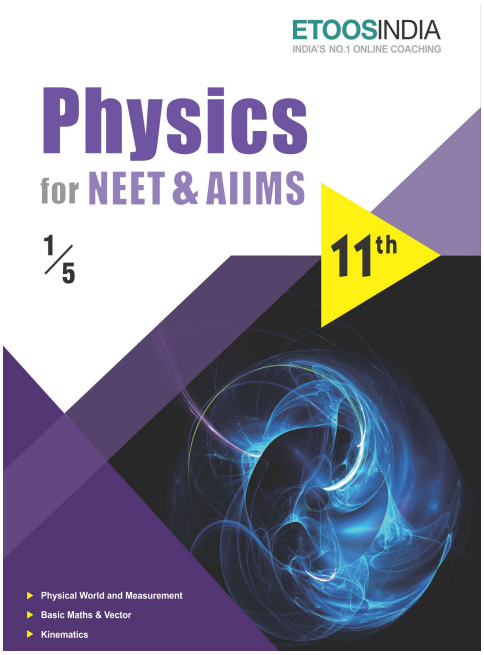
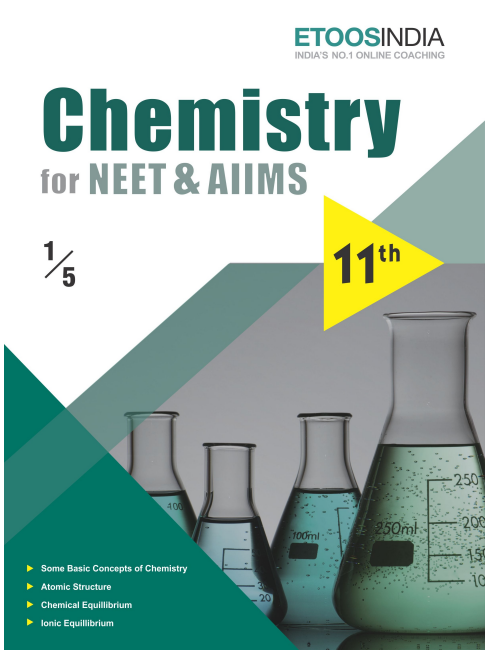
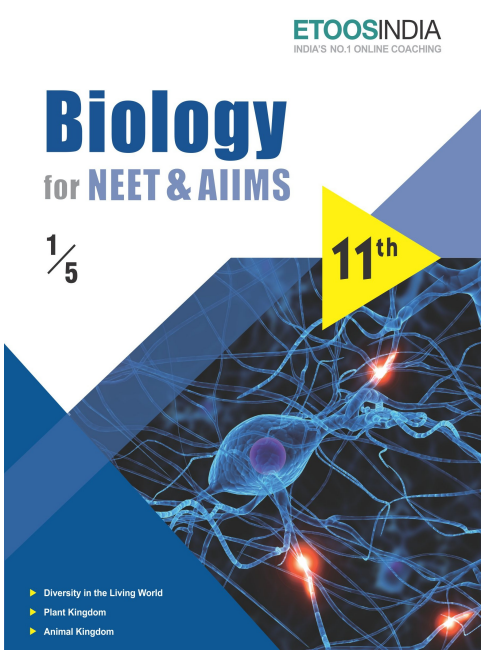
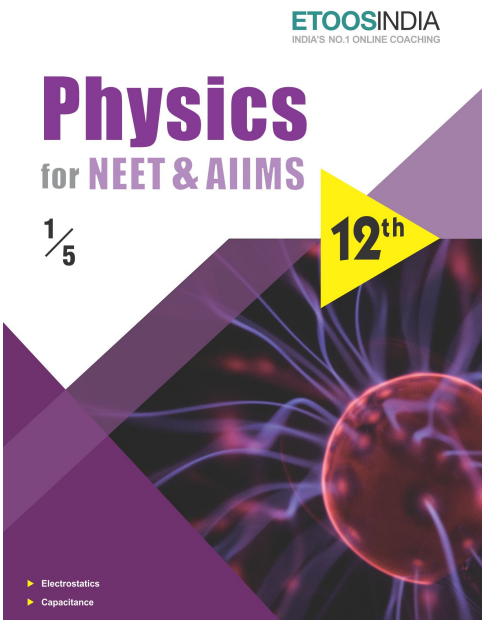
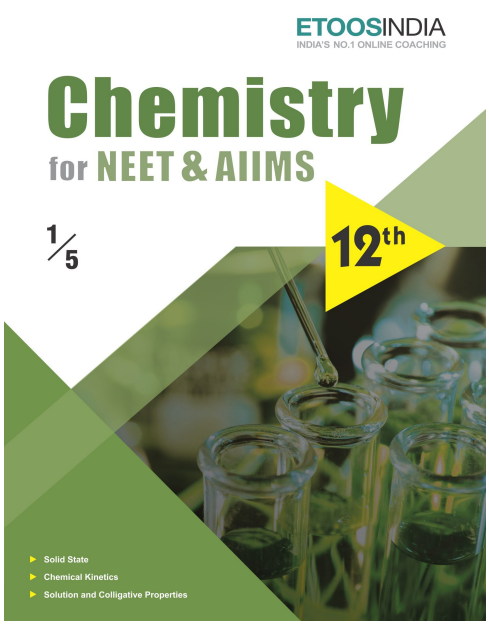
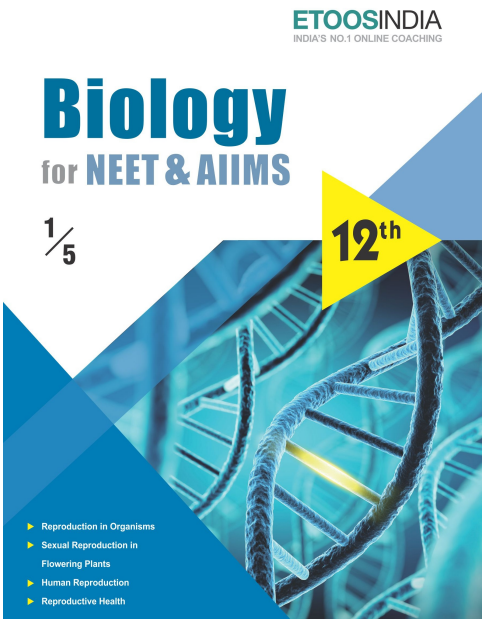












