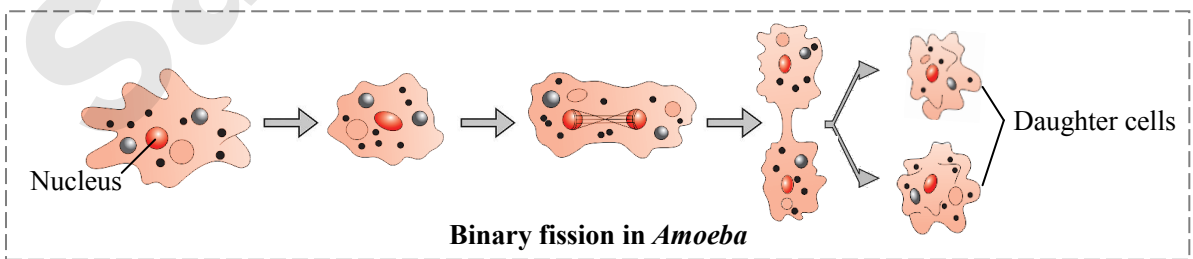
➢ **Characteristics:**

i. Single (parent) individual is involved in producing the offspring.
ii. Offsprings produced are identical to one another.
iii. They are exact copies of their parents.
iv. They are clones, i.e. morphologically and genetically similar individuals.
v. It is common among single-celled organisms and in plants and animals having relatively simple organizations.

➢ **Types of Asexual Reproduction:**

i. Binary fission:

Parental cell divides into two halves and each grows rapidly into an adult. e.g. *Amoeba*, *Paramoecium*.



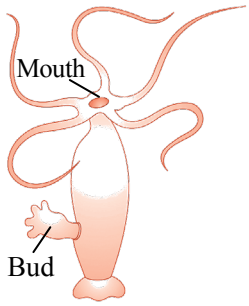
Binary fission in *Amoeba*

ii. Sporulation:

Under unfavourable condition, *Amoeba* shows encystation, in which *Amoeba* withdraws its pseudopodia and secretes a three-layered hard covering or cyst around itself. When conditions are favourable, the encysted *Amoeba* divides by multiple fission producing many minute *Amoebae* or pseudopodiospores. Cyst wall bursts out to release the spores in the surrounding medium. These spores grow up into many *Amoebae.* This is known as sporulation.

iii. Budding:
Unequal division takes place. Small buds are produced which initially remain attached to the parent cell, but later get separated and mature into new organisms (cells), e.g. Yeast, *Hydra*.

Budding in Yeast



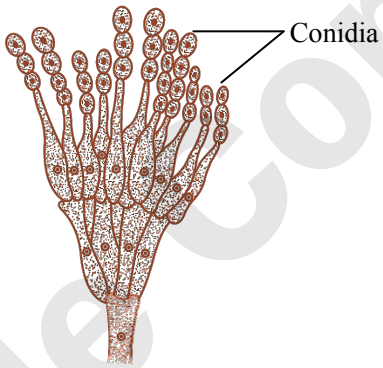
Buds in *Hydra*

iv. Zoospore formation: Members of kingdom fungi and simple plants like algae reproduce asexually by this method.
Zoospores are microscopic motile structures. This type of asexual reproduction is seen in *Chlamydomonas*.

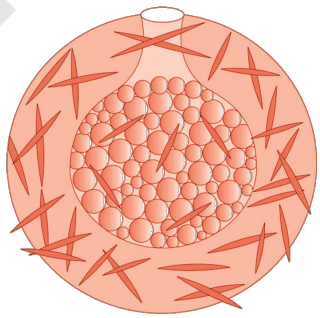
v. Conidia: Conidia are asexual reproductive structures seen in *Penicillium*.

vi. Gemmules: Gemmules are asexual reproductive structures seen in Sponges.

Zoospores of *Chlamydomonas*



Conidia of *Penicillium*



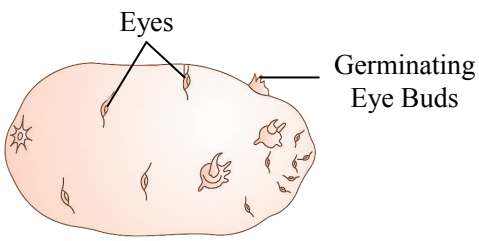
Gemmule in Sponge

vii. Fragmentation:
In this, parental body breaks up into fragments and each fragment grows into an adult, which is capable of producing offspring. This mode of asexual reproduction is called as fragmentation.
It is found in filamentous algae, *Hydra*, sponges, some flat worms, etc.

1.2 Vegetative Propagation in Plants

- **Vegetative Propagation:** Vegetative propagation is an asexual mode of reproduction as only a single parent is involved. It is a process of reproduction seen in plants in which a portion of the plant body functions as a propagule and gives rise to a new plant.
- **Vegetative propagules:** These are the units of vegetative propagation which are capable of giving rise to new offspring.
- **Some of the vegetative propagules in Angiosperms are:**

i. Eyes of potato: Small plantlets emerge from the eyes (axillary buds) of potato tuber.

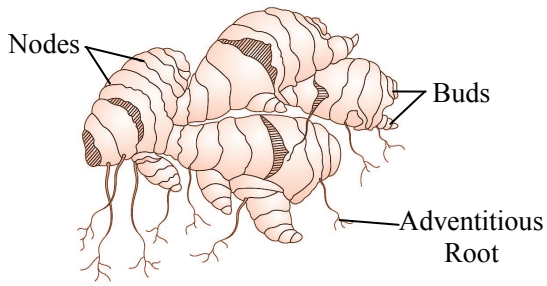


Eyes of Potato

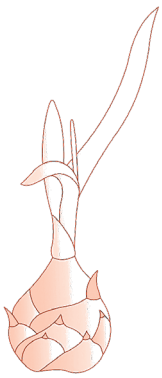
ii. **Rhizome:** Small plantlets develop from rhizome of ginger, turmeric, banana, etc.

iii. **Bulbil:** A vegetative propagule seen in *Agave*.
Bulbils are modified vegetative or floral buds, propagative in function. Bulbils on maturation, get detached from the plant and fall on the ground. Under favourable condition, it develops into new plant.

iv. **Leaf buds:** In *Bryophyllum*, leaves are notched along the margin. Adventitious buds arise from the notches on the leaves. These buds are capable of giving rise to a new plant.

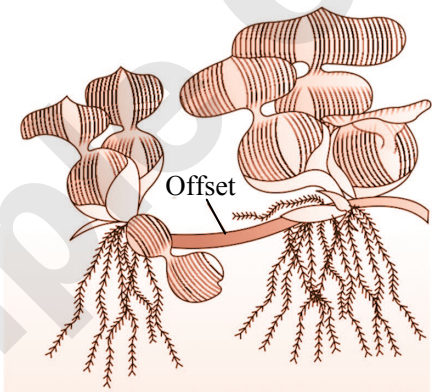


Rhizome of Ginger


Bulbil of *Agave*

Leaf buds of *Bryophyllum*

v. **Offset:**
It is found in water hyacinth, an aquatic plant which can propagate vegetatively at a rapid rate and spread over the standing water body in a relatively short time. Water hyacinth drains oxygen from water, resulting in death of fishes. It is also called 'scourge of water bodies and 'Terror of Bengal'.



Offset of water hyacinth

1.3 Sexual Reproduction

i. **Sexual reproduction:**
Production of offsprings by formation and fusion of gametes.
Characteristics:
a. Male and female gametes are produced.
b. Gametes are produced either by the same individual or by different individuals of opposite sex.
c. Gametes fuse to form zygote which develops into the new organism.
d. In comparison to asexual reproduction, it is a slow, elaborate and more complex process.
e. Offsprings produced are not identical to the parents or amongst themselves.

ii. Before organisms can reproduce sexually, they have to reach a certain stage of growth and maturity. This period is called the **juvenile phase** in animals. In plants, it is called **vegetative phase**. This phase has variable durations in different organisms.

iii. The **reproductive phase** begins after the end of juvenile/vegetative phase. Flowering in higher plants marks the beginning of the reproductive phase. Few plants exhibit unusual flowering phenomenon:

For e.g.

a. Bamboo species flower only once in their lifetime, generally after 50 – 100 years, produce numerous fruits and die.
b. *Strobilanthes kunthiana* (Neelakurinji) flowers once in 12 years.

iv. Females of placental mammals exhibit cyclic changes in the activities of ovaries and accessory ducts as well as hormones during the reproductive phase.

