EDUMATE

XII

Botany

Government of Kerala

DEPARTMENT OF EDUCATION

State Council of Educational Research and Training (SCERT), Kerala
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Foreword

As part of the comprehensive revision of curriculum from pre-primary to the Higher Secondary sector, new textbooks have been developed for Std. XI and Std XII during the years 2014 -15 and 2015-16 respectively. Evaluation activities should go hand in hand with the new curriculum. Real learning takes place by constructing knowledge through various learning processes.

In a constructive classroom, learners have opportunities to engage in a number of activities in which a range of attributes can be developed. The same activities provide the learner with scope for assessing development of these attributes. Hence there has been a shift from assessing only the products of learning to the process of learning. Anyhow it is to be noted that term end assessment is a part of continuous and comprehensive evaluation.

The main objective of this book is to help the learners to face the public examination with confidence. In this context, questions from all chapters of each subject of Std. XII have been developed along with the scoring indicators. Hope that this question bank titled "Edumate" will be helpful to learners as well as teachers. Your comments and suggestions are welcome and will assist us in improving the content of this book.

Wish you all the best.

Dr. J. Prasad
Director

Contents

Units

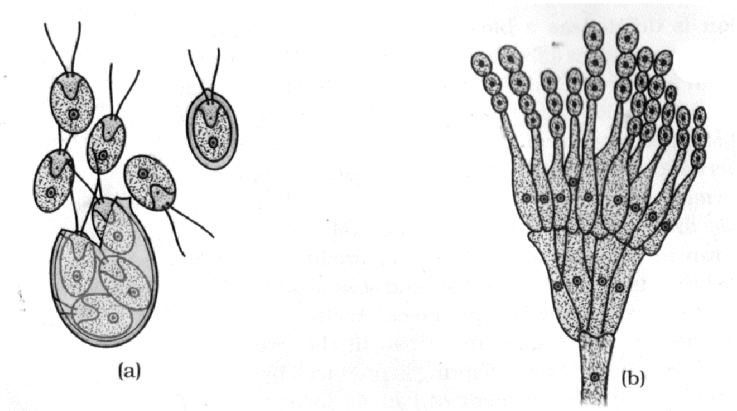
Chapter 1

REPRODUCTION IN ORGANISMS

Learning Outcome

Compares the asexual reproductive methods in lower organisms.

1. Observe the figures given below, identify and name the organisms and their asexual reproductive structures.



Score: 2, Time: 2 mts

Scoring Indicators

	Organisms		Asexual reproductive Structures	
a)	Chlamydomonas	-	Zoospore	(½+½)
b)	Penicilium	-	Conidia	(½+½)

Learning Outcome

Identifies the significance of fertilization and differentiates external and internal fertilisation.

2. In honeybees and turkey new organisms are formed through a peculiar phenomenon. Name that phenomenon.

Score: 1, Time: 1 mt

Scoring Indicators

Parthenogenesis

Learning Outcome

Explains the pre-fertilisation events.

3. The chromosome number in the meiocyte of housefly is 12 and that of its gamete is 6. Write the reason for the change in chromosome number of meiocyte and gamete.

Score: 2, Time: 3 mts

Scoring Indicators

- Meiocyte is diploid (2n) ..... (1)
- Meiocyte undergoes reduction division to form gametes ..... (1)

Learning Outcome

Explains the pre-fertilisation events.

4. In coconut, male and female flowers are separate. Write the technical term for the male and female flowers. Write the condition of the flower.

Score: 2, Time: 4 mts

Scoring Indicators

Female flower – pistillate ..... (½)

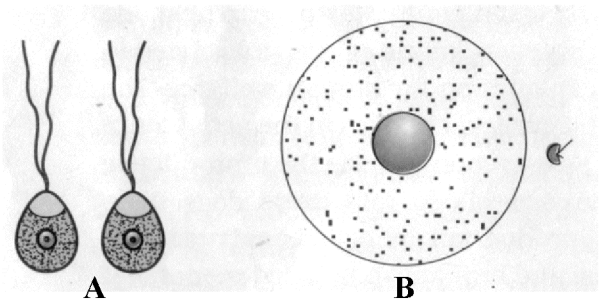
Male flower - staminate ..... (½)

Condition of the flower - unisexual ..... (1)

Learning Outcome

Explains the pre-fertilisation events. Time : 4 mts.

5. Observe the figures given below. Identify the gametes in A and B. Justify your answer. (2)



A B

Scoring Indicators

A. Homogametes ..... (½)

B. Heterogametes ..... (½)

A. Two gametes are similar ..... (½)

B. Dissimilar gametes ..... (½)

Learning Outcome

Compares the asexual reproductive methods in lower organisms.

6. Amoeba is a single-celled organism that reproduces through different ways.
   a. Name the mode of reproduction in which an amoeba divides into two halves and each half rapidly grows into an adult.
   b. Explain sporulation in amoeba.

Score: 3, Time: 4 mts

Scoring Indicators

a. Binary fission ..... (1)

b.
- During unfavourable condition amoeba withdraws its pseudopodia and secretes a cyst.(½)
- During favourable condition cysted amoeba divides to form pseudopodiospores (½)
- Cyst wall bursts out ..... (½)
- Spores are liberated in the surrounding medium and is called sporulation. ..... (½)

Learning Outcome

Identifies different kinds of vegetative propagules and explains vegetative propagation.

7. Match the items of column A with B.

A		B
a. Offset	i	Ginger
b. Bulb	ii	Agave
c. Rhizome	iii	Onion
d. Adventitious leaf buds	iv	Water hyacinth
	v	Bryophyllum

Score: 2, Time: 3 mts

Scoring Indicators

A	B	
a	iv	..... (½)
b	iii	..... (½)
c	i	..... (½)
d	v	..... (½)

Learning Outcome

Compares the asexual reproductive methods in lower organisms.

8. Identify the correctly matched pair.
   a. Chlamydomonas - conidia
   b. Sponge - zoospore
   c. Hydra - bud

Score: 1, Time: 2 mts

Scoring Indicators

c. Hydra - bud ..... (1)

Learning Outcomes

Explains the pre-fertilisation events.

Identifies the significance of fertilization and differentiates external and internal fertilisation.

9. Analyse the table given below and fill in the blanks.

A	B	C
(a)	Male and female reproductive organs in same organism.	Leech
Parthenogenesis	(b)	Rotifer
External fertilisation	Fertilisation occurs outside the body	(c) .....
Internal fertilisation	(d)	Mammals

Score: 2, Time: 5 mts

Scoring Indicators

a. Hermaphrodite / bisexual ..... (½)

b. Female gamete develops into new organism without fertilisation. ..... (½)

c. Majority of algae / fishes / amphibians ..... (½)

d. Fertilisation occurs inside the body ..... (½)

Learning Outcome

Explains the post-fertilisation events and evaluates its merits. Time : 2 mts.

10. The chances of survival of young ones is greater in viviparous organisms than oviparous organisms. Justify this statement.

Score: 2, Time: 3 mts

Scoring Indicators

- In viviparous organisms the zygote develops into young one inside the body of the female organism. ..... (1)
- So proper embryonic care and protection ..... (1)

Learning Outcome

Explains the pre-fertilisation events.

11. In some organisms male and female reproductive organs are seen in the same individual. Name that condition. Give two examples of such organisms.

Score: 2, Time: 2 mts

Scoring Indicators

Hermaphrodite ..... (1)

Eg. : Earthworm, Leech / tapeworm / sponge (Any two ½ + ½)

Learning Outcome

Identifies different kinds of vegetative propagules and explains vegetative propagation.

12. Name of certain plants and their vegetative propagules are given below. Make correct pairs using them.

Agave, Offset, Ginger, Bulb, Bulbil, Water hyacinth, Potato, *Bryophyllum*, Rhizome

Score: 3, Time: 4 mts

Scoring Indicators

Agave – Bulbil ..... (½)

Ginger – Rhizome ..... (½)

Water hyacinth – offset ..... (½)

Onion – Bulb ..... (½)

Learning Outcome

Identifies different kinds of vegetative propagules and explains vegetative propagation.

13. Choose the correct answer : Chlamydomonas reproduces asexually through

A. Gemmules

B. Conidia

C. Bud

D. Zoospores

Score: 1, Time: 1 mt

Scoring Indicators

D

Learning Outcome

Explains the pre-fertilisation events.

14. In Marchantia male and female thallus are separate. This condition is called

A. Dioecious

B. Hermaphrodite

C. Monoecious

D. Bisexual

Score: 1, Time: 1 mt

Scoring Indicators

A

Learning Outcome

Explains the pre-fertilisation events.

15. Find the odd one.

Bulbil, Bulb, Rhizome, Stem tuber

Score: 1, Time: 2 mts

Scoring Indicators

Bulbil

Learning Outcome

Explains the pre-fertilisation events.

16. Gametogenesis and gamete transfer are the two pre-fertilisation events. Write the differences between the two.

Score: 2, Time: 3 mts

Scoring Indicators

Gametogenesis – Formation of gametes ..... (1)

Gamete transfer – Transfer of male gamete to the female gamete ..... (1)

Learning Outcome

Explains the pre-fertilisation events.

17. Based on the nature of reproduction, organisms are classified as continuous breeders and seasonal breeders. Write the difference between the two.

Score: 2, Time: 4 mts

Scoring Indicators

Continuous breeders - reproductively active throughout their reproductive phase. ..... (1)

Seasonal breeders-reproduce only during favourable seasons in their reproductive phase. (1)

Learning Outcomes

Compares the asexual reproductive methods in lower organisms.

Identifies the significance of fertilization and differentiates external and internal fertilisation.

18. Observe the relationship between the first two terms and fill in the blanks.

a. Hydra : Bud ; ..... : Gemmule

b. Birds : Internal fertilisation ; ..... External fertilisation.

Score: 2, Time: 2 mts

Scoring Indicators

a. Sponge : gemmule ..... (1)

b. Algae / fishes /amphibians ..... (1)

Learning Outcome

Identifies the significance of fertilization and differentiates external and internal fertilisation.

Time : 3 mts.

19. Fertilisation in some organisms occur outside the body. Name that kind of fertilisation. Write its disadvantage.

Score: 2, Time: 3 mts

Scoring Indicators

External fertilisation ..... (1)

Disadvantage : Young ones are extremely vulnerable to predators ..... (1)

Learning Outcome

Identifies the significance of fertilization and differentiates external and internal fertilisation.

Time : 3 mts.

20. The offspring formed by asexual reproduction is referred to as clone. Justify this statement.

Score: 2, Time: 2 mts

Scoring Indicators

- Offsprings are morphologically and genetically similar individuals ..... (1)
- They are exact copies of their parent ..... (1)

Chapter 2

SEXUAL REPRODUCTION IN ORGANISMS

Learning Outcome

- Explains seed formation and compares different types of fruits.

1. Apple and mango are fruits. But they are formed in different ways. How are they formed?

Score: 2, Time: 3 mts

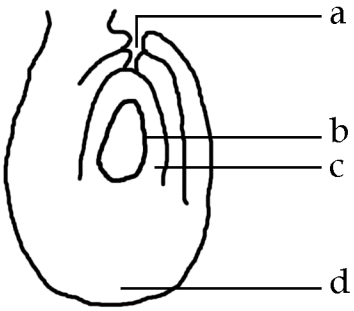
Scoring Indicators

- Apple is a false fruit, thalamus also contributes to fruit formation ..... (1)
- Mango is a true fruit, formed entirely from the ovary ..... (1)

Learning Outcome

- Explains seed formation and compares different types of fruits.

2. Observe the figure given below. Label the parts a, b, c, and d.



Score: 2, Time: 4 mts

Scoring Indicators

a - Micropyle ..... (½)

b - Embryo sac ..... (½)

c - Nucellus ..... (½)

d - Chalaza/chalazal pole ..... (½)

Learning Outcome

- Analyses the various stages of megasporogenesis and explains it.