CHAPTER 13

ORGANISMS AND POPULATIONS

"In nature nothing is created, nothing is lost, everything changes".

"ANTOINE LAVOISIER (1743-1794)"

INTRODUCTION

At various level of biological organisation macromolecules, cells,tissues, organs, individual organisms, population,communities and scosystems and biomes, complexity by investigating processes can be understood. Ecology deals with the study of interactions and interrelationships between organisms and thir environment.It is concerned with the four level of biological organisations-organisms, populations, communities and biomes.

The essence of ecological understanding is to know how organisms interact with other organisms and physical environment as a group and hance behave like organised wholes i.e., population, community, ecosystem or even as the whole biosphere.

This topic emphasize more on organismic and population level.

Organisms and Populations

Introduction

- The term ecology was coined and described by **E.Haeckel.** The term ecology was first authentically used by **Reiter.**
- Father of ecology – **Reiter**
- The term Ethology for ecology was used by – **Geoffroy Hilaire**
- The term Hexicology for ecology was used by – **G.H. Mivart**
- Study of ecology was initiated in India by – **W. Dudgeon**
- Father of Indian Ecology – **Prof. Ram Deo Misra**
- First of all term ecology was employed for for study of plants by – **Warming**
- The study of interaction or inter-relationship of organism with their environment is called ecology.
  Organism $\rightleftharpoons$ Environment
- Organism and environment are always interdependent, inter related or mutually reactive.