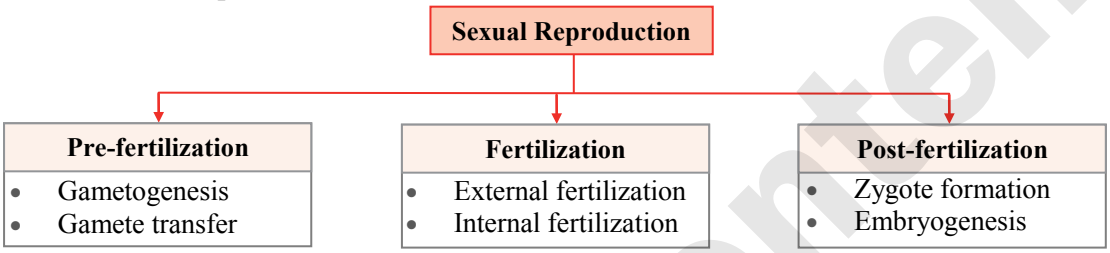
a. Oestrus cycle:
Takes place in non-primate mammals like dogs, cows, sheeps, rats, tigers, deers, etc.

b. Menstrual cycle:
Takes place in primates (monkey, ape and human beings).

c. Seasonal breeders:
Many mammals, which live in wild exhibit reproductive cycles only during favourable seasons.

d. Continuous breeders:
Many other mammals are reproductively active throughout their reproductive phase.

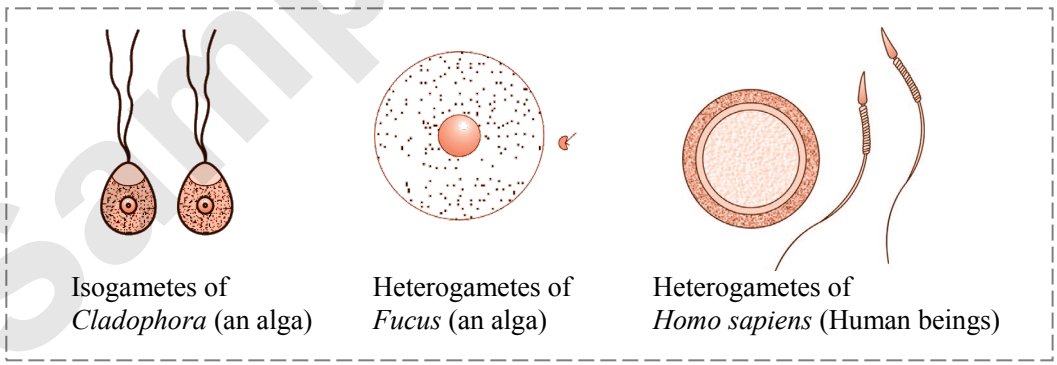
➢ **Events in Sexual Reproduction:**



➢ **Pre-fertilization events:**
These include the events taking place in sexual reproduction prior to the fusion of gametes.
These events are: **Gametogenesis and Gamete transfer**

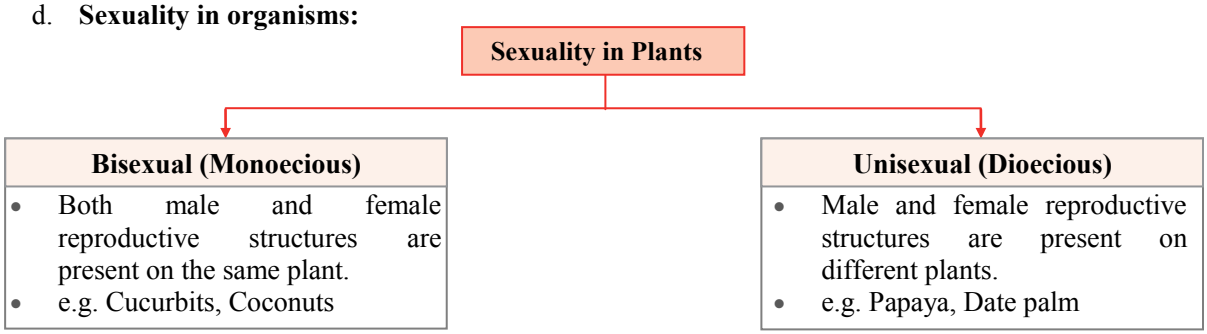
i. Gametogenesis:

a. It involves formation of two types of haploid gametes, i.e. male and female gametes.
b. In some algae, the two gametes are similar in appearance. Such gametes are called **Homogametes (Isogametes).**
c. In majority of sexually reproducing organisms, the two gametes are morphologically distinct types, i.e. **Heterogametes.**
Male gamete → Antherozoid / sperm
Female gamete → Egg / Ovum



Isogametes of *Cladophora* (an alga) | Heterogametes of *Fucus* (an alga) | Heterogametes of *Homo sapiens* (Human beings)

d. **Sexuality in organisms:**



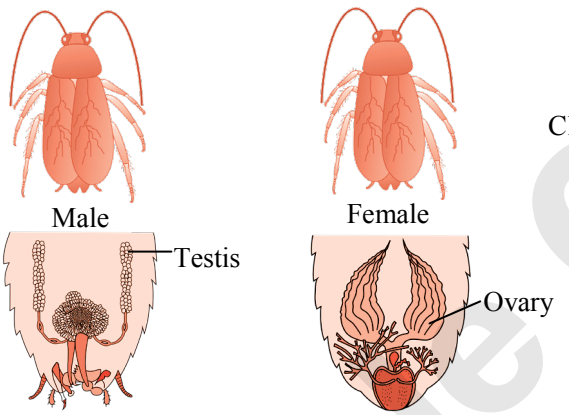
Smart tip - 1

Homothallic OR **Monoecious** plants denote **Bisexual** condition→ Male and female flowers on same plant→ E.g. Cucurbits, Coconuts
Heterothallic OR **Dioecious** plants denote **Unisexual** condition→ Male and female flowers on separate plants→ E.g. Papaya, Date Palm

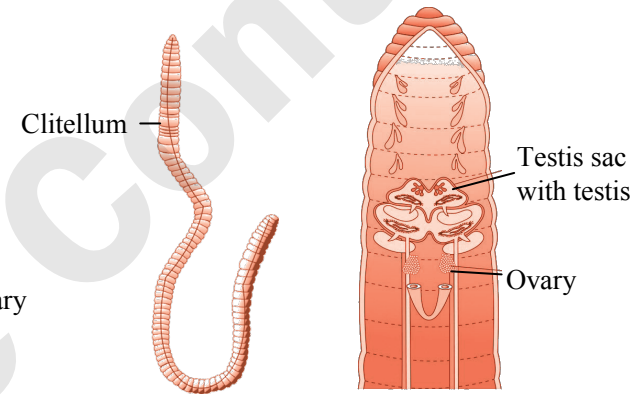
In many plants and fungi, the terms homothallic/monoecious are used to denote the bisexual condition, while the terms heterothallic and dioecious are used to denote unisexual condition.
In flowering plants,
Unisexual male flower: **Staminate** (Bearing only stamens)
Unisexual female flower: **Pistillate** (Bearing only pistils)