3. The embryo sac development in majority of flowering plants is monosporic development. Explain this type of embryo sac development.

Score: 2, Time: 4 mts

Scoring Indicators

- A single megaspore mother cell (MMC) of the nucellus differentiates in the ovule. . (½)
- MMC undergoes meiosis to form four megaspores. ..... (½)
- One megaspore becomes functional, while the other three degenerate. ..... (½)
- The functional megaspore develops into embryo sac. ..... (½)

Learning Outcome

- Analyses the various stages of megasporogenesis and explains it.

4. The synergids have special cellular thickenings. Name the thickening and write its function.

Score: 2, Time: 2 mts

Scoring Indicators

Filiform apparatus ..... (1)

Function – Guiding the pollen tube into the synergid. ..... (1)

Learning Outcome

- Analyses the various stages of megasporogenesis and explains it.

5. Self incompatibility and dioecious condition are two devices for discouraging self pollination in plants. Explain the two.

Score: 2, Time: 3 mts

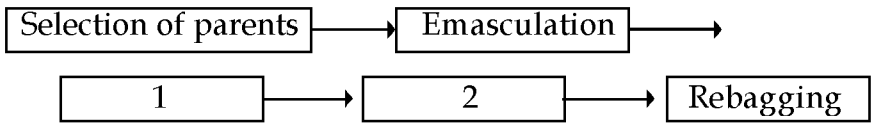
Scoring Indicators

- Self incompatibility – Genetic mechanism that prevents self pollen from fertilizing the egg by inhibiting pollen germination in the pistil. ..... (1)
- Dioecious condition – Male and female flowers on different plants. ..... (1)

Learning Outcome

- Explains microsporogenesis and evaluates the role of each parts.

6. Observe the flow chart given below. Fill in the blank 1 and 2. Write the relevance of the process indicated as 1.



Score: 2, Time: 3 mts

Scoring Indicators

1. Bagging ..... (½)
2. Artificial pollination ..... (½)
   - 1 - To prevent contamination of stigma with unwanted pollen ..... (1)

Learning Outcome

- Explains seed formation and compares different types of fruits.

7. Choose the correctly matched pair.
   a. Coleorrhiza – Hollow foliar structure
   b. Perisperm – Remnants of nucellus
   c. Proembryo – mature embryo

Score: 1, Time: 2 mts

Scoring Indicators

b

Learning Outcome

- Identifies the different pollinating agents and lists the floral peculiarities.

8. Geitonogamy and xenogamy are two types of pollination. Differentiate between the two.

Score: 2, Time: 3 mts

Scoring Indicators

Geitonogamy - Transfer of pollen grains from the anther to the stigma of another flower of the same plant. ..... (1)

Xenogamy - Transfer of pollen grains from anther to the stigma of a different plant. (1)

Learning Outcome

- Explains microsporogenesis and evaluates the role of each parts.

9. The inner most wall layer of microsporangium is tapetum. It is multinucleate. Justify this statement.

Score: 1, Time: 2 mts

Scoring Indicators

- Tapetum nourishes the developing pollen grains ..... (1)

Learning Outcome

- Explains seed formation and compares different types of fruits.

10. Peculiarities of two types of seeds are given below. Identify the two types of seeds and give example for each.
    (i) Endosperm completely used by embryo.
    (ii) Endosperm not completely used by embryo.

Score: 2, Time: 3 mts

Scoring Indicators

(i) Non – albuminous / Ex-albuminous Eg. : Pea/Groundnut ..... (½+½)
(ii) Albuminous Eg.: Wheat/Maize/Barley/Castor ..... (½+½)

Learning Outcome

Explains endosperm and embryo development.

11. The embryo of monocotyledons and dicotyledons show differences in structure. Explain the structure of dicot embryo.

Score: 3, Time: 4 mts

Scoring Indicators

- A dicot embryo has an embryonal axis ..... (½)
- It has two cotyledons ..... (½)
- The portion of embryonal axis above the level of cotyledons is the epicotyl ..... (½)
- This terminates in the plumule ..... (½)
- The cylindrical portion below the level of cotyledons is hypocotyl ..... (½)
- This terminates at its lower end in the radicle ..... (½)

Learning Outcome

- Analyses the various stages of megasporogenesis and explains it.

12. Analyse the table and fill in the blank.

A	B	C
False fruit	..... (a)	Apple
..... (b)	Fruit developed from the ovary through fertilisation	Orange
..... (c)	Fruit developed without fertilisation	..... (d) .....

Score: 2, Time: 5 mts

Scoring indicators

a. Thalamus also contributes to fruit formation ..... (½)
b. True fruit ..... (½)
c. Parthenocarpy ..... (½)
d. Banana ..... (½)

Learning Outcome

- Differentiates special types of reproduction.

13. Occurrence of more than one embryo in a seed is called polyembryony.
    a. Give two examples of polyembryony.
    b. How does polyembryony occur?

Score: 3, Time: 3 mts

Scoring indicators

a. Citrus and mango ..... (½+½)

b. • Some of the nucellar cells surrounding the embryo sac start dividing ..... (1)
   • They protrude into the embryo sac and develop into the embryos. ..... (1)

Learning Outcome

- Explains microsporogenesis and evaluates the role of each parts.

14. Choose the correct answer.
    The layer of microsporangium that nourishes the developing pollen grains is
    A. Endothecium
    B. Tapetum
    C. Middle layer
    D. Epidermis

Score: 1, Time: 1 mt

Scoring indicators

B

Learning Outcome

- Analyses the various stages of megasporogenesis and explains it.

15. A typical angiosperm embryo sac at maturity is.
    a. 7 nucleate 8 celled
    b. 8 nucleate 8 celled
    c. 7 nucleate 7 celled
    d. 8 nucleate 7 celled

Score: 1, Time: 1 mts

Scoring indicators

d

Learning Outcome

- Explains seed formation and compares different types of fruits.

16. The process of formation of fruits without fertilisation is called.
    A. Parthenogenesis
    B. Parthenocarpy
    C. Apomixis
    D. Autogamy

Score: 1, Time: 1 mt

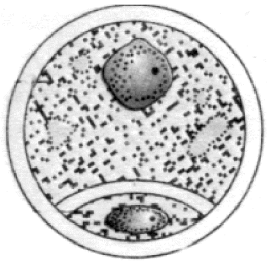
Scoring indicators

B

Learning Outcome

- Compares the structure and function of pollen grain.

17. Observe the figure given below and explain its structure.



Score: 3, Time: 5 mts

Scoring indicators

- Pollen grain has a two layered wall. ..... (½)
- The hard out layer called exine. ..... (½)
- Exine has prominent apertures called germ pores ..... (½)
- The inner wall is called the intine ..... (½)
- Pollen grain has two cells. ..... (½)
- A large vegetative cell and a small generative cell ..... (½)

Learning Outcome

- Compares the structure and function of pollen grain.

18. Peculiarities of certain parts of the ovule are given below. Name the parts.
    a. Protective envelops of the ovule
    b. Stalk of the ovule
    c. The layer of cells within the integuments
    d. Junction between ovule and funicle

Score: 2, Time: 3 mts

Scoring indicators

a. Integuments ..... (½)
b. Funicle ..... (½)
c. Nucellus ..... (½)
d. Hilum ..... (½)

Learning Outcome

- Compares the structure and function of pollen grain.

19. Mature pollen grain has a vegetative cell and a generative cell. Write the peculiarities of the two cells.

Score: 3, Time: 4 mts

Scoring Indicators

Vegetative cell – Bigger, Abundant food reserve, Large irregularly shaped nucleus.(1½)
Generative cell – Small, floats in the cytoplasm of vegetative cell, spindle shaped, dense cytoplasm and a nucleus. ..... (1½)

Learning Outcome

- Explains endosperm development.

20. Endosperm develops from the primary endosperm nucleus. Explain the process of endosperm development.

Score: 2, Time: 3 mts

Scoring Indicators

- The PEN undergoes successive nuclear divisions to give rise to free nuclei. ..... (1)
- Cell wall formation occurs and becomes cellular. ..... (1)

Learning Outcome

- Identifies the different pollinating agents and lists the floral peculiarities.

21. Wind is an abiotic agent that helps in pollination. Write any six features of wind pollinated flowers.

Score: 3, Time: 4 mts

Scoring indicators

- Pollen grains are light ..... (½)
- Non-sticky pollen grains ..... (½)
- Well exposed stamens ..... (½)
- Large, feathery stigma ..... (½)
- Single ovule in each ovary ..... (½)
- Numerous flowers packed into inflorescence. ..... (½)

Learning Outcome

- Identifies the different pollinating agents and lists the floral peculiarities.

22. Geitonogamy is similar to autogamy. Justify this statement.

Score: 1, Time: 2 mts

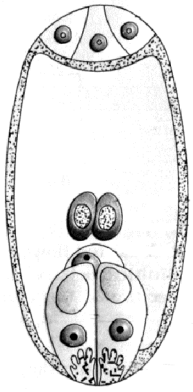
Scoring indicators

In geitonogamy pollen grains come from the same plant as in geitonogamy.

Learning Outcome

- Analyses the various stages of megasporogenesis and explains it.

23. Observe the diagram given below.

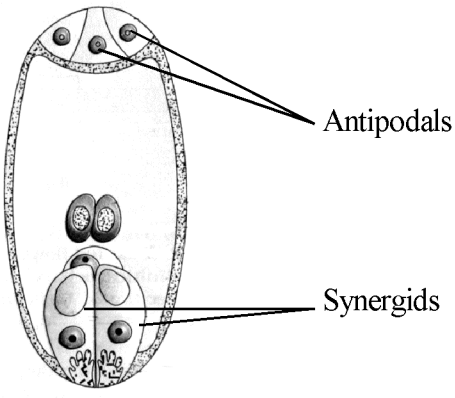


a. Copy the diagram, and label antipodals and synergids.

b. Explain double fertilisation.

Score: 5, Time: 8 mts

Scoring indicators



a. • Copying the diagram. ..... (½+½)

b. • One of the male gametes fuses with egg cell to form a diploid zygote ..... (1)

• The other male gamete fuses with the polar nuclei to form primary endosperm nucleus (PEN) ..... (1)

• Thus two types of fusion occur in the embryo sac, namely syngamy and triple fusion.(1)

Learning Outcomes

- Explains microsporogenesis and evaluates the role of each parts.
- Compares the structure and function of pollen grain.
- States the processes involved in double fertilisation and their significance.

24. Observe the relationship between the first two terms and fill in the blanks.

a. Exine : Sporopollenin ; Intine : .....

b. Pistils fused : syncarpous ; Pistils free : .....

c. Zygote : 2n ; Endosperm: .....

Score: 3, Time: 5 mts

Scoring indicators

a. Cellulose and pectin ..... (1)

b. Apocarpous ..... (1)

c. 3n ..... (1)

Learning Outcome

- Compares the structure and function of pollen grain.
- Locates the parts of ovule.

25. Find the odd one.

Hilum, Funicle, Intine, Integuments

Score: 1, Time: 1 mt

Scoring indicators

Intine

Learning Outcome

- Explains apomixis.
- Compares the features of asexual and sexual forms of reproduction.

26. Apomixis is an asexual form of reproduction, that mimics sexual reproduction. Substantiate this statement.

Score: 2, Time: 3 mt

Scoring indicators

- In apomixis seeds are produced without fertilisation, hence it is asexual. ..... (1)
- By retaining the seed habit, it is mimicing sexual reproduction. ..... (1)

Learning Outcome

- Compares and explains the phenomena of parthenocapy and apomixis.

27. There is no fertilisation process in both parthenocarpy and apomixis. How one differs from the other? Cite an example for each process?

Score: 2, Time: 3 mt

Scoring indicators

- In parthenocarpy seedless fruits are formed without fertilisation. eg: Banana ..... (1)
- In apomixis seed habit is retained, without fertilisation. eg: Asteraceae/grasses ..... (1)

Chapter 3

STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION

Learning Outcome

- Identifies the importance of animal husbandry with special reference to poultry farm management.