Branches of Ecology – It is based on organism level

1. **Autecology or species ecology** – Study of the relation of a species with its environment is known as autecology
2. **Synecology or Biocoenology or Community ecology** – Study of the relation of the group of different species with their environment. Ex. Population, community, ecosystem, biome ecology.

Aims & Scope

- The main aim of ecology is to study the interrelationship between organisms. i.e., Plants, animals and environment..
- Studies like pollution, soil conservation, soil erosion, proper use of land, afforestation, control on deforestation, regulation of overgrazing, flood control, maintenance of soil fertility etc., are also done in the ecology.
- Thus, the scope of this science is very vast.
- The living world can be dealt at different level of complexities. A molecular biologists restricts itself to the level of genes & cells whereas a development biologist deals at the level of tissues, organs & organisms. Whereas an ecologist treats the living organisms largely at the level of population, community & ecosystem.
- A **population** is defined as a group of individuals of a species growing in a given area.
- A **community**, on the other hand, is collection of populations of different species growing in a given area.
- The transition zone between two different communities is known as **ecotone**.
- A species may be defined as a uniformly inbreeding population spread over a time. Ecologically, a species is sub-divided into **ecotype** and the ecotypes into **ecads**.

Ecotype/Ecological Race/Ecospecies :

- Formed due to genotypical responce to a particular habitat.
- Genetically different but interfertile.
- Adaptations are genetically fixed and irreversible.
- Variations are not changed if different ecotypes are grown in same habitat
- Ecospecies with one or more ecotypes.

Physchrophytes :

- They are also known as **hekistotherms**. These plants are grown in cold soil (land). Psychrophytes are found in **north** and **south polar regions**. The plants grown at 11000 feet or above are only psychrophytes. They known as Alpines. Such plants are grown on Himalaya.
- Cold lands are **physiologically dry.** Plants are unable to absorb water because temperature of soil is very less, reasons are as follows -
- The viscosity of the water increase due to decrease in temperature.
- Water potential of water decreases due to low temperature.
- The permeability of plasma membrane decreases at low temperature.
- The true characters of xerophytes are found in these plants, such as small leaves, thick cuticle and very deep root system.

  e.g. Rhododendron, Delphinium, Anemone, Primula, Sexifraga.

Adaptation against High pressure → In hydrothermal vents :

- No excess body cavities (swim bladder) → provide bouyancy.
- Flesh and bones are Flubby
- T.M.O-Tri methylineoxide. Binds with pressure sensitive protiens and protects their pressure inhibition.
- Serine phosphaethanol amine - protects protiens from pressure effect.

Adaptation of plants against predators :

Thorns, Hairs, Thick stem, Nectorless. Silica in grasses.

Chemicals : Cafin, Tannin, Quinin, Opium, Glycosides, Pyrethrin.

Adaptation of Animals against predators :

(i) Cryptic appearence/Camouflage.
Grass hopper-Look like green leaf.
Preying Mantis-Look like dead leaf.

ETOOS KEY POINTS

- **Best pH** of the soil for cultivation of plant is **5.5 - 6.5**
- Excess water produces **salinity** problem in soil.
- Calcifuge Plants → Those plants which can grow in little amount of calcium in soil (pH - 3.8 to 4.0) eg., Rhododendron, Rumax etc.
- Calcarious soil → Soil having excess of calcium carbonate.
- Alkaline soil can be corrected by adding gypsum ($CaCO_4$) and heavy irrigation whereas acidic soil can be corrected by adding lime $Ca(OH)_2$
- Availability of nutrients from the soil is related with pH of soil.