Sexuality in Animals

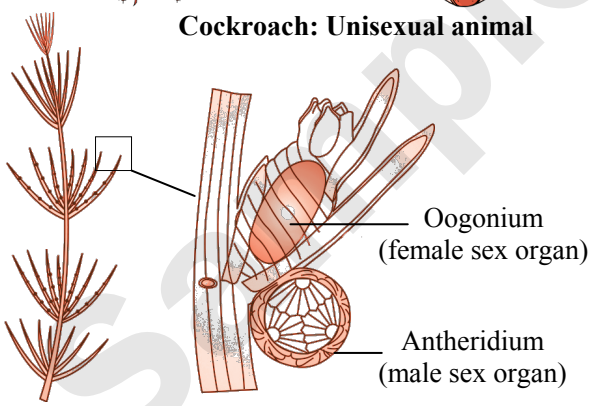
Unisexual	Bisexual (Hermaphrodite)
• Male and female sex organs are present in different individuals. • e.g. Cockroach	• Male and female sex organs are present in the same individual. • e.g. Earthworm, leech, sponge, tapeworm



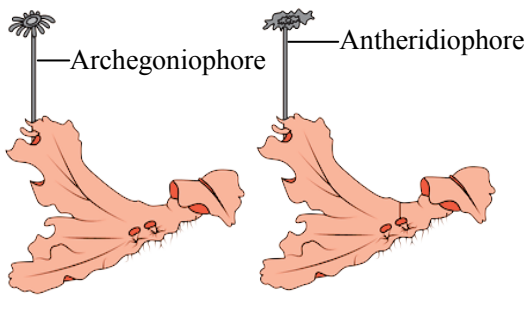
Cockroach: Unisexual animal



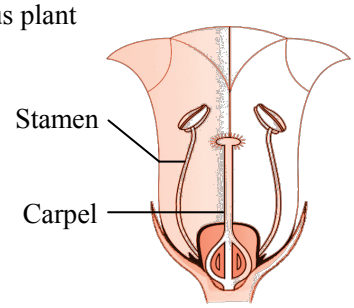
Earthworm: Bisexual animal



Chara: Monoecious plant



Marchantia: Dioecious plant



Sweet potato: Bisexual flower

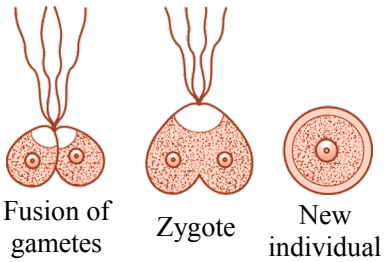
Diversity of sexuality in organisms

➢ **Cell division during gamete formation:**

i. In all heterogametic species gametes are of two types: Male and Female gametes
ii. Haploid parent plant body produces gametes by mitosis.
iii. In diploid parent plant body, meiocytes (2n) undergo meiotic cell division to form haploid gametes (n).

ii. Gamete Transfer:

a. In most organisms, male gamete is motile, while the female gamete is non-motile. Exceptions to this are few fungi and algae, in which both gametes are motile.
b. Male gametes require a medium for movement.
c. In algae, bryophytes and pteridophytes, water serves as the medium for gamete transfer.
d. A large number of male gametes fail to reach female gametes. To compensate this, the number of male gametes produced are more than the female gametes.
e. In seed-bearing plants, pollen grains produced in anthers are the carriers of male gametes and ovule has the egg.
f. In self-fertilizing plants like pea, transfer of pollen grains from anther to stigma is relatively easy as they are located in close proximity.
g. In cross pollinating plants (including dioecious plants), **pollination** takes place which involves transfer of pollen grains to the stigma.
h. Successful transfer and fusion of gametes is essential for Fertilization.



Homogametic contact in alga

Germinating pollen grains on the stigma of a flower

➢ **Fertilization:** Fertilization is the complete and permanent fusion of two haploid gametes to form a diploid zygote. It is also known as **syngamy**.

Syngamy

External Fertilization	Internal Fertilization
• Occurs outside the body of organism • External medium is needed e.g. water • Large number of gametes are produced. • Offsprings are extremely vulnerable to predators. • e.g. Aquatic organisms like algae, bony fishes, frogs, etc.	• Occurs inside the body of organism. • Egg formed inside female body fuses with male gamete. • Number of sperms produced are greater than the number of eggs. • In seed-bearing plants, male gametes (non-motile) are carried by pollen tubes to the female gamete. • e.g. Terrestrial organisms like birds, reptiles, mammals. Plants like Bryophytes, pteridophytes, gymnosperms, angiosperms

➢ **Parthenogenesis:** Development of an egg into a complete individual without fertilization is known parthenogenesis. It is found in many non-vertebrates such as bees, rotifers and even some lizards and birds (turkey).

➢ **Post - fertilization Events:** These include the events which take place after zygote formation in sexual reproduction.

i. Zygote formation:

a. Formation of diploid zygote takes place in all sexually reproducing organisms.
b. After a zygote is formed, its development depends on the type of life cycle of the organism and the environment to which it is exposed.
c. In fungi and algae, zygote develops a thick wall which is resistant to desiccation and damage. It germinates after a period of rest.
d. In organisms having haplontic life cycle:

$$\underset{(2n)}{\text{Zygote}} \xrightarrow{\text{Meiosis}} \underset{(n)}{\text{Spores}} \xrightarrow{\text{develop}} \underset{(n)}{\text{Haploid Individuals}}$$

e. **Zygote:** Vital link between organisms of one generation and the next.

ii. Embryogenesis:

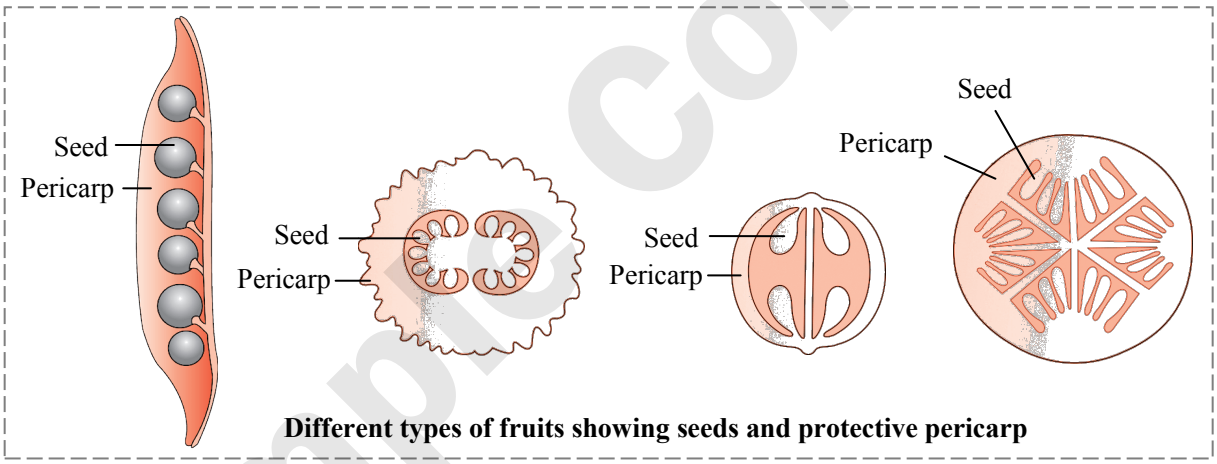
a. It is the process of development of embryo from zygote.
b. During embryogenesis, zygote undergoes cell division (mitosis) and cell differentiation.
c. **Cell division (Mitosis)** in zygote increases the number of cells in developing embryo.
d. **Cell differentiation** helps in modification of certain groups of cells to form specialized tissue and organs to form an organism.

➢ **Oviparous and viviparous animals:**

	Oviparous Animals	Viviparous Animals
i.	Development of zygote takes place outside the female's body.	Development of zygote takes place inside the female's body.
ii.	They lay eggs which are covered by hard calcareous shell.	Zygote develops into young one.
iii.	They lay eggs in a safe place in the environment, but chances of survival of young one is less.	They give birth directly to young ones and their chances of survival are more due to proper embryonic care and protection.
iv.	e.g. Birds, reptiles	e.g. Majority of mammals including humans.