1. Fill in the blank.

   _____ virus created a scare in the country and drastically affected egg and chicken consumption.

Score: 1, Time: 2 mts

Scoring Indicators

Bird flu virus

Learning Outcome

- Lists the importance of animal breeding and classifies animal breeding methods.

2. Jersey is an important breed of cattle.
   a) Define breed.
   b) Differentiate between inbreeding and outbreeding.

Score: 3, Time: 5 mts

Scoring Indicators

- A group of animals related by descent and similar in most characters like general appearance, feature, size, configuration etc., are called a breed. ..... (1)
- Inbreeding - The mating of more closely related individuals within the same breed for 4 - 6 generations. ..... (1)
- Outbreeding - Breeding of the unrelated animals of the same breed but have no common ancestors for 4 - 6 generations. ..... (1)

Learning Outcome

Lists the importance of animal breeding and classifies animal breeding methods.

3. Breeding between animals of the same breed is called inbreeding. Write the steps of inbreeding.

Score: 2, Time: 3 mts

Scoring Indicators

1. Identifies superior male and female of the same breed. ..... (½)
2. Mate them in pairs. ..... (½)
3. Identifies the superior male and female of the progeny for further mating. ..... (½)
4. Select the best breed. ..... (½)

Learning Outcome

Lists the importance of animal breeding and classifies animal breeding methods.

4. Write the advantages and disadvantages of inbreeding.

Score: 3 Time: 4 mts

Scoring indicators

Advantages	Disadvantages
Increase homozygosity	Expose harmful recessive genes
Evolve pure line	Continued inbreeding reduces fertility
Accumulation of desirable gene and elimination of less desirable gene	Inbreeding depression

(½x6)

Learning Outcome

Lists the importance of animal breeding and classifies animal breeding methods.

5. When inbreeding depression becomes a problem, how can we overcome the issue?

Score: 2, Time: 3 mts

Scoring indicators

- Select animals from inbred population and mate them with unrelated superior animals of the same breed. ..... (1)
- This helps to restore fertility and yield. ..... (1)

Learning Outcome

Lists the importance of animal breeding and classifies animal breeding methods.

6. Match the following column A with column B

A	B
1. Inbreeding	a) Cross between two different related species
2. Interspecific hybridisation	b) Mating of animals within the same breed but having no common ancestors
3. Out crossing	c) Superior males of one breed are mated with superior females of another breed
4. Cross breeding	d) Breeding between the animals of same breed

Score: 2, Time: 5 mts

Scoring indicators

1(d), 2(a), 3(b), 4(c) ..... (½x4)

Learning Outcome

Lists the importance of animal breeding and classifies animal breeding methods.

7. Hisardale is a new breed of sheep developed in Punjab through

a) Out crossing
b) outbreeding
c) Cross breeding
d) Interspecific hybridisation

Score: 1, Time: 2 mts

Scoring indicators

C) Cross breeding

Learning Outcome

Lists the importance of animal breeding and classifies animal breeding methods.

8. Male and female animals of two different related species are mated. In some cases, the progeny may combine the desirable features of both the parents. Name the type of hybridisation?

Score: 1, Time: 2 mts

Scoring indicators

Interspecific hybridisation

Learning Outcome

Lists the importance of animal breeding and classifies animal breeding methods.

9. Explain the steps of controlled breeding experiments carried out using artificial insemination. Write its advantages.

Score: 2, Time: 3 mts

Scoring indicators

1. Collect semen from the male. ..... (½)
2. Inject the semen into the reproductive tract of the selected female ..... (½)
   - Helps to overcome several problems of normal mating. ..... (1)

Learning Outcome

Lists the importance of animal breeding and classifies animal breeding methods

10. To improve the chances of successful production of hybrids, MOET is employed.

    a) Expand MOET.

    b) Explain the steps involved in MOET.

Score: 4, Time: 4 mts

Scoring indicators

a) Multiple Ovulation Embryo Transfer Technology ..... (1)

b) i. A cow is administered with FSH hormones ..... (½)

ii. it induce follicular maturation ..... (½)

iii. they produce 6-8 cells instead of one egg per cycle ..... (½)

iv. cow is mated with elite bull or artificially inseminated ..... (½)

v. zygote at 8-32 cells are recovered non surgically and transferred to surrogate mothers (½)

vi. The genetic mother is available for another round of super ovulation ..... (½)

Learning Outcome

Analyses the importance of bee-keeping, fisheries and aquaculture.

11. _____ is the common species of honeybee in India.

Score: 1, Time: 2 mts

Scoring indicators

Apis indica

Learning Outcome

Analyses the importance of bee-keeping, fisheries, and aquaculture.

12. Bee-keeping is the maintenance of hives of honey bees for the production of honey. Illustrate the important steps for successful bee keeping.

Score: 2, Time: 3 mts

Scoring indicators

1. Knowledge of the nature and habit of bees ..... (½x4)
2. Selection of suitable location for keeping the beehives
3. Catching and hiving of swarms
4. Management of beehives during different seasons
5. Handling and collecting honey and beewax (Any four)

Learning Outcome

Compares blue revolution and green revolution.

13. Observe the relationship between the first two terms and fill in the blanks

IR - 8 : Rice
Atlas 66 : .....

Score: 2, Time: 2 mts

Scoring indicators

Wheat

Learning Outcome

Explains the steps in plant breeding and the methods of production of plants with desirable quantities and qualities.

14. Carefully read the statements given below related to the steps in plant breeding. Choose the correct sequence.

1. Testing and commercialisation of new variety
2. Evaluation and selection of parents
3. Selecting and testing superior recombinants
4. Cross hybridisation among the selected parents
5. Collection of variability

a) 5,2,4,3,1 b) 1,4,3,5, 2 c) 2,3,4,5,1 d) 4,5,3,2,1

Score: 1, Time: 3 mts

Scoring indicators

a) 5,2,4,31

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities

15. Observe the statements given below.

a) High yielding disease resistant wheat
b) Semi-dwarf variety of rice developed in Taiwan
c) Semi-dwarf variety of rice developed in India
d) Semi-dwarf variety rice developed in Philippines

Fill up column B using the above statements.

A	B
a) Kalyan Sona and Sonalika	.....
b) IR-8	.....
c) Taichung Native - 1	.....
d) Jaya	.....

Score: 2, Time: 5 mts

Scoring Indicators

a) High yielding disease resistant wheat ..... (½x4)
b) Semi-dwarf variety of rice developed in Philippines
c) Semi-dwarf variety of rice developed in India
d) Semi-dwarf variety of rice developed in Taiwan

Learning Outcome

Examines the application of plant breeding in the production of disease resistant and insect/pest resistant plants.

16. Some of the plant diseases and their causative organisms are given below. Find out the correct match pairs

i) Brown rust of wheat –Bacteria
ii) Late blight of potato-Fungi
iii) Turnip mosaic -Virus
iv) Black rot of crucifers-Fungi

b) Name two conventional method of breeding for disease resistance.

Score: 2, Time: 3 mts

Scoring Indicators

a) ii and iv ..... (½+½)
b) Hybridisation and selection ..... (1)

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

17. Name the disease resistant variety of wheat developed against Hill bunt disease.

Score: 1, Time: 1 mt

Scoring Indicators

Himgiri

Learning Outcome

Examines the application of plant breeding in the production of disease resistant and insect/pest resistant plants.

18. Observe the table and fill a, b, c, and d.

Crop	Variety	Resistance to Disease
Chilli	a.	Chilli mosaic virus
b.	Pusa swarnim	White rust
Cauliflower	Pusa snowball k-1	c. .....
Cow pea	d.	Bacterial blight

Score: 2, Time: 5 mts

Scoring Indicators

a. Pusa sadabahar
b. Brassica
c. Black rot / curl blight black rot
d. Pusa komal

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities

19. Construct a table with column –A Crop, and Column-B Variety using the hints given below.

Hints-Wheat, Brassica, Cow pea, Cauliflower, Pusa Swarnim, Pusa Shubhra, Himgiri, Pusa Komal

Score: 4, Time: 5 mts

Scoring indicators

Crop	Variety
Wheat	Himgiri
Brassica	Pusa Swarnim
Cow pea	Pusa Komal
Cauliflower	Pusa Shubhra

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities

20. Give one example each of variety developed against white rust and bacterial blight.

Score: 2, Time: 2 mts

Scoring indicators

White rust – Pusa Swarnim
Bacterial blight-Pusa Komal

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

21. 1. In mung bean, two varieties are developed through mutation breeding for disease resistance. Name the diseases for which the varieties are produced.

2. Name two agents that induce mutation.

Score: 2, Time: 4 mts

Scoring Indicators

1. a) Resistance against yellow mosaic virus ..... (½)
   b) Resistance to powdery mildew ..... (½)
2. chemicals, gamma radiation. ..... (½+½)

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities

22. Parbhani kranti is a resistant variety of bhindi.
   a) Which disease this breed is resistant to?
   b) Name the scientific name of parbhani kranthi.

Score: 2, Time: 3 mts

Scoring Indicators

a) Yellow mosaic virus ..... (1)
a) *Abelmoschus esculentus* ..... (1)

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities

23. Observe the terms given below. Arrange them in the order of crop, variety, and insect pests in three columns.

Pusa Gaurav, Aphids , Shoot and fruit borer, Brassica, Pusa Sem 3, Okra, Pusa Sawani, PusaA-4.

Score: 3, Time: 5 mts

Scoring Indicators

Crop	Variety	Insect Pest
Brassica	Pusa Gaurav	Aphids
Okra	Pusa Sawani	Shoot and fruit borer

(½x6)

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

24. The most practical means to improve the public health is biofortification.
    1. What do you mean by biofortification.
    2. List out its main objectives.

Score: 4, Time: 5 mts

Scoring indicators

1. Breeding crops with higher levels of vitamins, minerals, higher protiens and healtheir fats
2. i) protein content and quality ..... (1)
   ii) oil content and quality ..... (1)
   iii) vitamin content ..... (1)
   iv) micronutrient and mineral content ..... (1)

Learning Outcomes

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

25. Fill in the blank.
    ..... is a wheat variety with high protein content and used as a donor for improving cultivated wheat.

Score: 1, Time: 2 mts

Scoring indicators

Atlas 66

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

26. Indian agricultural institute, New Delhi developed vegetables with enriched vitamin and minerals. Write two examples of vitamin A, iron and calcium enriched vegetables.

Score: 2, Time: 4 mts

Scoring indicators

1. Vitamin A enriched-Carrot, pumpkin ..... (½+½)
2. Iron and calcium enriched Spinach and bathua ..... (½+½)

Learning Outcome

Evaluates the application of plant breeding in biofortification and analyses the significance of SCP.

27. SCP is an alternate source of protein.
    1) Expand SCP.
    2) Name two microbes used in SCP production.

Score: 2, Time: 3 mts

Scoring Indicators

1. Single cell protein ..... (1)
2. *Spirulina, Methylophilus methylotrophus* ..... (½+½)

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

28. Explant, totipotency, micropropagation are terms very commonly used in tissue culture. Explain each term.

Score: 3, Time: 4 mts

Scoring Indicators

1. Explant -Any plant part taken for tissue culture. ..... (1)
2. Totipotency.-Capacity to generate whole plant from any cell. ..... (1)
3. Micropropagation-Propagation of thousands of plants through tissue culture. ..... (1)

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

29. Fill in the blank.

    Plants produced through micropropagation are genetically identical to the original plant from which they were grown are known as.....

Score: 1, Time: 2 mts

Scoring Indicators

Somaclones

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

30. Fill in the blank.

The part of plant used for virus free culture is .....

Score: 1, Time: 1 mt

Scoring indicators

Meristem

Learning Outcome

Explains the steps in plant breeding and the method of production of plants with desirable quantities and qualities.