Literization :

In the **tropical area** due to high temperature, high rainfall, litter is decomposed very rapidly in A-layer. Due to mineralization of **Al** and **Fe** are liberated in the upper layer (A-layer) of soil, colour of this soil becomes **redish-brown,** this process is known as laterization and soil is **literite.**

Podsolization :

In **temperate area** temperature is low and high humidity occurs. Humus and minerals contents dissolve and percolate with water and are leached from A layer to B layer. Due to loss of chemicals the colour of soil of A-layer (horizon) turns to **light ash** colour. This process is known as podosolization and soil is known as **podosols.**

Gleization :

In **tundra** region due to low temperature and humid condition humus is formed in less quantity and moves slowly in B-layer. So colour of B-layer becomes **blue-grey** due to deposition of **Fe** salt. This process is known as gleization and soil is known as **gleys**.

Etoos Tips & Formulas

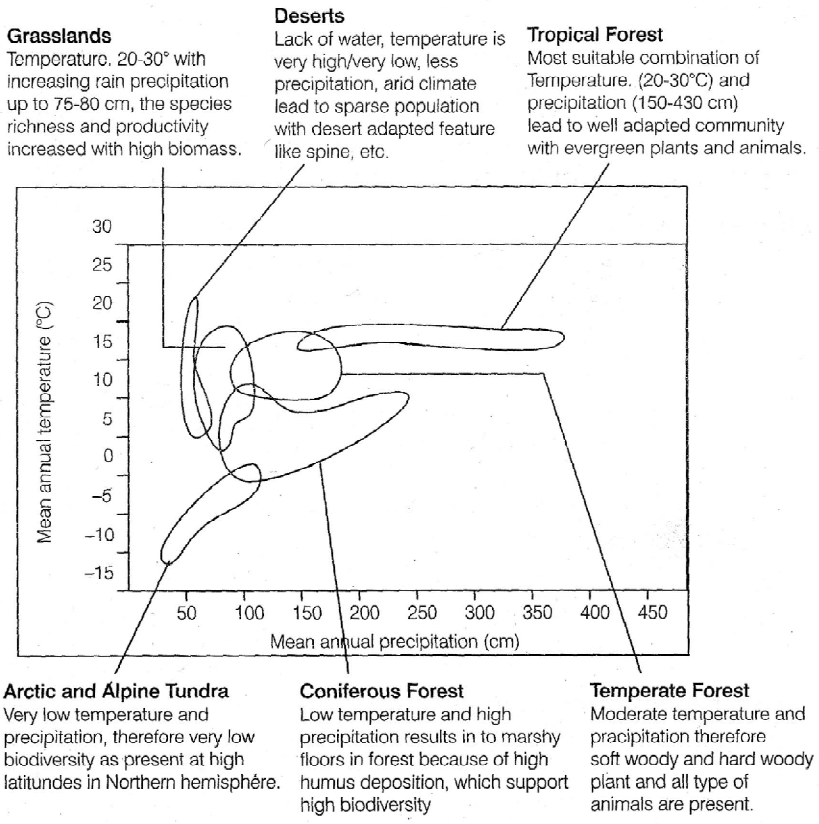
→ An isolated, biological entity (e.g., unicellular or multicellular) which is able to perform biological process independently called as organism. Individual organism is the basic unit of ecological hierarchy.

Organism and its Environment

→ Organism's life exists not just in a few, favourable habitats, but even in extreme and harsh conditions, e.g., desert, rainforests, deep ocean and other unieque habitats.

→ The suitability of environment directly affect the growth of residing population and manifested in from of various biological communities.

→ Following diagrammatic representation clearly indicates the relationship between environmental conditions and its impact on population which ultimately results into different types of communities.



Climatic adaptation among floral and faunal communities

Responses to Abiotic Factors

→ Organism cope up with the stressful conditions or possibilities to manage with the adverse situation. With following set of modification, an organism can stabilised its relationship with environment.

Regulate

→ Some organisms are able to maintain a constant body temperature and constant osmotic concentration despite changes in the external environment. e.g., **Thermoregulation**, as human is an isothermic organism, it regulate the temperature, in summer by sweating and in winter by shivering. The proces of regulation mostly occurs in birds and higher animals.