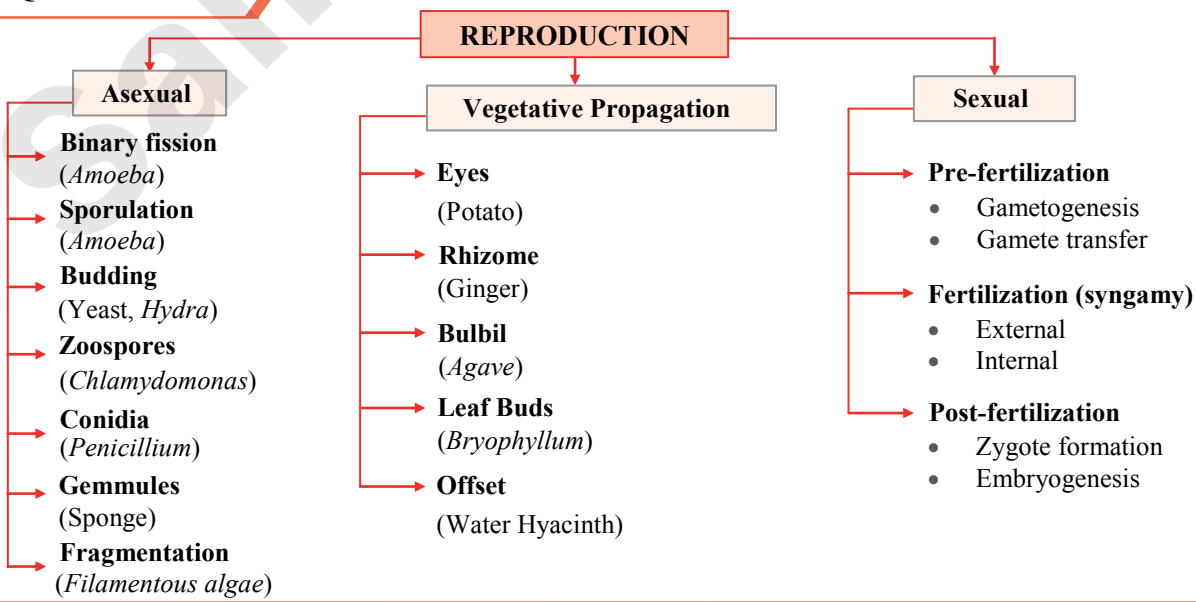
➢ **Post- fertilization changes in flowering plants:**

Before fertilization	After fertilization
Sepals, petals, stamens	Wither and fall off
Zygote	Embryo
Ovules	Seeds
Ovary	Fruit
Ovary wall	Pericarp



Different types of fruits showing seeds and protective pericarp

Quick Review



Concept Building Problems

1.0 Introduction

1. Read the given statements and select the correct option.
Statement I: The life spans of organisms are correlated with their sizes.
Statement II: The sizes of crows and parrots are almost same yet their life spans show a wide difference.
(A) Statement I is correct.
(B) Statement II is correct.
(C) Both statement I and statement II are correct.
(D) Both statement I and statement II are incorrect.

1.1 Asexual Reproduction

1. Asexual reproduction involves
(A) only meiosis
(B) only mitosis
(C) both mitosis and meiosis
(D) either mitosis or meiosis

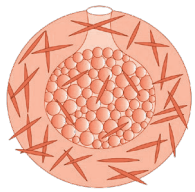
2. Select the INCORRECT statement about asexual reproduction.
(A) Single individual is involved in producing offsprings.
(B) Offsprings are identical to their parents but differ genetically amongst themselves.
(C) Offsprings are morphologically as well as genetically similar.
(D) It is common among single-celled organisms.

3. *Amoeba* is immortal because
(A) it is multicellular
(B) it is microscopic
(C) it reproduces by sexual method only
(D) parental body is distributed among the offsprings during binary fission

4. Select the CORRECT statement from the following regarding asexual reproduction.
i. It is slower than sexual reproduction.
ii. It involves a single parent.
iii. It produces progeny that are genetically identical with the parent.
iv. Clones are the progeny of asexual reproduction.
(A) i, ii, iii, iv (B) i, ii, iv
(C) i, ii, iii (D) ii, iii, iv

5. Asexual reproduction, in which cell division itself is a mode of reproduction, is found in
(A) *Hydra* (B) sponge
(C) *Agave* (D) *Amoeba*

6. Identify the asexual reproductive structure in the given figure.



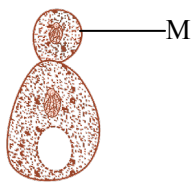
(A) Conidia (B) Gemmule
(C) Buds (D) Zoospores

7. Complete the given analogy with respect to asexual reproductive structures.
Chlamydomonas : Zoospores :: *Penicillium* : _____
(A) Binary fission (B) Gemmules
(C) Conidia (D) Buds

8. 

The given diagram represents
(A) buds of yeast
(B) buds of bacteria
(C) gemmules of sponge
(D) zoospores of *Chlamydomonas*

9. Identify the asexual reproductive structure 'M' in the following diagram.



(A) Zoospore (B) Bud
(C) Gemmule (D) Conidium

10. During unfavourable condition, *Amoeba* exhibits
(A) sporulation (B) encystation
(C) guttation (D) binary fission

11. Which of the following statement is INCORRECT about process of sporulation in *Amoeba*?
(A) During unfavourable condition, *Amoeba* forms a three-layered hard covering (cyst) around itself.
(B) The *Amoeba* divides by multiple fission to produce pseudopodiospores.
(C) The cyst wall of *Amoeba* bursts to release spores which grow up into many *Amoeba*.
(D) Sporulation occurs when favourable conditions return.

12. In these, reproduction involves formation of gemmule:
(A) *Sycon* (B) *Planaria*
(C) *Hydra* (D) *Monocystis*

13. Fragmentation is a mode of asexual reproduction seen in
(A) Yeast (B) *Amoeba*
(C) *Spirogyra* (D) *Paramoecium*

1.2 Vegetative Propagation in Plants

1. Vegetative propagule in water hyacinth and *Agave* is _____ respectively.
(A) offset and rhizome
(B) bulbil and leaf buds
(C) rhizome and offset
(D) offset and bulbil

2. Vegetative propagule in *Agave* is termed as **[Phase-II 2020]**
(A) Bulbil (B) Offset
(C) Eye (D) Rhizome

3. Which of the following pairs is NOT correctly matched? **[Re-Test 2015]**

	Mode of reproduction	Example
(A)	Conidia	*Penicillium*
(B)	Offset	Water Hyacinth
(C)	Rhizome	Banana
(D)	Binary fission	*Sargassum*

4. Match the Column I (Type of asexual reproduction) with Column II (Organism) and select the correct option.

	Column I		Column II
i.	Binary fission	a.	Offset of water Hyacinth
ii.	Zoospores formation	b.	*Hydra*
iii.	Budding	c.	*Chlamydomonas*
iv.	Vegetative propagation	d.	*Paramoecium*

(A) i – c, ii – a, iii – d, iv – b
(B) i – d, ii – b, iii – c, iv – a
(C) i – d, ii – c, iii – b, iv – a
(D) i – b, ii – a, iii – d, iv – c

5. Considering mode of asexual reproduction, match the Column I with Column II and select the correct option.

	Column I		Column II
(i)	Yeast	(P)	Fragmentation
(ii)	*Penicillium*	(Q)	Zoospores
(iii)	Filamentous algae	(R)	Budding
(iv)	*Chlamydomonas*	(S)	Conidia

(A) (i – R); (ii – S); (iii – P); (iv – Q)
(B) (i – Q); (ii – R); (iii – P); (iv – S)
(C) (i – S); (ii – R); (iii – Q); (iv – P)
(D) (i – R); (ii – Q); (iii – P); (iv – S)

6. Find the ODD one from the following.
(A) Gemmules (B) Offset
(C) Rhizome (D) Tuber

7. The aquatic weed which is popularly called Terror of Bengal is
(A) Water lily (B) Water hyacinth
(C) *Hydra* (D) Sponges

8. With respect to Water hyacinth,
Statement X: It drains off oxygen from water and is seen growing in standing water.
Statement Y: It is an indigenous species of our country.
(A) Only statement X is correct and Y is wrong.
(B) Both the statements X and Y are correct.
(C) Only statement Y is correct and X is wrong.
(D) Both the statements X and Y are wrong.