31. Pomato is a somatic hybrid. Write how this is developed?

Score: 2, Time: 3 mts

Scoring indicators

1. Isolation of single cell each from potato and tomato ..... (½)
2. Digestion of the cell wall ..... (½)
3. Isolate the protoplast. ..... (½)
4. Fuse to get hybrid protoplast. This can be grown to form a new plant. ..... (½)

Chapter 4

BIOTECHNOLOGY-PRINCIPLES AND PROCESSES

Learning Outcome

- Identifies the development of biotechnology and the major terminologies used in it.

1. 'One of the limitations of traditional hybridization is that it leads to inclusion and multiplication of undesirable genes along with the desired genes'. How does genetic engineering help to overcome these limitations?

Score: 2, Time: 2 mts

Scoring Indicators

- Creation of recombinant DNA, use of gene cloning and gene transfer ..... (½+½)
- Introduction of one or a set of desirable genes without introducing undesirable genes into the target organism. ..... (1)

Learning Outcome

- Analyses the nature of restriction enzymes and DNA ligases and compares them.

2. The cutting of DNA at specific locations became possible with the discovery of enzymes called 'molecular scissors'. Identify this enzyme.

Score: 1, Time: 1 mts

Scoring Indicators

Restriction enzymes/*Restriction Endonucleases*

Learning Outcome

- Analyses the nature of restriction enzymes and DNA ligases and compares them.

3. Which among the following is the first discovered *Restriction Endonuclease*?

A. Hind I C. Eco RI

B. Hind II D. Eco RII

Score: 1, Time: 2 mts

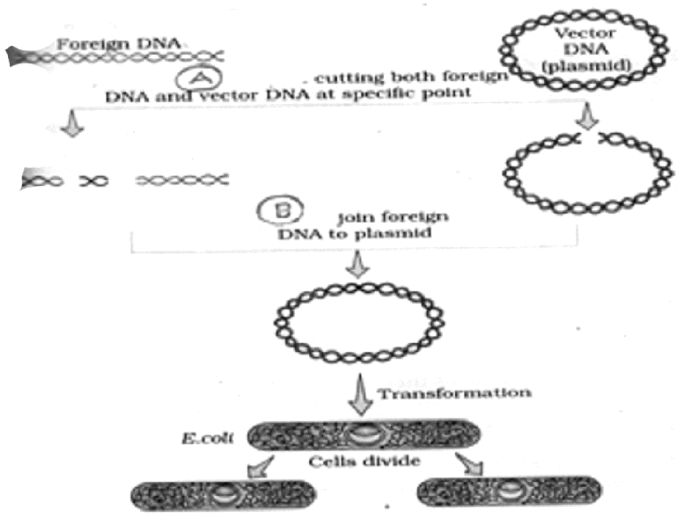
Scoring Indicators

B. Hind II

Learning Outcome

- Analyses the nature of restriction enzymes and DNA ligases and compares them.

4. Observe the following illustration and find out the enzymes which are denoted as A and B



Score: 2, Time: 3 mts

Scoring indicators

A. Restriction endonucleases ..... (1)

B. DNA ligases ..... (1)

Learning Outcome

- Identifies the principle of separation of DNA fragments during agarose gel electrophoresis.

5. Write the technique used for the separation of DNA fragments.

Score: 1, Time: 1 mts

Scoring indicators

Gel Electrophoresis

Learning Outcome

- Identifies the principle of separation of DNA fragments during agarose gel electrophoresis.

6. In gel electrophoresis, we cannot see pure DNA fragments in visible light and without staining. Explain how is it possible to visualise the DNA fragments?

Score: 2, Time: 2 mts

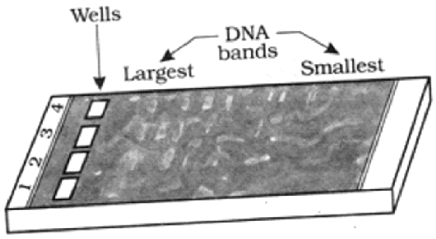
Scoring indicators

Staining the DNA with Ethidium bromide, followed by exposure to UV radiation. ..... (1+1)

Learning Outcome

- Identifies the principle of separation of DNA fragments during agarose gel electrophoresis.

7. Figure given below is an important technique used in genetic engineering.



a. Identify the technique.
b. Find out the aim of this technique.

Score: 2, Time: 3 mts

Scoring Indicators

a. Gel electrophoresis ..... (1)
b. Separation of DNA fragments. ..... (1)

Learning Outcome

- Identifies the principle of separation of DNA fragments during agarose gel electrophoresis.

8. Final step of gel electrophoresis is the extraction of DNA molecules from the gel. What is this process called?

Score: 1, Time: 2 mts

Scoring Indicators

Elution

Learning Outcome

- Identifies the principle of separation of DNA fragments during agarose gel electrophoresis.
- Evaluates competency and explains various methods of gene transfer.
- Identifies the method and process of gene amplification.
- Recommends the use of bioreactors and identifies the importance of downstream processing.

9. Match the following columns A and B suitably

A	B
i. Gel Electrophoresis	a. Continuous culture of microorganisms
ii. Microinjection	b. Amplification of genes
iii. Polymerase Chain reaction	c. Separation of DNA fragments
iv. Bioreactor	d. Precipitation of DNA fragments
	e. Direct gene transfer method

Score: 2, Time: 5 mts

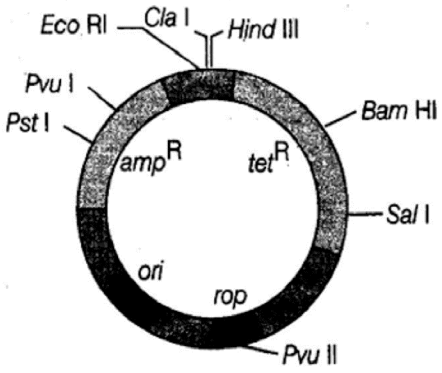
Scoring Indicators

A	B
(i)	(c)
(ii)	(e)
(iii)	(b)
(iv)	(a)

Learning Outcome

- Analyses the types of cloning vectors and the uses of plasmid vector in rDNA technology and identifies the vectors for cloning genes in plants and animals.

10. Given below is the diagram of a cloning vector.



(a) Identify the vector.

(b) What do amp^R and tet^R stand for?

Score: 3, Time: 4 mts

Scoring Indicators

a. pBR 322 ..... (1)

b. amp^R-ampicillin resistant gene ..... (1)

tet^R-tetracyclin resistant gene ..... (1)

Learning Outcome

- Evaluates competency and explains various methods of gene transfer.

11. Which among the following is not a gene transfer method?

A. Microinjection C. Gene gun

B. Disarmed pathogen vectors D. Elution

Score: 1, Time: 2 mts

Scoring Indicators

D. Elution

Learning Outcome

- Identifies the method and process of gene amplification.

12. One of the given options is not related to PCR. Find it

A. Denaturation C. Extension

B. Spooling D. Annealing

Score: 1, Time: 2 mts

Scoring Indicators

B. Spooling

Learning Outcome

- Analyses the types of cloning vectors and the uses of plasmid vector in rDNA technology and identifies the vectors for cloning genes in plants and animals.

13. Cloning vector suitable for gene transfer in plants is

A. Ti plasmid C. Viruses

B. Bacteriophages D. Transposons

Score: 1, Time: 2 mts

Scoring Indicators

A. Ti Plasmid

Learning Outcome

- Analyses the types of cloning vectors and the uses of plasmid vector in rDNA technology and identifies the vectors for cloning genes in plants and animals.

14. Which among the following are the selectable markers of pBR-322.

A. amp^R,kan^R C. amp^R,tet^R

B. tet^R,kan^R D. chl^R, tet^R

Score: 1, Time: 2 mts

Scoring indicators

C. amp^R, tet^R

Learning Outcome

- Analyses the nature of restriction enzymes and DNA ligases and compares them.

15. Restriction Endonucleases cut DNA at specific locations by breaking.....

A. Sugar-phosphate bonds

C. Hytrogen bonds

B. Sugar-Nitrogen base bonds

D. Disulphide bonds

Score: 1, Time: 2 mts

Scoring indicators

A. Sugar-phosphate bond

Learning Outcome

- Recommends the use of bioreactors and identifies the importance of downstream processing.

16. Downstream processing is the final step in the process of recombinant DNA technology. What do you understand by "down stream processing"?

Score: 1, Time: 3 mts

Scoring indicators

Separation and purification of gene product

Learning Outcome

- Analyses the nature of restriction enzymes and DNA ligases and compares them.

17. Each restriction endonuclease recognizes a specific palindromic nucleotide sequence in the DNA.

(a) What is a palindrome?

(b) Give one example.

Score: 2, Time: 4 mts

Scoring indicators

a. Palindrome is a sequence of base pairs that reads same on two strands of DNA molecule ..... (1)

b. 5' GAATTC 3' ..... (1)
3' CTTAAG 5'

Learning outcome

- Identifies and compares the methods to extract DNA from different groups of organisms.

18. Given below are some enzymes used for the release of DNA molecules from different types of cells.

Lysozyme, chitinase, cellulase.

Arrange them suitably in the columns provided below.

Plant cells	.....
Bacterial cells	.....
Fungal cells	.....

Score: 3, Time: 5 mts

Scoring indicators

Plant cells	Cellulase	(1)
Bacterial cells	Lysozyme	(1)
Fungal cells	Chitinase	(1)

Learning Outcome

- Analyses the types of cloning vectors and the uses of plasmid vector in rDNA technology and identifies the vectors for cloning genes in plants and animals.

19. Selectable markers help us in identifying and eliminating non transformed cells during gene cloning. Explain how the gene for α - *galactosidase* enzyme works as selectable marker?

Score: 3, Time: 4 mts

Scoring indicators

- A recombinant DNA inserted within the coding sequence of the enzyme ..... (1)
  α -galactosidase
- Non transformed colonies give blue colour ..... (1)
- Transformed colonies do not give any colour due to insertional inactivatiion. ..... (1)

Learning outcome

- Evaluates competency and explains various methods of gene transfer.

20. In order to force bacteria to take up the plasmid, the bacterial cells must first be made *'competent'* to take up DNA. Suggest a method to make bacterial cell competent to receive DNA.

Score: 2, Time: 5 mts

Scoring indicators

- Treat the cell with divalent cation like calcium, which increases the efficiency with which DNA enters the bacterium through pores in the cell wall. ..... (1)

  Incubation of cell with DNA and placing them briefly at 42^0 C and then putting back to ice. (1)

Learning Outcome

- Identifies the method and process of gene amplification.

21. Multiple copies of the gene of interest in synthesized in vitro using *DNA polymerase* enzyme.
    a. Which are the three steps of the above process?
    b. Find out the DNA polymerase enzyme used here.

Score: 4, Time: 5 mts

Scoring indicators

a. Denaturation ..... (1)
   Annealing ..... (1)
   Extension ..... (1)
b. Thermostable *DNA polymerase/Taq polymerase* ..... (1)

Learning Outcome

- Recommends the use of bioreactors and identifies the importance of downstream processing.

22. Bioreactors help for the large scale production of recombinant proteins.
    a. Which are the two commonly used bioreactors?
    b. What is the purpose of stirring mechanism in a bioreactor?

Score: 2, Time: 4 mts

Scoring indicators

a. Simple stirred tank bioreactor ..... (½)
   Sparged stirred tank bioreactor ..... (½)
   The stirrer facilitates mixing and O_2 availability ..... (1)

Learning Outcome

- Identifies the method and process of gene amplification.

23. We can produce multiple copies of gene of interest through a process.
    a. Identify the process.
    b. How can we achieve gene amplification by this method?

Score: 2, Time: 3 mts

Scoring indicators

a. Polymerase Chain Reaction/PCR ..... (½)

b. - Denaturation ..... (½)
- Annealing ..... (½)
- Extension ..... (½)

Learning Outcome

- Analyses the types of cloning vectors and the uses of plasmid vector in rDNA technology and identifies the vectors for cloning genes in plants and animals.