Conform

→ It is the strategy to adjustment of organisms towards environmental conditions. In this an organism control their physiology in the tune of environmental conditions. e.g., poikilotherms (i.e., an organism which fails to maintain their body temperature constant) changes their body temperature with environment e.g., fishes.

SOLVED EXAMPLE

Ex.1 Plant species having a wide range of genetical distribution evolve into a local population known as

(A) Ecotype **(B)** Biome
(C) Ecosystem **(D)** Population
(E) Ephemerals

Sol. **(A)**

Ex.2 Biogenetic law was put forward by

Or

The term ecology was coind by

(A) E. Haeckel **(B)** Charles Darwins
(C) Karl von Bear **(D)** Lamarck

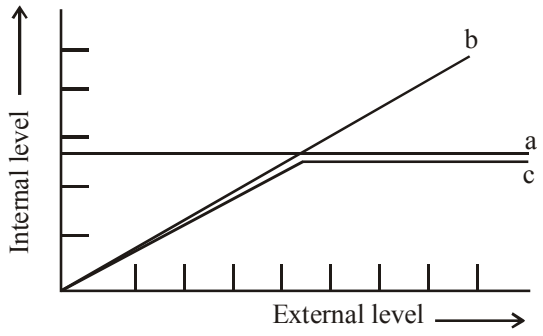
Sol. **(A)**

Ex.3 The term 'niche' of a species refers to

(A) Specific and habitual function
(B) Specific place where an organism lives and perform its duty
(C) Competitive power of an organism
(D) Specific function of organism

Sol. **(B)** : Ecological niche is specific habitat where a specific species lives.

Ex.4 The figure given below is a diagrammatic representation of response of organism to abiotic factors. What do a, b and c represent respectively.



(a)	(b)	(c)
(A) Regulator	Conformer	Partial regulator
(B) Conformer	Regulator	Partial regulator
(C) Regulator	Partial regulator	Conformer
(D) Partial regulator	Regulator	Conformer

Sol. **(A)**

Ex.5 The plant of this group are adapted to live partly in water and partly above substratum and free from water.

Or

Pnenumatophore roots are present in

(A) Xerophytes **(B)** Thalophytes
(C) Halophytes **(D)** Hydrophytes

Sol. **(C)**

Ex.6 Population density of terrestrial organisms is measured in terms of individual per

(A) $Meter^3$ **(B)** $Meter^4$
(C) Meter **(D)** $Meter^2$

Sol. **(D)** : Population density is the total population within a geographic entity divided by the number of square miles of land area of that entity measured in square kilometers square meters or square miles.

Ex.7 The concept that "Population tends to increase geometrically while food supply increases arithmetically" was put forward by

(A) Thomas Malthus **(B)** Adam Smith
(C) Stuart Mill **(D)** Charles Darwin

Sol. **(A)** : It was an essay on the principles of population by R.T. Malthus which made Darwins realise that under intense competition, natural seletion operates.

Ex.8 Autecology is the

(A) Relation of heterogenous population to its environment
(B) Relation of an individual to its environement
(C) Relation of a community to its environement
(D) Relation of a biome to its environement

Sol. **(B)**

Ex.9 Ecological niche is

(A) The surface area of the ocean
(B) Composed of the plants present in the soil
(C) Life in the outer space
(D) Formed of all plants and animals living at the bottom of a lake

Sol. **(C)**

Exercise # 1

SINGLE OBJECTIVE | NEET LEVEL

1. The term ecology was coined by
(A) Linnaeus (B) William
(C) Odum (D) Haeckel

2. Number of endangered species of angiosperms in India is
(A) 487 (B) 3000
(C) 5000 (D) 15,000

3. The carrying capacity of a population is determined by its
(A) Birth rate (B) Death rate
(C) Limiting resource (D) Reproductive status