9. In ginger, vegetative propagation occurs through **[2015]**
(A) rhizome (B) offsets
(C) bulbils (D) runners

10. **Assertion:** Rhizome of ginger is a modified stem.
Reason: New plantlets and adventitious roots arise from the nodes of a rhizome.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false.

11. In *Bryophyllum*, adventitious buds arise from
(A) the main stem of a plant.
(B) the notches present in margin of leaves.
(C) the secondary roots.
(D) any part of a stem.

12. The 'eyes' of potato are located at the
(A) root apex (B) leaf apex
(C) nodes (D) internodes

13. In the given options, which one cannot be propagated by vegetative means?
(A) A marginal piece of *Bryophyllum* leaf
(B) A middle piece of sugarcane internode
(C) A piece of potato tuber with eyes
(D) A piece of ginger rhizome

14. Which one of the following is NOT true about vegetative propagation?
(A) Easy and cheaper method
(B) Rapid propagation
(C) Production of genetically similar plants
(D) Production of genetically dissimilar plants

15. Which one of the following statements is NOT correct? **[Phase II 2016]**
(A) Water Hyacinth growing in the standing water, drains oxygen from water that leads to the death of fishes.
(B) Offspring produced by the asexual reproduction are called clone.
(C) Microscopic, motile, asexual reproductive structures are called zoospores.
(D) In potato, banana and ginger, the plantlets arise from the internodes which are present in the modified stem.

1.3 Sexual Reproduction

1. Which of the following is NOT involved in sexual reproduction?
(A) Fusion of male and female gametes
(B) Zygote formation
(C) Zoospores formation
(D) Formation of male and female gametes

2. **Assertion:** Offsprings produced in sexual reproduction are not identical to the parents or amongst themselves.
Reason: Sexual reproduction involves fusion of male and female gametes.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false.

3. As compared to asexual reproduction, sexual reproduction is
(A) an elaborate process
(B) complex process
(C) slow process
(D) all the above are true

4. Which of the following flowers only once in its life-time? **[2018]**
(A) Mango (B) Jackfruit
(C) Bamboo species (D) Papaya

5. Select the INCORRECT statement from the following.
(A) The perennial species of plants show clear cut vegetative, reproductive and senescent phases.
(B) In animals, the juvenile phase is followed by morphological and physiological changes prior to active reproductive behaviour.
(C) In plants, end of juvenile phase indicates the beginning of the reproductive phase.
(D) Vegetative as well as reproductive phase is of variable duration in different plants.

6. Which of the following exhibits menstrual cycle?
(A) Monkey (B) Rat
(C) Tiger (D) Dog

7. Identify from the following group of animals, which exhibit oestrus cycle.
(A) Monkey, ape, man and elephant
(B) Lion, deer, dog and cow
(C) Lion, dog, monkey and ape
(D) Cow, monkey, elephant and ape

8. Select the option which gives CORRECT difference between seasonal breeders as well as continuous breeders.

	Seasonal Breeders	Continuous Breeders
(A)	They do not show menstrual or oestrus cycle.	They show both menstrual as well as oestrus cycle.
(B)	They are reproductively active only during favourable season in their reproductive phase.	They are reproductively active throughout their reproductive phase.
(C)	They are mainly primates.	They are mainly non-primates.
(D)	They reproduce more at the end of reproductive phase.	They reproduce more at the beginning of reproductive phase.

9. _____ are responsible for transition of plants and animals from juvenile to senescent stage.
(A) Seasons
(B) Number of chromosomes
(C) Hormones
(D) Both (B) and (C)

10. Identify the INCORRECT statement.
(A) Humans are seasonal breeders.
(B) Menstrual cycle is present in human female.
(C) Humans are reproductively active throughout their reproductive phase.
(D) Reproduction in humans include fertilization, formation of zygote and embryogenesis.

11. Gametes are
(A) mostly diploid cells
(B) haploid cells
(C) formed by the process of embryogenesis
(D) always morphologically similar

12. **Assertion:** In humans, male and female gametes are called heterogametes.
Reason: In humans, male gametes (sperm) are smaller in size and female gametes (eggs) are larger in size.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false.

13. Find out the CORRECT pair from the following.
(A) Monoecious plant→Unisexual condition →E.g. Cucurbits
(B) Homothallic plant→Bisexual condition→E.g. Date palm
(C) Dioecious plant→Unisexual condition→E.g. Papaya
(D) Heterothallic plant→Male and female flowers on same plant→ E.g. Date palm

14. Match the columns and select the correct option.

	Column I		Column II
i.	Female flower	a.	Staminate
ii.	Both male and female flowers on same plant	b.	Dioecious
iii.	Male flower	c.	Pistillate
iv.	Male and female flowers on separate plants	d.	Monoecious

(A) i – d, ii – b, iii – c, iv – a
(B) i – c, ii – b, iii – d, iv – a
(C) i – d, ii – c, iii – a, iv – b
(D) i – c, ii – d, iii – a, iv – b

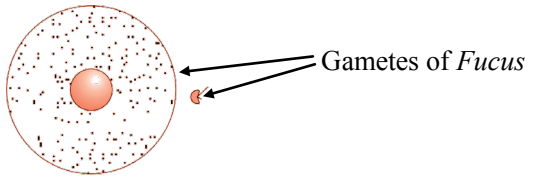
15. **Assertion:** In flowering plants, both male and female flowers may be present on the same individual, called 'dioecious' or present on separate individuals, called 'monoecious'.
Reason: In flowering plants, the unisexual male flower is staminate, i.e. bearing stamens, while the female is pistillate, i.e. bearing pistils.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Assertion is false but reason is true.

16. Choose the correct matching.

	List-I		List-II
i.	Dioecious plant with archegoniophore	a.	Papaya
ii.	Monoecious plant with Oogonium	b.	*Chara*
iii.	Homothallic plants	c.	Fungi
iv.	Dioecious plant with pistillate flowers	d.	Maize
		e.	*Marchantia*

	i.	ii.	iii.	iv.
(A)	e.	b.	d.	a.
(B)	e.	c.	b.	a.
(C)	e.	d.	c.	a.
(D)	e.	a.	b.	c.

17. Observe the figure given below and select the INCORRECT statement.



(A) They are heterogametes.
(B) It is not possible to categorise them into male and female gametes.
(C) The larger gamete is egg and smaller is antherozoid.
(D) These gametes are of morphologically distinct types.

18. The type of gametes produced by pistillate flower are
(A) ova (B) sperms
(C) antherozoids (D) Both (A) and (B)

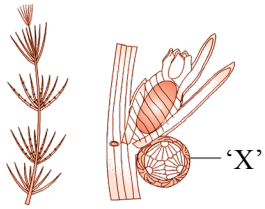
19. Which of the following is an example of unisexual species?
(A) Earthworm (B) Leech
(C) Cockroach (D) Sponge

20. Animals which possess both male and female reproductive organs are called as
(A) pistillate (B) dioecious
(C) hermaphrodites (D) both (B) and (C)

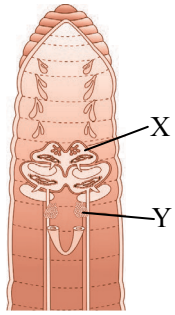
21. Find the ODD one from the following with respect to ploidy of main plant body.
(A) Bryophytes (B) Pteridophytes
(C) Gymnosperms (D) Angiosperms

22. In diploid organism specialised cells that undergo meiosis are called as
(A) gametes (B) antherozoids
(C) meiocytes (D) egg cells

23. Observe the following figure of *Chara* and identify the part labelled as 'X'.
(A) Oogonium
(B) Ovary
(C) Antheridium
(D) Archegoniophore



24. In the given figure 'X' produces sperms, whereas 'Y' produces ova, thus the given animal is
(A) dioecious
(B) hermaphrodite
(C) unisexual
(D) none of these



25. If the number of chromosomes in gametes produced by onion is 8 then the number of chromosomes in meiocyte of onion will be
(A) 4 (B) 8
(C) 16 (D) 24

26. Which of the following does NOT require water for gamete transfer?
(A) *Pinus* (B) *Equisetum*
(C) Liverworts (D) *Spirogyra*

27. **Assertion:** Generally, the number of male gametes produced is several thousand times the number of female gametes produced.
Reason: A large number of the female gametes fail to reach the male gametes.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false.