24. Ti plasmid is a suitable cloning vector for plants. It is the plasmid of a bacterium called – – – – – – – – – – – –

Score: 1, Time: 2 mts

Scoring indicators

Agrobacterium tumifaciens

Learning Outcome

- Analyses the nature of restriction enzymes and DNA ligases and compares them.

25. *Restriction Endonucleases* are enzymes responsible for cutting of DNA molecule. *Eco RI* is a common example.

a. How the name *Eco RI* is derived?

b. Write the palindromic sequence of *Eco RI.*

Score: 4, Time: 5 mts

Scoring indicators

a. - First letter from the genus and second two letters from the species name ..... (1)
- Letter 'R' is derived from the type of strain ..... (1)
- Roman number indicates the order of discovery ..... (1)

b. 5'……GAATTC……3' ..... (1)
3'……CTTAAG……5' ..... (1)

Learning outcome

- Identifies and compares the methods to extract DNA from different groups of organisms.
- Identifies the method and process of gene amplification.
- Recommends the use of bioreactors and identifies the importance of downstream processing.

26. Following are the various steps of recombinant DNA technology. Arrange them in correct sequential order.

(i) Obtaining the foreign gene product

(ii) Amplification of gene of interest using PCR

(iii) Cutting of DNA at specific locations

(iv) Downstream processing

(v) Insertion of recombinant DNA into the host cell/organism

(vi) Isolation of genetic material

Score: 3, Time: 5 mts

Scoring indicators

(vi). Isolation of genetic material ..... (½x6)

(iii) Cutting of DNA at specific locations

(ii) Amplification of gene of interest using PCR

(v) Insertion of recombinant DNA into the host cell/ organism

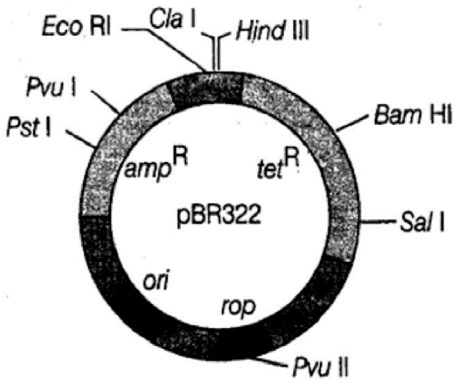
(i) Obtaining the foreign gene product

(iv) Downstream processing

Learning outcome

- Analyses the types of cloning vectors and the uses of plasmid vector in rDNA technology and identifies the vectors for cloning genes in plants and animals.

27. Given below is the diagram of a cloning vector. Observe the diagram and answer the following questions.



a. Name the bacterium from which this vector is made?

b. What are the significances of 'ori' and 'rop' denoted in the picture?

Score: 3, Time: 4 mts

Scoring Indicators

a. E coli ..... (1)

b. "ori"-origin of replication/the point from which replication starts. ..... (1)

"rop"- codes for proteins involved in replication of plasmid. ..... (1)

Chapter 5

BIOTECHNOLOGY AND ITS APPLICATIONS

Learning Outcome

- Evaluates the development of Bt cotton by genetic engineering.

1. *Bacillus thuringiensis* produces insecticidal proteins. Why does this protein not kill the Bacillus?

Score: 1, Time: 1 mt

Scoring Indicators

Bt toxin exist as inactive protoxins

Learning Outcome

- Evaluates the development of Bt cotton by genetic engineering.

2. *Bacillus thuringiensis* produce insecticidal proteins , called Bt toxins. Explain how Bt toxin works in insects and kill them.

Score: 3, Time: 4 mts

Scoring Indicators

- Inactive protoxin produced by *Bacillus thuringiensis* becomes active at the alkaline pH of the gut of insects. ..... (1)
- The activated toxin binds to the surface of midgut epithelial cells. ..... (1)
- Creates pores that cause cell swelling and lysis. ..... (1)

Learning Outcome

- Evaluates the development of Bt cotton by genetic engineering.

3. Bt plants are genetically engineered insect resistant plants.
   a. What does 'Bt' stand for?
   b. Cite examples for any two 'cry' genes which produce Bt toxin.

Score: 2, Time: 3 mts

Scoring Indicators

a. Bacillus thuringiensis ..... (1)
b. Cry IAc, Cry IIAb, Cry IAb (any two) ..... (½+½)

Learning Outcome

- Identifies gene therapy and compares it with other types of treatment methods.

4. Disorder due to ADA deficiency can be overcame by – – – – – – -

A. RNA interference
B. PCR
C. ELISA
D. Gene Therapy

Score: 1, Time: 1 mt

Scoring indicators

B.Gene Therapy

Learning Outcome

- Analyses the application of RNAi in the production of pest resistant plants.

5. RNA interference takes place in all eukaryotic organisms as a method of cellular defense. What is RNA interference?

Score: 2, Time: 3 mts

Scoring indicators

- Silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevents translation of the mRNA. ..... (1+1)

Learning outcome

- Analyses the application of RNAi in the production of pest resistant plants.

6. Pest resistant plants can be developed by genetic engineering. Explain how ***RNAi*** is successful in this area?

Score: 4, Time: 5 mts

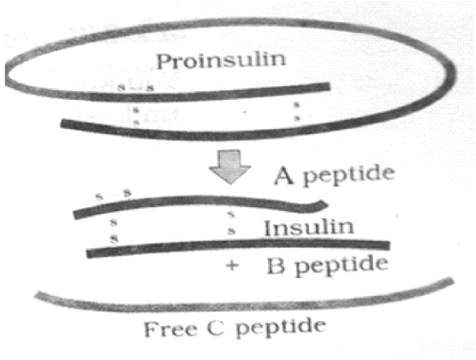
Scoring indicators

- Nematode specific genes were introduced into the host plant ..... (1)
- Both sense and antisense RNA are formed from this. ..... (1)
- Since this two RNAs are complementary to each other form a dsRNA. ..... (1)
- RNAi is operated and the nematode can't produce proteins, ... (1)

Learning outcome

- Identifies the production of genetically engineered insulin and sketches the structure of insulin molecule.

7. Given below is the diagram showing formation of insulin from pro-insulin. Explain how proinsulin develops to form insulin?



Score: 2, Time: 4 mts

Scoring indicators

- Proinsulin contains A, B, and C chains. ..... (1)
- It is matured into insulin by the removal of C peptide. ..... (1)

Learning outcome

- Compares and recommends various types of molecular diagnostic methods.

8. Very low concentration of DNA of pathogen can be amplified and hence diagnosis becomes easy. Which method is suitable for this method?

Score: 1, Time: 2 mts

Scoring Indicators

PCR (Polymerase Chain Reaction)

Learning outcome

- Compares and recommends various types of molecular diagnostic methods.

9. Given below are two laboratory methods used for molecular diagnosis

PCR, ELISA

a. Expand PCR and ELISA

b. What is the principle of ELISA

Score: 3, Time: 4 mts

Scoring Indicators

a. Polymerase Chain Reaction ..... (1)
Enzyme Linked Immuno Sorbent Assay ..... (1)

b. Antigen-antibody interaction ..... (1)

Learning Outcome

- Evaluates the ethical issues of genetic engineering and judges the various aspects of patent and biopiracy.

10. Manipulation of living organisms by the human race cannot go on any further, without regulations. Which committee in India makes decisions regarding GM research?

Score: 1, Time: 2 mts

Scoring Indicators

GEAC (Genetic Engineering Approval Committee)

Learning Outcome

- Evaluates the ethical issues of genetic engineering and judges the various aspects of patent and biopiracy.

11. Our country is very rich in biodiversity and traditional knowledge. So we have faced many problems related to biopiracy.

    a. What is biopiracy?

    b. Give two examples of biopirated plants.

    c. How can we control biopiracy?

Score: 3, Time: 5 mts

Scoring Indicators

a. Use of bioresources without proper authorization from the country or people concerned without compensatory payment. ..... (1)

b. Basmati rice/ neem/ turmeric(any Two) ..... (½+½)

c. By developing laws and regulations/ Patents Bill ..... (1)

Learning Outcome

- Identifies gene therapy and compares it with other types of treatment methods.

12. The first clinical gene therapy was given in 1990 to a four year old girl with ADA deficiency.

    a. Write the steps involved in this method of treatment.

    b. What is the major disadvantage of this process?

Score: 4, Time: 5 mts

Scoring indicators

a. • Lymphocytes from the blood of the patient are collected, and grown in a culture outside the body. ..... (1)

- Functional ADA cDNA is introduced into these lymphocytes. ..... (1)
- These lymphocytes are returned to the patient. ..... (1)

b. Since the lymphocytes are not immortal, patient requires periodic infusion of genetically engineered lymphocytes. ..... (1)

Learning Outcome

- Analyses and categorises the various uses of transgenic animals.

13. Given below are some biological products, which are produced by transgenic organisms
    - α - 1 - antitrypsin
    - α - lactalbumin
    - human insulin

    a. Fill in the column given below suitably using the above terms

(i)	(ii)
A.....	Eli Lilly, USA
B.....	Human milk protein
C.....	Emphysema

    b. ———————is the transgenic cow, which produces human milk protein.

Score: 2, Time: 5 mts

Scoring indicators

a. A = human insulin ..... (½)
   B = α lactalbumin ..... (½)
   C = α - 1 - antitrypsin ..... (½)

b. Rosie ..... (½)

Leaning Outcome

- Evaluates the ethical issues of genetic engineering and judges the various aspects of patent and biopiracy.

14. Which among the following plants is related with the issues of biopiracy?

A. Bt cotton B. Basmati Rice
C. Atlas 66 D. Bt Brinjal

Score: 1, Time: 2 mts

Scoring Indicators

B.Basmati Rice

Learning Outcome

- Evaluates the development of Bt cotton by genetic engineering.

15. Crystals of Bt toxin produced by *Bacillus thuringiensis* do not kill the bacteria themselves because.

A. Bacteria is resistant to toxin

B. Toxins only kill animals

C. Toxin is inactive

D. Toxin is protein

Score: 1, Time: 2 mts

Scoring Indicators

C.Toxin is inactive

Learning Outcome

- Identifies the production of genetically engineered insulin and sketches the structure of insulin molecule.

16. What is the major disadvantage of insulin taken from slaughtered cattle and pigs?

Score: 1, Time: 2 mts

Scoring Indicators

Develop allergy and other types of reactions

Learning Outcome

- Analyses and categorises the various uses of transgenic animals.

17. Animals that had their DNA manipulated are known as transgenic animals. Suggest any four uses of transgenic animals.

Score: 4, Time: 3 mts

Scoring Indicators

(i) Normal Physiology and development ..... (1x4)

(ii) Study of diseases

(iii) Biological products

(iv) Vaccine safety

(v) Chemical safety (Any four)

Learning Outcome

- Analyses the application of biotechnology in agriculture.

18. Genetically modified plants have been useful in many ways. Suggest some advantages of genetically modified plants in agriculture.

Score: 2, Time: 3 mts

Scoring Indicators

- Made crops more tolerant to abiotic stress ..... (½x4)
- Reduced the use of chemical pesticides
- Reduced post harvest loss
- Increased mineral usage efficiency
- Enhanced nutritional value

(Any four points)

Learning Outcome

- Evaluates the development of Bt cotton by genetic engineering.

19. Identify any two genes of *Bacillus thuringiensis* which can produce Bt toxin.

Score: 2, Time: 2 mts

Scoring Indicators

CryIAc, CryIIAb, Cry IAb ..... (1+1)

(Any two)

Learning Outcome

- Analyses the application of RNAi in the production of pest resistant plants.

20. RNAi was first introduced in tobacco plants to restrict the infection of a nematode worm –

Score: 1, Time: 1 mts

Scoring Indicators

Meloidegyne incognitia

Chapter 6

ORGANISMS AND POPULATIONS

Learning Outcome

Lists various abiotic factors.

1. Observe the following statements. Select the correct one.
   a. Temperatue increases progressively from equator towards the poles and from plain to mountain tops.
   b. Temperature is sub-zero level in polar areas and high altitude and increases to above 50^0c in tropical desert in summer.
   c. In unique habitats such as thermal springs and deep sea hydrothermal vents average temperatures exceed 20^0c
   d. Mango trees grow in temperate countries like Canada and Germany.

   Score: 1, Time: 3 mts

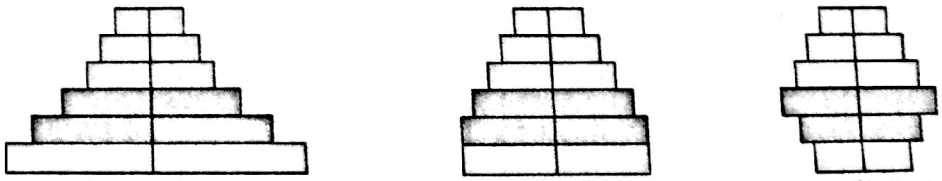
Scoring Indicators

b. Temperature is sub-zero level in polar areas and high altitude and increases to above 50^0c in tropical desert in summer.

Learning Outcome

Differentiates the population growth models and identifies their characters.

2. Study the three age pyramids of human population and answer the following questions.



A B C

   a. Name A, B and, C pyramids
   b. Which one is ideal for a population. Suggest reason.
   c. How does such age pyramids help policy makers of the country

   Score: 4, Time: 5 mts

Scoring Indicators

a. A. Expanding ..... (½)
B. Stable ..... (½)
C. Declining ..... (½)
b. Expanding ..... (½)
Pre reproductive group is more ..... (1)
c. Reflects the growth status ..... (1)

Learning Outcome

Identifies and differentiates various kinds of adaptation shown by plants and animals.

3. Use proper terms for the statements given below.

1. Few organisms can tolerate and thrive in wide range of temperature
2. Some organisms are tolerant to a narrow range of salinities.
3. The organism should try to maintain the constancy of its internal environment.
4. The organism may move temporarily from the strainful habitats to more hospitable area and return when stressful period is over.

Score: 4, Time: 5 mts

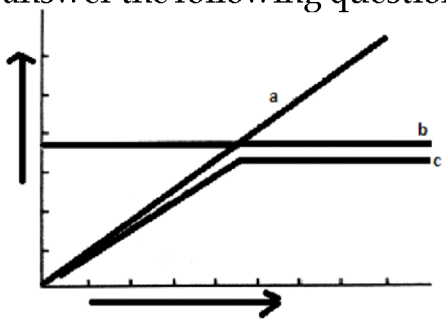
Scoring indicators

1. Eurythermal ..... (1)
2. Stenothermal ..... (1)
3. Homeostasis ..... (1)
4. Migrate ..... (1)

Learning Outcome

Identifies the response of organism to various factors.

4. Analyse the given graph and answer the following questions.



1. Label a, b,c.
2. How a differs from b?

Score: 5, Time: 8 mts

Scoring Indicators

1. a. Conformers ..... (1)
   b. Regulators ..... (1)
   c. Partial regulators ..... (1)
2. a. Cannot maintain constant internal environment ..... (1)
   b. maintain constant internal environment through thermoregulation and osmoregulation.(1)

Learning Outcome

Identifies and differentiates various kinds of adaptations shown by plants and animals.

5. Read the statements properly and choose the correct one.

   1. Many desert plants have CAM pathway that enables their stomata to remain open during day time.
   2. In Opuntia, leaf reduced into green flattened structure.
   3. Kangaroo rat in North American deserts is capable of meeting all water requirements through the protein oxidation.
   4. Mammals from colder climate generally have shorter ears and limbs.

Score: 1, Time: 2 mts

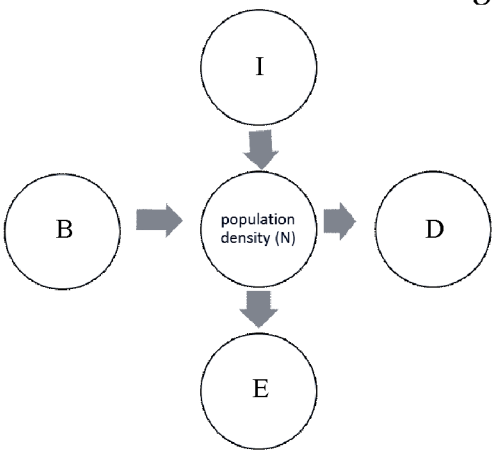
Scoring Indicators

4

Learning Outcome

Lists various attributes of population and population growth

6. Observe the flow chart given below and answer the following questions.



   1. Identify I, B, D and E.
   2. Write the equation for population density.
   3. B and I are positive, D and E are negative about population. Suggest reason.

Score: 5, Time: 4 mts

Scoring indicators

1. I-Immigration ..... (½)
   D-Mortality ..... (½)
   E-Emigration ..... (½)
   B-Natality ..... (½)
2. N_{t+1}=Nt + [(B+I)-(D + E)] ..... (1)
3. N and I are natality and immigration –Both contribute an increase in population density. (1)
   D and E are mortality and emigration- cause a decrease in population. ..... (1)

Learning Outcome

Differentiates the population growth models and identifies their characteristics.

7. $dN/dt = (b - d) \times N$

   Let (b - d) = r, then

   $dN/dt = rN$

   1. What does r indicate in the above equation?
   2. Which parameter is chosen for assessing impact of any biotic factor or abiotic factor on population growth?

   Score: 2, Time: 3 mts

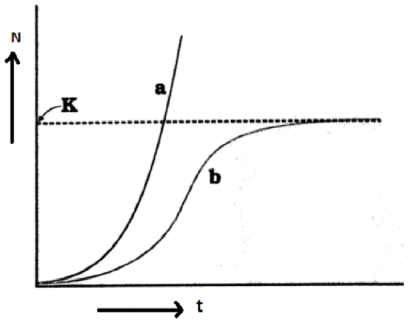
Scoring indicators

1. Intrinsic rate of natural increase. ..... (1)
2. r parameter ..... (1)

Learning Outcomes

Differentiates the population growth models and identifies their characteristic.

8. Analyze the given graph which represents the population growth curve.



   1. Which growth curves do 'a' and 'b' indicate?
   2. Suggest an equation for 'b'.
   3. What parameters are required for calculating current r value?

   Score: 3, Time: 5 mts

Scoring indicators

1. a) Exponential growth curve ..... (½)
   b) logistic growth curve ..... (½)
2. $dN/dt = rN\left[\frac{K-N}{K}\right]$ ..... (1)
3. Current birth rate and death rate ..... (1)

Learning Outcomes

Differentiate the population growth models and identifies their characteristics.

9. The integral form of the exponential growth equation is $Nt = N_0e^{rt}$. Expand the symbols in this equation.

Score: 2, Time: 4 mts

Scoring indicators

Nt- Population density at time t ..... (½)
No - Population density at time 0 ..... (½)
r- Intrinsic rate of natural increase ..... (½)
e – base of natural logarithms. ..... (½)

Learning Outcome

Analyses the significances of population interaction and classifies them.

10. Fill in the blanks.

Species A	Species B	Name Of Interaction
+	+	.....a
-	-	.....b
+	-	c
+	-	.....d
+	0	.....e
-	0	.....f

Score: 3, Time: 5 mts

Scoring indicators

a. Mutualism ..... (½x6=3)
b. Competition
c. Predation
d. Parasitism
e. Commensalism
f. Amensalism

Learning Outcomes

Identifies predation and evaluates the significance of predation.

11. In rocky intertidal communities of the American Pacific Coast the starfish Pisaster were removed for an experimental purpose.
    1. How did this affect the invertebrates in that region?
    2. List out the important role of predators in nature.

    Score: 4, Time: 5 mts

Scoring indicators

1. Pisaster is an important predator in the intertidal area. When Pisasters were removed, more than 10 species of invertebrates became extinct, because of interspecific competition. (1)
2. i) Predation is the natural way to transfer energy to higher trohpic level from plants. (1)
   ii) Agricultural pest control is based on the ability of predator to regulate prey population.(1)

Learning Outcome

Explains competition and evaluates its merits and demerits.

12. Which one of the following is not related to competition.
    a) Competition occurs when closely related species compete for the same resources that are limiting.
    b) Unrelated species also compete for same resources.
    c) Even if resources are abundant ,the feeding effect of one species might be reduced due to the interfering and inhibitory presence of other species.
    d) Calotropis growing in abandoned fields is an example of competition.

    Score: 1, Time: 3 mts

Scoring Indicators

d) Calotropis growing in abandoned fields is an example of competition.

Learning Outcome

Lists the importance of parasitism and identifies different types of parasites.

13. Parasitic mode of life ensures free lodging and meals. Identify the correct statements related to parasites.
    a. Parasites are not host specific and co-evolved.
    b. Parasites have special adaptations like loss of unnecessary sense organs, presence of suckers, loss of digestive systems, high reproductive capacity.
    c. Lice is an endoparasite.
    d. The female mosquito is a parasite.

    Score: 2, Time: 4 mts

Scoring Indicators

a, b

Learning Outcome

Explains commensalism with examples.

14. Define commensalism and write any two examples.

Score: 3, Time: 4 mts

Scoring Indicators

Definition : Interaction in which one species gets benefit and the other is neither harmed nor benefited. ..... (1)

Examples – Cattle egret and grazing cattle ..... (1)

Sea anemone and clownfish ..... (1)

Learning Outcome

Evaluates the significance of mutualism and co-evolution with suitable examples.

15. Match A with B based on mutalism

A	B
Lichen	Wasp
Mycorrhiza	Ophrys
Fig tree	Cyanobacteria
Sexual deceit	Fungi

Score: 2, Time: 3 mts

Scoring Indicators

Lichen-cyanobacteria ..... (½)

Mycorrhiza-fungi ..... (½)

Fig tree-Wasp ..... (½)

Sexual deceit-Ophrys ..... (½)

Learning Outcome

Lists the importance of parasitism and identifies different types of parasites.

16. Cuscuta and vanda are growing on a mango tree. Which plant makes harm to the mango tree. Justify your answer.

Score: 2, Time: 3 mts

Scoring Indicators

- Cuscuta makes harm. ..... (1)
- Cuscuta is a parasite. It derives its nutrition from the host plant. ..... (1)

Learning Outcome

Identifies the response of organisms to abiotic factors.

17. Observe the relationship between the first two terms and fill in the blanks.

Hibernation : Bear; ..... : Snail

Score: 1, Time: 1 mts

Scoring Indicators

Aestivation

Learning Outcome

Identifies and differentiates various types of adaptations shown by plants and animals.

18. Adaptations may be morphological, physiological or behavioural. Write the behavioural adaptations in desert lizard.

Score: 2, Time: 4 mts

Scoring Indicators

- Desert lizards bask in the sun and absorb heat when their body temperature drops below the comfort zone. ..... (1)
- They move into shade when the temperature starts increasing. ..... (1)

Learning Outcome

Explains commensalism with examples.

19. Interaction between sea anemone and clown fish is termed as commensalism. Substantiate this statement.

Score: 3, Time: 5 mts

Scoring Indicators

- Sea anemone has stinging tentacles and the clown fish lives among them ..... (1)
- The fish gets protection from predators which stay away from the stinging tentacles. (1)
- The sea anemone does not derive any benefit or harm by hosting the clown fish. ..... (1)

Learning Outcome

Explains competition and evaluates its merits and demerits.