28. In mango plant, the carriers of male gametes are
(A) antheridiophore (B) pollen grains
(C) ovules (D) zygote

29. A specialized event which facilitates transfer of pollen grains to the stigma is known as
(A) parthenogenesis (B) embryogenesis
(C) fertilization (D) pollination

30. The most critical event in sexual reproduction is
(A) pollination (B) gamete transfer
(C) fertilization (D) gametogenesis

31. In which of the following process haploid cells fuse?
(A) Meiosis
(B) Syngamy
(C) Pollination
(D) Cell differentiation

32. In which of the following parthenogenesis does NOT occur?
(A) Rotifers (B) Elephant
(C) Honeybees (D) Turkey

33. Select the INCORRECT pair from the following.
(A) Turkey-Parthenogenesis
(B) Earthworm-Hermaphrodite
(C) Cockroach-Bisexual
(D) *Chara*-Monoecious

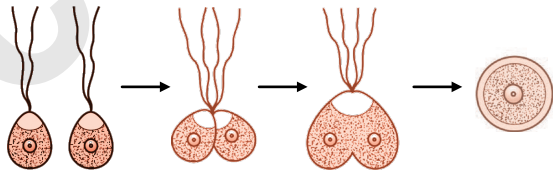
34. Internal fertilization is seen in all of these, except
(A) reptiles (B) birds
(C) Some amphibians (D) mammals

35. **Assertion**: Producing large number of offsprings by bony fishes and frogs is a disadvantage.
Reason: Offsprings of bony fishes and frogs become extremely vulnerable to predators threatening their survival up to adulthood.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false.

36. Complete the given analogy.
Pre-fertilization event : Gamete transfer : :
Post-fertilization event : _____
(A) Gametogenesis (B) Parthenogenesis
(C) Syngamy (D) Embryogenesis

37. Formation of _____ is universal in all sexually reproducing organisms.
(A) diploid zygote (B) seeds
(C) diploid gametes (D) fruits with pericarp

38. Observe the given figures of gametes of *Cladophora* forming a new individual by fusion.



Gametes of *Cladophora* | Fusion of gametes | Zygote | New Individual

Read the statements given below and select the correct option.
(A) Gametes of *Cladophora* are heterogametes.
(B) Gametes are motile, hence it shows internal fertilization.
(C) It is not possible to categorise them into male and female gametes.
(D) The new-individual formed from zygote must be haploid.

39. **Assertion:** In organisms belonging to fungi and algae, zygote develops a thick wall.
Reason: Zygote in fungi and algae, undergoes a period of rest before germination, thus it is necessary to protect it from desiccation and damage.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false.

40. During development of embryo, zygote undergoes
(A) mitosis only
(B) meiosis only
(C) both mitosis and meiosis
(D) either mitosis or meiosis

41. Select the INCORRECT statement about embryogenesis from the following.
(A) In embryogenesis, embryo undergoes meiosis and cell differentiation.
(B) In this process, mitotic cell division increases the number of cells in developing embryo.
(C) Embryogenesis is a post fertilization event.
(D) In embryogenesis, cell differentiation results in formation of specialized tissues and organs to form an organism.

42. Select the CORRECT sequence of events. **[Odisha 2019]**
(A) Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell differentiation → Cell division (Cleavage) → Organogenesis.
(B) Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell division (Cleavage) → Cell differentiation → Organogenesis.
(C) Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell division → (Cleavage) → Organogenesis → Cell differentiation.
(D) Gametogenesis → Syngamy → Gamete transfer → Zygote → Cell division (Cleavage) → Cell differentiation → Organogenesis.

43. Which of the following statement is WRONG about viviparous animals?
(A) Development of zygote takes place inside the body of female parent.
(B) Embryonal protection and care is better in viviparous organisms.
(C) Majority of mammals are viviparous.
(D) Chances of survival of young one is less in viviparous as compared to oviparous animals.

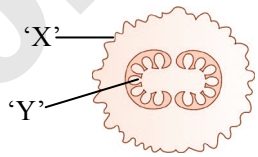
44. Which of the following part of the flowering plant always remains attached to the plant even after fertilization?
(A) Pistil
(B) Stamens
(C) Petals
(D) Sepals

45. Pre-fertilization events include which of the following?
I. Gametogenesis
II. Zygotic embryogenesis
III. Gamete transfer
IV. Homogametic union
V. Heterogametic union
The correct combination is:
(A) II, V (B) I, II, IV
(C) III, IV, V (D) I, III

46. Which among these is NOT a post fertilization event?
(A) Fruit formation (B) Gametogenesis
(C) Seed formation (D) Embryogenesis

47. Select the INCORRECT option from the following with respect to post fertilization changes in a flower.

	Before fertilization	After fertilization
(A)	Ovary wall	Pericarp
(B)	Ovary	Fruit
(C)	Zygote	Embryo
(D)	Ovule	Pistil

48. 

In the given figure of fruit labels 'X' and 'Y' represents,
(A) Pericarp and seed respectively.
(B) Fruit wall and ovary respectively.
(C) Seed and ovaries respectively.
(D) Zygote and embryo respectively.

Practice Problems

1.0 Introduction

1. Select the INCORRECT statement about reproduction in organisms.
(A) It is necessary for the survival and continuity of species.
(B) Reproduction is necessary for survival of an organism.
(C) Reproduction is a process of organic evolution.
(D) Vegetative propagation is an asexual reproduction.

1.1 Asexual Reproduction

1. Asexual reproduction is absent in
(A) animals with complex organisations.
(B) single-celled organisms.
(C) plants with simple organisations.
(D) most of the members of Protista and Monera.

2. **Assertion:** There is no natural death in single celled organisms like *Amoeba*.
Reason: *Amoeba* reproduces asexually in which the body of the parent cell is divided into daughter cells.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false.

3. Read the given statements and select the correct option.
Statement I: Asexual reproduction is common in organisms that have relatively simple organisation.
Statement II: Higher plants exhibit only sexual mode of reproduction.
Statement III: Asexual as well as sexual mode of reproduction is present in most of the animals.
(A) Statements I and III are correct.
(B) Statements II and III are incorrect.
(C) Only statement III is incorrect.
(D) Only statement II is correct.

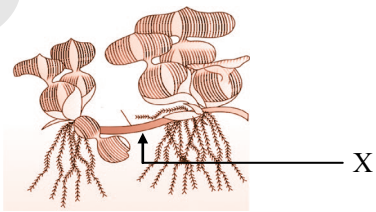
4. Select the CORRECT statement from the following.
(A) Clones produced by sexual reproduction are morphologically as well as genetically similar.
(B) In *Paramoecium*, cell divides into four parts and each rapidly grows into an adult.
(C) In yeast, small buds are produced on the parent body, which eventually get separated and mature into new yeast cells.
(D) Members of Kingdom Fungi and Algae reproduce by means of macroscopic non-motile zoospores.

5. Sexual reproduction enables organisms to survive during unfavourable conditions.
Why is sexual reproduction favoured during such condition?
(A) Sexual reproduction is a complex and slow process.
(B) It brings variation into the individuals the changed conditions and survive.
(C) Sexual reproduction ensures the continuity of species.
(D) Both (B) and (C).

1.2 Vegetative Propagation in Plants

1. All the given below are vegetative propagules in plants, EXCEPT
(A) offset and runner
(B) bulb and rhizome
(C) gemmules and conidia
(D) tuber and sucker

2. Read the given statements about water hyacinth and choose the correct option.
i. It is the most invasive weed found growing in standing water.
ii. Vegetative propagule found in this plant is bulbil.
iii. It increases oxygen level in water, thus it was introduced in India.
iv. It is also called as Terror of Bengal.
The INCORRECT statements are:
(A) i and ii (B) ii and iii
(C) iii and iv (D) i and iv

3. 

What is the function of part 'X' indicated in the given figure of water hyacinth?
(A) It gives mechanical support to the plant.
(B) It absorbs water and minerals.
(C) It is capable of giving rise to new offspring.
(D) It stores food material.

1.3 Sexual Reproduction

1. Read the given statements about Neelakurinji and select the correct option.
I. It flowers once in 4 years.
II. Its botanical name is *Strobilanthes kunthiana.*
III. It is an example of perennial species.
IV. Due to its mass flowering, large tracks of hilly areas of Kerala, Karnataka and Tamil Nadu transform into blue stretches in every year.
The INCORRECT statements are
(A) I and III
(B) I only
(C) II and III
(D) I and IV

2. **Assertion:** *Marchantia* is a dioecious plant.
Reason: In *Marchantia*, bisexual condition is observed in which single plant bears both male and female sex organs.
(A) Both assertion and reason are true and reason is the correct explanation of assertion.
(B) Both assertion and reason are true but reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false.

3. How many of the given animals show oestrus cycle?
Monkey, Cow, Tiger, Rat, Humans, Sheep, Apes, Deer
(A) 5 (B) 6 (C) 7 (D) 4

4. Which of the following pair is CORRECT example of unisexual species?
(A) Date palm and earthworm
(B) Cockroach and papaya
(C) Sponge and coconut
(D) Cockroach and leech

5. Which of the following have haploid and diploid parental plant body respectively?
(A) Monera and algae
(B) Fungi and bryophytes
(C) Pteridophytes and gymnosperms
(D) Fungi and angiosperms

6. Identify the organism having diploid parental plant body.
(A) *Chara* (B) *Selaginella*
(C) Wheat (D) *Funaria*

7. Read the given statements and select the correct option.
i. Majority of organisms require water for gamete transfer as both male and female gametes are motile.
ii. There are few fungi and algae in which both male and female gametes are motile.
iii. Bryophytes are called as amphibians of plant kingdom because they require water for fertilization.
iv. In humans, both male and female gametes are stationary, thus water is not essential for fertilization.
v. Pteridophytes are first terrestrial plants, thus they do not need water for gamete transfer.
The INCORRECT statements are
(A) i, iv and v (B) ii, iii and iv
(C) ii and iv (D) ii and iii

8. Read the given events and select the option which gives correct sequence of the given events.
i. Pollen tube carrying the male gametes reach the ovule.
ii. Pollen grains germinate on stigma.
iii. Pollen grains are transferred to stigma by pollination.
iv. Zygote is formed as a result of fertilization.
v. Pollen grains are produced in anthers.
(A) i → v → ii → iii → iv
(B) v → iii → ii → i → iv
(C) iv → v → iii → i → ii
(D) v → i → iii → ii → iv

9. Identify 'X', 'Y' and 'Z' in the given statements by selecting the correct option.
i. In the process of reproduction, male and female gametes fuse. This process is called 'X'.
ii. The process 'X' results in the formation of a diploid 'Y'.
iii. In honeybees, new organisms are formed without 'X'. This phenomenon is called 'Z'.

	X	Y	Z
(A)	Syngamy	Endosperm	Embryogenesis
(B)	Fertilization	Zygote	Parthenogenesis
(C)	Fertilization	Embryo	Cell differentiation
(D)	Syngeny	Embryo	Parthenogenesis

10. Select the INCORRECT statement about syngamy.
(A) In majority of algae, fishes and amphibians syngamy occurs in the external medium.
(B) Syngamy may or may not occur in honeybees and turkey.
(C) Syngamy results in formation of a diploid zygote.
(D) In a majority of plants, such as bryophytes and pteridophytes syngamy occurs in external medium such as water.

11. External fertilization is seen in
(A) *Rana* (B) *Chelone*
(C) *Pavo* (D) *Felis*

12. Read the given statements about internal fertilization and select the correct option.
i. It is commonly found is fishes, amphibians and some reptiles.
ii. The male gamete is motile and has to reach the egg for syngamy.
iii. It requires external medium such as water for the process of fertilization.
iv. The number of sperms produced is very large as compared to number or eggs produced.
(A) Only statement ii is correct
(B) Statement ii and iv are correct
(C) Statement i, iii and iv are correct
(D) Statement i and iii are correct

13. i. 'X' is the vital link that ensures continuity of species between organisms of one generation and the next.
ii. Formation of 'X' is universal in all sexually reproducing organisms.
iii. Every sexually reproducing organism begins life as a single cell – 'X'.
The 'X' in the given statements is
(A) Gamete (B) Embryo
(C) Zygote (D) Seed

14. Select the option representing the CORRECT pair.

(A)	Oviparous	Development of zygote takes place inside the body of female parent
(B)	Viviparous	After attaining a certain stage of growth, the young ones are delivered out of the body of the female parent
(C)	Oviparous	The chance of survival of young ones is greater.
(D)	Viviparous	Majority of reptiles and birds are viviparous.

15. Given below are examples of viviparous animals, except
(A) Human (B) Bats
(C) Dolphin (D) Platypus

16. Select the CORRECT statement from the following.
(A) Pericarp of fruit mainly performs the function of photosynthesis.
(B) In viviparous animals, eggs present inside the female parent are covered by hard calcareous shell, which protects them from acidic environment.
(C) Embryo inside the mature seed is the progenitor of the next generation.
(D) Animals are categorized into oviparous and viviparous mainly on the basis of their habitat.

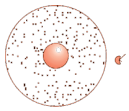
17. Match the Column I and Column II and select the correct option.

	Column I		Column II
i.	Hermaphrodite animal	a.	Date palm
ii.	Oestrus cycle	b.	Earthworm
iii.	Heterothallic condition in plant	c.	*Pisum sativum*
iv.	Monoecious plant	d.	Apes
		e.	Cockroach
		f.	Cows

(A) i – e, ii – d, iii – c, iv – a
(B) i – b, ii – d, iii – a, iv – c
(C) i – b, ii – f, iii – a, iv – c
(D) i – d, ii – f, iii – c, iv – a

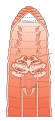
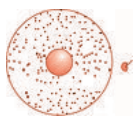
Problems To Ponder

1. Match the Column I (Figure of types of gametes) with Column II (Organism) and Column III (Type of gametes); and select the correct option.

	Column I		Column II		Column III
i.		a.	*Fucus*	p.	Isogametes
ii.		b.	*Cladophora*	q.	Heterogametes
iii.		c.	Human		

(A) i–b–q, ii–c–p, iii–a–p
(B) i–c–p, ii–a–p, iii–b–q
(C) i–c–q, ii–b–p, iii–a–q
(D) i–b–p, ii–a–q, iii–c–p

2. Which of the following option shows the CORRECT pair?

(A)		Male thallus of *Marchantia*
(B)		Hermaphrodite animal-Earthworm
(C)		Testis of male cockroach
(D)		Heterogametes of *Homo sapiens*

3. Complete the given table by selecting the correct option.

Name of organism	Chromosome no. in meiocyte	Chromosome no. in gamete
Dog	**i**	39
House fly	12	**ii**
Butterfly	**iii**	190
Ophioglossum	**iv**	630
Rat	42	**v**

	i.	ii.	iii.	iv.	v.
(A)	78	24	630	315	84
(B)	20	36	760	1890	21
(C)	78	6	380	1260	21
(D)	19.5	24	95	351	84

4. Match the Column I and Column II and select the correct option.

	Column I		Column II
i.	Zygote is formed inside the body of an organism.	p.	External fertilization
ii.	Gametes are released into the surrounding medium.	q.	Internal fertilization
iii.	Occurs in many terrestrial organisms.		
iv.	Zygote is formed in external medium, usually water.		
v.	Occurs in majority of fishes as well as amphibians.		