20. Competition causes extinction of species. Substantiate this statement based on the extinction of Abingdon tortoise.

Score: 3, Time: 4 mts

Scoring Indicators

- Abingdon tortoise in Galapagos islands became extinct due to the introduction of goat on the island. ..... (1)
- Goats have greater browsing efficiency. ..... (1)
- Due to the lack of food tortoise became extinct. ..... (1)

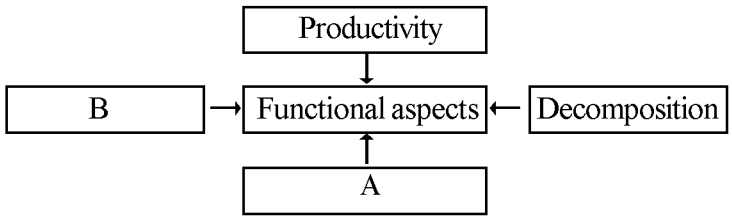
Chapter 7

ECOSYSTEM

Learning Outcome

- Recognises the structure and functions of ecosystem and identifies the different components of the ecosystem.

1. Observe the flow chart on functional components of ecosystem given below.



a. Identify the components given as A and B

b. What is stratification?

Score: 2, Time: 3 mts

Scoring Indicators

a. A =Energy flow ..... (½)
B = Nutrient cycling ..... (½)
OR
A = Nutrient cycling
B = energy flow

b. Vertical distribution of different species occupying different levels. ..... (1)

Learning outcome

- Differentiates primary and secondary productivity.

2. How can you differentiate primary productivity from secondary productivity?

Score: 2, Time: 2 mts

Scoring Indicators

a. Primary productivity-productivity of producers ..... (1)

b. Secondary productivity- productivity of consumers ..... (1)

Learning outcome

- Differentiates primary and secondary productivity.

3. Which among the following equation is related with net primary productivity?

   A. GPP+R=NPP

   B. NPP+GPP=R

   C. GPP-R=NPP

   D. R+R= GPP

   Score: 1, Time: 2 mts

Scoring indicators

C. GPP-R= NPP ..... (1)

Learning Outcome

- Analyses the energy flow through various trophic levels.

4. Observe the food chain given below.

   Grass ⟶ Goat ⟶ Man

   a. Identify the type of food chain.

   b. How does it differ from detritus food chain?

Score: 3, Time: 3 mts

Scoring indicators

a. Grazing Food Chain ..... (1)

b. • Grazing food chain starts with producers ..... (1)

   • Detritus food chain starts with dead organic matter ..... (1)

Learning Outcome

- Differentiates and constructs different types of ecological pyramids.

5. In most ecosystems, all the pyramids of number, biomass and energy are upright. Suggest one occasion each where the pyramid of number and pyramid of biomass are inverted.

Score: 2, Time: 3 mts

Scoring indicators

- When a big tree is considered as an ecosystem-pyramid of number is inverted. ..... (1)
- Pyramid of biomass in sea is also inverted. ..... (1)

Learning Outcome

- Differentiates and constructs different types of ecological pyramids .

6. Ecological pyramids express the food or energy relationship between organisms. Write any three limitations of ecological pyramids.

Score: 3, Time: 3 mts

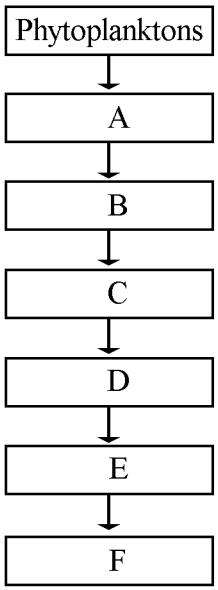
Scoring indicators

- Same species may belong to two or more trophic levels ..... (1)
- It does not represent food web ..... (1)
- Saprophytes are not given any place ..... (1)

Learning Outcome

- Identifies different stages of hydrarch succession.

7. Given below is the flow chart of ecological succession occur in water bodies



a. Identify the stages A, B, C, D, E and F

b. What is this succession called?

Score: 4, Time: 4 mts

Scoring Indicators

a. A = Submerged plant stage ..... (½x4)
B = Submerged free floating plant stage
C = Reed-swamp stage
D = Marsh-meadow stage
E = Scrub stage
F = Forest stage

b. Hydrarch succession ..... (1)

Learning Outcome

- Identifies different stages of hydrarch succession.

8. Find out the stage given below which is not included in hydrarch succession.

A. Forest

B. Phytoplanktons

C. Lichens

D. Marsh-Meadow

Score: 1, Time: 1 mt

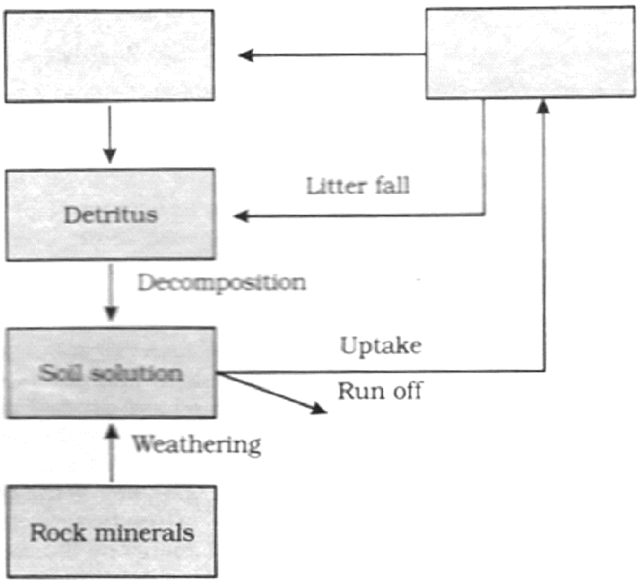
Scoring Indicators

C. Lichens

Learning Outcome

- Analyses nutrient cycling and differentiates gaseous and sedimentary cycles.

9. Given below is a simplified model of a nutrient cycling in a terrestrial ecosystem.



a. Identify the cycle?

b. How does it differ from a gaseous cycle?

Score: 3, Time: 3 mts

Scoring indicators

a. Phosphorus cycle ..... (1)

b. • This cycle starts from earth's crust ..... (1)

• Gaseous cycle exists in atmosphere ..... (1)

Learning Outcome

- Compares and explains the different stages of decomposition.

10. Decomposition of detritus is a complex process. Decomposition has various steps. Identify the steps given below and fill the blanks (2)

Breakdown of detritus into smaller particles	..... (a) .....
Water soluble inorganic nutrients go down into soil horizon	..... (b) .....
Degradation of detritus into simpler molecules by bacteria and fungi	.....(c) .....
Formation of humus in the soil	..... (d).....
Release of inorganic nutrients into the soil	Mineralization

Score: 2, Time: 4 mts

Scoring indicators

a. Fragmentation ..... (½x4)
b. Leaching
c. Catabolism
d. Humification

Leaning Outcome

- Compares and explains the different stages of decomposition.

11. Decomposition is the breakdown of complex organic matter into inorganic substances like CO_2, water etc.
    a. Identify the gas which is most essential for decomposition.
    b. Find out any two conditions which inhibit decomposition.

Score: 3, Time: 3 mts

Scoring Indicators

a. Oxygen ..... (1)
b. • Low temperature ..... (1)
   • Anaerobiosis ..... (1)

Learning Outcome

- Compares and explains the different stages of decomposition.

12. Which among the following is an alternate term for decomposers.
    A. Autotrophs
    B. Saprotrophs
    C. Heterotrophs
    D. Herbivores

Score: 1, Time: 1 mt

Scoring Indicators

B. Saprotrophs

Learning Outcomes

- Differentiates primary and secondary productivity.
- Analyses nutrient cycling and differentiates gaseous and sedimentary cycles.

13. Analyze the table given below and fill in the blanks suitably.

Ecological term	Description
.....(a).....	Total mass of living material in each trophic level at a particular time
Standing state	.....(b).....

Score: 2, Time: 3 mts

Scoring Indicators

a. Standing crop ..... (1)

b. The amount of nutrients present in the soil at any given time. ..... (1)

Learning Outcomes

- Identifies different stages of hydrarch succession.
- Analyses nutrient cycling and differentiates gaseous and sedimentary cycles.

14. Match the items of column A with column B (3)

A	B
(a) Carbon cycle	(i) Forest
(b) Phosphorous cycle	(ii) Lichens
(c) Pioneer species	(iii) Sedimentary cycle
(d) Climax community	(iv) Mosses
	(v) Gaseous cycle

Scoring indicators

(a) = (v)
(b) = (iii)
(c) = (ii)
(d) = (i)

Learning outcome

- Analyses nutrient cycling and differentiates gaseous and sedimentary cycles.

15. Human activities have significantly influenced the carbon cycle by increasing the amount of CO_2 production. Justify this statement with minimum two points.

Score: 2, Time: 4 mts

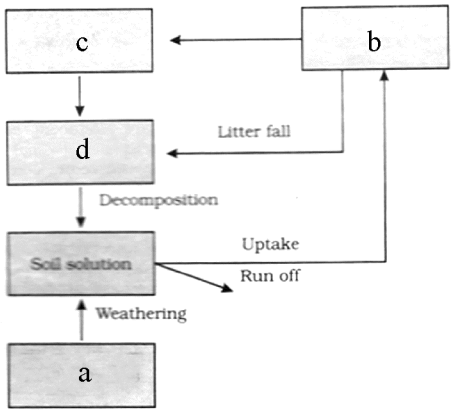
Scoring indicators

- Rapid deforestation ..... (1)
- Massive burning of fossil fuels for energy and transport. ..... (1)

Learning outcome

- Analyses nutrient cycling and differentiates gaseous and sedimentary cycles.

16. Given below is a simplified model of a biogeochemical cycle.
Fill up the blanks (a), (b), (c) and (d)



Score: 2, Time: 2 mts

Scoring indicators

a) Rock minerals ..... (½x4)
b) Producers
c) Consumers
d) Detritus

Learning outcome

- Evaluates the services provided by ecosystems.

17. Healthy ecosystems are the base for a wide range of goods and services. Find out any four ecosystem services provided by a healthy forest ecosystem.

Score: 2, Time: 3 mts

Scoring Indicators

- Purify air and water ..... (½x4)
- Mitigate drought and floods
- Cycling of nutrients
- Generate fertile soils
- Provide wildlife habitat
- Maintain biodiversity
- Provide cultural, aesthetic and spiritual values
(any four)

Learning outcome

- Analyses nutrient cycling and differentiates gaseous and sedimentary cycles.

18. Observe the relationship between the first two terms and fill in the blank.

Carbon cycle : Gaseous cycle

Phosphorous cycle : .....

Score: 1, Time: 1 mts

Scoring Indicators

Sedimentary cycle

Learning outcome

- analyses nutrient cycling and differentiates gaseous and sedimentary cycles.

19. Carbon cycle and phosphorus cycle are two common biogeochemical cycles. Write any three differences between these two cycles.

Score: 3, Time: 5 mts

Scoring Indicators

Carbon cycle	**Phosphorous cycle**
(1) Gaseous cycle	(a) Sedimentary cycle
(2) Respiratory release into atmosphere	(b) No respiratory release
(3) Atmospheric input through rainfall very high	(c) Atmospheric input through rainfall is very low
(4) Gaseous exchange between organism and environment is very high (Any three differences)	(d) Gaseous exchange is negligible

(½x6)

Learning Outcome

- Differentiates primary and secondary productivity.

20. Which one of the following is a primary consumer in an aquatic ecosystem

A. Phytoplanktons

B. Aquatic birds

C. Zooplanktons

D. Large Fishes

Score: 1, Time: 1 mts

Scoring indicators

C. Zooplanktons

Learning outcome

- Differentiates and constructs different types of ecological pyramids.

21. Construct a pyramid of biomass using the data given below.

PC $37\ kgm^{-2}$

TC $1.5\ kgm^{-2}$

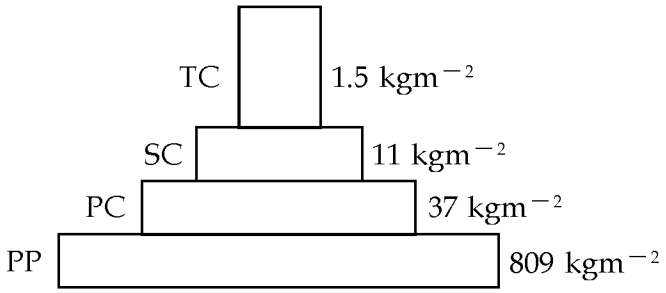
PP $809\ kgm^{-2}$

SC $11\ kgm^{-2}$

Score: 3, Time: 4 mts

Scoring indicators

- For constructing pyramid ..... (1)
- Marking 4 levels ..... (4 x ½)



Chapter 8

ENVIRONMENTAL ISSUES

Learning outcome

Classifies and compares various causes of water pollution and suggests remedies for control.