(A) i – q, ii – p, iii – p, iv – q, v – q
(B) i – p, ii – p, iii – q, iv – q, v – p
(C) i – q, ii – p, iii – q, iv – p, v – p
(D) i – p, ii – q, iii – p, iv – q, v – p

Answers to MCQs

Concept Building Problems

1.0 : 1. (B)

1.1 : 1. (B) 2. (B) 3. (D) 4. (D) 5. (D) 6. (B) 7. (C) 8. (D) 9. (B) 10. (B)
11. (A) 12. (A) 13. (C)

1.2 : 1. (D) 2. (A) 3. (D) 4. (C) 5. (A) 6. (A) 7. (B) 8. (A) 9. (A) 10. (B)
11. (B) 12. (C) 13. (B) 14. (D) 15. (D)

1.3 : 1. (C) 2. (A) 3. (D) 4. (C) 5. (A) 6. (A) 7. (B) 8. (B) 9. (C) 10. (A)
11. (B) 12. (A) 13. (C) 14. (D) 15. (D) 16. (A) 17. (B) 18. (A) 19. (C) 20. (C)
21. (A) 22. (C) 23. (C) 24. (B) 25. (C) 26. (A) 27. (C) 28. (B) 29. (D) 30. (C)
31. (B) 32. (B) 33. (C) 34. (C) 35. (A) 36. (D) 37. (A) 38. (C) 39. (A) 40. (A)
41. (A) 42. (B) 43. (D) 44. (A) 45. (D) 46. (B) 47. (D) 48. (A)

Practice Problems

1.0 : 1. (B)

1.1 : 1 (A) 2. (A) 3. (B) 4. (C) 5. (D)

1.2 : 1. (C) 2. (B) 3. (C)

1.3 : 1. (B) 2. (C) 3. (A) 4. (B) 5. (D) 6. (C) 7. (A) 8. (B) 9. (B) 10. (D)
11. (A) 12. (B) 13. (C) 14. (B) 15. (D) 16. (C) 17. (C)

Problems To Ponder

1. (C) 2. (B) 3. (C) 4. (C)

Hints to MCQs

Concept Building Problems

1.0 Introduction

1. Life spans of organisms are not necessarily correlated with their sizes.

1.1 Asexual Reproduction

4. **Thinking Hatke - Q. 4**
Asexual reproduction is faster than sexual reproduction. Statement (i) given in the question is incorrect therefore options (A), (B) and (C) representing (i) as correct statement cannot be the answer. Hence, the correct answer is option (D).

11. In *Amoeba*, sporulation occurs when favourable conditions return. Encystation or cyst formation occurs during unfavourable conditions. Thus cyst formation is not a part of sporulation.

12. *Sycon* is a sponge in which asexual reproduction involves formation of gemmule.

13. Fragmentation is an asexual mode of reproduction in which the body of some organisms breaks into distinct pieces (fragments). Each fragment grows into an adult capable of producing an offspring.

1.2 Vegetative Propagation in Plants

3. Binary fission occurs in unicellular organisms, whereas *Sargassum* is multicellular brown algae.

4. **Thinking Hatke - Q. 4**
Budding occurs in *Hydra*. Therefore answer for (iii) is (b). This combination is observed only in option (C). The probability of having answer from other options is eliminated and therefore, the correct answer is (C).

6. Offset, rhizome and tuber are vegetative propagule in higher plants, whereas gemmules are asexual reproductive structures found in sponges.

8. Water hyacinth is an exotic species.

13. For vegetative propagation of sugarcane, it requires atleast the presence of one node. A middle piece of a sugarcane internode can therefore not be used for propagation by vegetative means.

15. Plantlets always arise from nodes of stem or modified stem.

1.3 Sexual Reproduction

4. Bamboo species are monocarpic (flower generally only once in its life-time after 50- 100 years).
Jackfruit, papaya and mango are polycarpic (produce flowers and fruits many times in their life-time).

5. Annual and biennial types of plants show clear cut vegetative, reproductive and senescent phases.

6. Monkey exhibits menstrual cycle.

10. Humans are continuous breeders.

13. Refer ***Smart tip - 1***

14. **Thinking Hatke - Q. 14**
Pistillate flowers means flowers bearing pistils. Thus, (i-female flower) matches with (c-Pistillate). This combination is observed in (B) and (D).
Similarly, staminate flower means flowers bearing stamens. Thus (**iii**-Male flower) matches with (**a**-Staminate). Thus option (B) is eliminated and the correct option is (D).

15. In flowering plants, both male and female flowers may be present on the same individual, called 'monoecious' or present on separate individuals, called 'dioecious'.

18. Sperms or antherozoids are male gametes produced by staminate flowers.

19. Earthworm, leech, sponge, tapeworm are examples of hermaphrodites.

21. Many organisms belonging to monera, fungi, algae and bryophytes have haploid plant body.

24. The given figure is of earthworm which is a hermaphrodite (bisexual) animal.

25. Gametes are haploid, thus n=8, whereas meiocytes are diploid, thus 2n=16.

27. A large number of the male gametes fail to reach the female gametes.

33. Cockroach-Unisexual animal

34. In amphibians, external fertilization is observed.

41. In embryogenesis, zygote undergoes cell division (mitosis) and cell differentiation.

43. Chances of survival of young one is more in viviparous as compared to oviparous animals.

47. After fertilization, ovules develop into seeds.

Practice Problems

1.0 Introduction

1. Reproduction is not essential for survival of an individual but it is necessary for the survival of species.

1.1 Asexual Reproduction

3. Statement II: Higher plants exhibit both asexual (vegetative) as well as sexual mode of reproduction.
Statement III: Only sexual reproduction is present in most of the animals.

4. Clones produced by asexual reproduction are morphologically as well as genetically similar.
In *Paramoecium*, cell divides into two parts by binary fission and each rapidly grows into an adult.
Members of Kingdom Fungi and Algae reproduce by means of microscopic motile zoospores.

1.2 Vegetative Propagation in Plants

1. Gemmules and conidia are asexual reproductive structures.

2. Vegetative propagule found in water hyacinth is offset. It drains oxygen from water, thus leads to death of fishes.

1.3 Sexual Reproduction

1. Neelakurinji flowers once in every 12 years.

2. *Marchantia* is a dioecious plant, where the male plant bears antheridiophore and female plant bears archegoniophore.

3. Monkey, humans and apes show menstrual cycle.

4. Coconut is a monoecious plant, papaya and date palm are dioecious plants. Earthworm, sponge and leech are hermaphrodite (bisexual) animals.

6. Wheat has diploid parental plant body. It is hexaploid.

7. i. In majority of organisms, male gamete is motile and female gamete is stationary.
iv. In humans, male gamete (sperm) is motile whereas female gamete (ovum) is non-motile.
v. Pteridophytes need water for gamete transfer.

10. In a majority of plants, such as bryophytes, pteridophytes, gymnosperms and angiosperms, syngamy occurs inside the body of the organisms (internal fertilization).

11. *Rana* (Frog) : External fertilization
Chelone (Turtle), *Pavo* (Peacock),
Felis (Cat) : Internal fertilization

15. Mammals are viviparous with few exceptions such as Platypus which is an oviparous mammal.

17. **Thinking Hatke - Q. 17**
Earthworm is an example of Hermaphrodite animal, thus (i-b). Only options (B) and (C) show this combination. Thus option (A) and (D) are eliminated.
Oestrus cycle is present in cows, thus (ii-f). Thus option (B) is eliminated and the correct option is (C).

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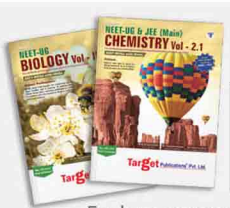

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