1. The amount of biodegradable organic matter in sewage water can be estimated by measuring BOD.
   a. Expand BOD
   b. Write the impact of the discharge of sewage into a river

Score: 2, Time: 3 mts

Scoring Indicators

a. BOD – Biochemical Oxygen Demand ..... (1)

b.
- Microorganisms consume lot of oxygen from water for the biodegradation of organic matter. ..... (½)
- Causes sharp decline in dissolved oxygen. ..... (½)

Learning outcome

Predicts the ill effects of solid wastes and e-wastes and recommends their control.

2. Radiation by nuclear waste is extremely dangerous to organisms.
   a. Write any two dangers.
   b. Write the recommendations for the storage of nuclear waste.

Score: 3, Time: 5 mts

Scoring Indicators

a.
- Causes mutation at a very high rate. ..... (½x2)
- At high doses nuclear radiation is lethal
- At lower doses creates various disorders

(Any two)

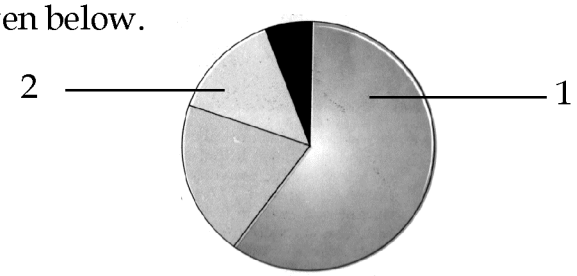
b. Nuclear waste must be stored after sufficient pre treatment. ..... (½+½)

It must be done in suitable shielded containers buried within the rocks, about 500m deep below the earth's surface.

Learning outcome

Analyses the effect of greenhouse gases and global warming and suggests its control measures.

3. Observe the figure given below.



a. Identify the greenhouse gases 1, 2 and write their percentage of contribution to total global warming.

b. Write any four measures to control global warming.

Score: 4, Time: 5 mts

Scoring Indicators

a. 1 – CO_2 – 60% ..... (½+½)

2 – CFCs 14% ..... (½+½)

b. • Cutting down use of fossil fuel. ..... (½x4)

• Improving efficiency of energy usage

• Reducing deforestation

• Planting trees

• Slowing down the growth of human population (Any four)

Learning outcome

Classifies and compares various causes of water pollution and suggests remedies for control.

4. Presence of large amounts of nutrients in water cause excessive growth of plankton.

a. Name this process.

b. Write the dangers caused by this process.

Score: 3, Time: 3 mts

Scoring Indicators

a. Algal bloom ..... (1)

b. • Imparts a distinct colour to the water bodies ..... (½x4)

• Deterioration of the water quality

• Fish mortality

• Toxic to human beings and animals

Learning outcome

Classifies and compares various causes of water pollution and suggests remedies for control.

5. Pollutants from man's activities like effluents from the industries and homes accelerate the aging process of lakes.

   a. Name this phenomenon.

   b. Write any four harmful effects of this process.

Score: 3, Time: 5 mts

Scoring Indicators

a. Cultural or Accelerated eutrophication ..... (1)

b. • Over stimulate the growth of algae
   • Cause unsighty scum .....(½x4)
   • Cause unpleasant odor
   • Rob dissolved oxygen
   • Death of fish

Learning outcome

Evaluates the various causes of air and noise pollution and their control measures.

6. CNG is better than diesel. Substantiate this statement writing any four advantages of CNG. Expand CNG

Score: 3, Time: 5 mts

Scoring Indicators

a. • CNG burns most efficiently .....(½x4)
   • Cheaper than petrol or diesel
   • Cannot be siphoned off by thieves
   • cannot be adulterated like petrol or diesel

b. • Compressed Natural Gas ..... (1)

Learning outcome

Evaluates the degradation of natural resources and predicts the effect of deforestation.

7. Government of India has instituted an award for individuals or communities from rural areas who have shown extraordinary courage and dedication in protecting wild life. Name that award.

Score: 1, Time: 2 mts

Scoring Indicators

Amrita Devi Bishnoi Wildlife Protection Award

Learning outcome

Predicts the ill effects of solid wastes and e-wastes and recommends their control.

8. Ecological sanitation is a sustainable system of handling human excreta, using dry composting toilets. Write the advantages of this method.

Score: 2, Time: 2 mts

Scoring Indicators

- A practical method ..... (½x4)
- hygienic
- efficient
- cost effective
- human excreta can be recycled into a natural fertilizer

(Any four responses)

Learning outcome

Classifies and compares various causes of water pollution and suggests remedies for control.

9. Choose the correct answer.

Substances that cause biomagnification are

A. Mercury and DDT

B. Mercury and Phosphorus

C. DDT and Phosphorus

D. Phosphorus and nitrogen

Score: 1, Time: 2 mts

Scoring Indicators

A

Learning outcome

Analyses the effect of greenhouse gases and global warming and suggests its control measures.

10. Observe the relationship between the first two terms and fill in the blank.

Green house effect : carbon dioxide; ozone depletion : .....

Score: 1, Time: 1 mt

Scoring Indicators

Chlorofluorocarbons

Learning outcomes

Evaluates the various causes of air and noise pollution and their control measures.

Classifies and compares various causes of water pollution and suggests remedies for control.

Analyses the effect of greenhouse gases and global warming and suggests its control measures.

Analyses the effect of ozone depletion in the stratosphere.

11. Match the items of column A with B.

A		B
a. DDT	i	Greenhouse effect
b. CO_2	ii	Eutrophication
c. Nitrogen	iii	Air pollution
d. Particulate matter	iv	Ozone depletion
	v	Biomagnification

Score: 2, Time: 4 mts

Scoring Indicators

A	B ..... (½x4)
a	v
b	i
c	ii
d	iii

Learning outcome

Evaluates the degradation of natural resources and predicts the effect of deforestation.

12. A number of human activities contribute to deforestation.

    a. Write any one such activity.

    b. Write the consequences of deforestation.

Score: 3, Time: 5 mts

Scoring Indicators

a. Cutting trees for timber,firewood,cattle ranching, cultivation (Any one) ..... (1)

b.
- Enhanced carbon dioxide concentration in the atmosphere ..... (½x4)
- Loss of biodiversity due to habitat destruction
- Disturbs hydrologic cycle
- Causes soil erosion
- Desertification in extreme cases (Any four)

Learning Outcome

- Classifies and compares various causes of water pollution and suggests remedies for control.

13. Choose the correct statement regarding biomagnification in an aquatic ecosystem.

A. Decrease in concentration of the toxicant in successive trophic levels.
B. Higher concentration of toxicant is seen in the first trophic level.
C. Bird population is least affected.
D. Causes decline in bird population.

Score: 1, Time: 2 mts

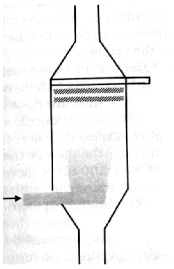
Scoring Indicators

D. Causes decline in bird population.

Learning Outcome

Evaluates the various causes of air and noise pollution and their control measures.

14. Observe the figure given below.Identify the equipment and write its use.



Score: 2, Time: 2 mts

Scoring Indicators

- Scrubber ..... (1)
- A Scrubber can remove gases like sulphur dioxide ..... (1)

Learning Outcome

Analyses the effect of ozone depletion in the stratosphere.

15. There is a balance between production and degeneration of ozone in the stratosphere.

a. Name the gas that disrupts this balance.
b. Explain how this balance is disrupted?

Score: 3, Time: 3 mts

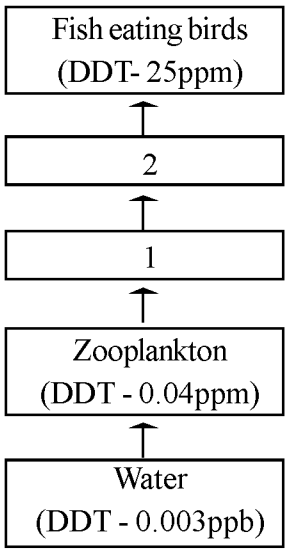
Scoring Indicators

a. Chlorofluorocarbons(CFCs) ..... (1)
b. In stratosphere,UV rays act on CFCs and release Cl atoms. ..... (1)
c. Cl degrades ozone releasing molecular oxygen. ..... (1)

Learning Outcomes

Classifies and compares various causes of water pollution and suggests remedies for control.

16. Observe the flow chart given below.



a. Fill in the blanks 1 and 2.

b. Identify the process illustrated in the flow chart.

Score: 3, Time: 3 mts

Scoring indicators

a. 1. Small fish (DDT 0.5 ppm) ..... (1)

2. Large fish (DDT 2 ppm) ..... (1)

b. Biomagnification. ..... (1)

Learning Outcome

Classifies and compares various causes of water pollution and suggests remedies for control.

17. Algal bloom and eutrophication are the two effects of water pollution.Write the differences between the two.

Score: 2, Time: 3 mts

Scoring indicators

Algal bloom:Excessive growth of planktonic algae due to the presence of large amount of nutrients in water.

Eutrophication: Natural aging of a lake by nutrient enrichment of its water.

Learning Outcome

Classifies and compares various causes of water pollution and suggests remedies for control.

18. People in the town of Arcata created an integrated waste water treatment within a natural system. Explain the method.

Score: 3, Time: 6 mts

Scoring indicators

- Cleaning of waste water is conducted in two stages. ..... (½)
- In the first stage conventional sedimentation, filtering and chlorine treatment are given. (½)
- To remove the remaining dangerous pollutants like dissolved heavy metals, Biologists have developed a series of six connected marshes over 60 hectares of marshland. ..... (½)
- Appropriate plants, algae, fungi and bacteria were seeded into this area. ..... (½)
- They neutralise, absorb and assimilate the pollutants as the water flows through the marshes. ..... (½)
- Water gets purified naturally. ..... (½)

Learning Outcome

Classifies and compares various causes of water pollution and suggests remedies for control.

Analyses the effect of greenhouse gases and global warming and suggests its control measures.

19. Match the items of column A with B and C.

A	B	C
a. Biomagnification	(i) CO_2	1. Aging of lakes
b. Eutrophication	(ii) DDT	2. Heating of earth
c. Global warming	(iii) Phosphorus	3. Increase in concentration of toxicants at successive trophic level

Score: 3, Time: 5 mts

Scoring indicators

a - ii - 3 ..... (½+½)

b - iii - 1 ..... (½+½)

c - i - 2 ..... (½+½)

Learning Outcome

Evaluates the degradation of natural resources and predicts the effect of deforestation.

20. In 1980s the Government of India has introduced JFM to conserve forests.

    a. Expand JFM.

    b. Write its significance.

Score: 3, Time: 4 mts

Scoring indicators

a. Joint Forest Management. ..... (1)

b. • Participation by local communities for protecting and managing forest. ..... (1)

   • These communitives get benefit of various forest products. ..... (1)

Learning Outcome

Evaluates the various causes of air and noise pollution and their control measures.

21. Catalytic converters are fitted into automobiles for reducing emission of poisonous gases into the atmosphere. Write its working in reducing pollution.

Score: 3, Time: 4 mts

Scoring indicators

- As the exhaust from the automobiles passes through the catalytic converter, unburnt hydrocarbons are converted into carbon dioxide and water. ..... (1)
- carbon monoxide is changed into carbon dioxide. ..... (1)
- Nitric oxide is converted into nitrogen gas. ..... (1)