4. Tetonic is the study of
(A) Earthquakes (B) Earth's crust
(C) Sand (D) None of these

5. A community is defined as
(A) A group of birds
(B) A collection of species
(C) Interacting populations
(D) An interactive ecosystem

6. Distribution of different plant geographically is called
(A) Allopatric (B) Sympatric
(C) Geopatric (D) Sibling

7. Group of two or more than two plant species is called as
(A) Plant community (B) Animal ecosystem
(C) Plant ecosystem (D) Ecological niche

8. Study of environment and animals relation
(A) Ecosystem (B) Phytosociology
(C) Biotic community (D) Ecology

9. Which of the following statements is true regarding individuals of same species
(A) They are interbreeding
(B) They live in same niche
(C) They live in different niche
(D) They live in different habitate

10. Which of the following isolation is important for speciation
(A) Seasonal (B) Tropical
(C) Behavioural (D) Reproductive

11. Species are considered as
(A) Real units of classification devised by taxonomists
(B) Real basic units of classification
(C) The lowest units of classification
(D) Artificial concept of human mind which cannot be defined in abosolute terms

12. "Exobiology" refers to the study of
(A) Exodermis (B) Terrestrial organism
(C) Life in the air (D) Life on other planets

13. Y-shaped energy flow model was given by
(A) H.T. Odum (B) E.P. Odum
(C) Tensley (D) Both (A) and (B)

14. The ecological niche of population is a
(A) Geographical area that it covers
(B) Place where it lives
(C) Set of conditions and resource it uses
(D) None of these

15. Biological concept of species is mainly based on
(A) Reproductive isolation
(B) Morphological features only
(C) Methods of reproduction only
(D) Morphology and methods of reproduction

16. Territoriality occurs as a result of
(A) Parasitism (B) Predation
(C) Co-operation (D) Competition

17. In an aqueous environment, the microscopic animals are collectively called
(A) Herbivores (B) Carnivores
(C) Planktons (D) Fauna and flora

18. Soil is a mixture of
(A) Sand and clay
(B) Sand and humus
(C) Clay and humus
(D) Sand, clay and humus

19. Clay soil is obtained
(A) In desert (B) Around ponds
(C) On seashore (D) On rocks

20. A bird enters the mouth of crocodile and feed on parasitic leeches. The bird gets food and crocodile gets ribs of blood sucking leeches. Both the partners can live independently. Such an association is
(A) Mutualism (B) Amensalism
(C) Commensalism (D) Protocooperation

Exercise # 2 SINGLE OBJECTIVE AIIMS LEVEL

1. Ruthless exploitation and pollution of the environment has increased the magnitude of waste materials which has disturbed the operations of all important
(A) Biomes
(B) Ecosystems
(C) Bio-geo-chemical cycles
(D) All above

2. The study of inter-relationship between living organisms and their environment is called
(A) Ecosystem (B) Phytogeography
(C) Ecology (D) Phytosociology

3. Term 'ecology' was proposed by
(A) William (B) Odum
(C) Reiter (D) Daubenmier

4. Biotic potential refers to
(A) Increase of population under optimum conditions
(B) Increase of population under given conditions
(C) Increase of population under natural conditions
(D) Increase of population under climatic conditions

5. E.P. Odum is a leading
(A) Bryologist (B) Physiologist
(C) Ecologist (D) Mycologist

6. The term 'biocoenosis' was proposed by
(A) Tansley (B) Carl Mobious
(C) Warming (D) None of the above

7. Ecology takes into account only
(A) Environmental factors only
(B) Plant adaptations only
(C) Effect of environment on plants
(D) All of the above

8. World environment day is celeberated on
(A) 15th March (B) 15th April
(C) 4th May (D) 5th June

9. Ecological factors which prevent a species from producing at its maximum rate is termed as
(A) Survival curve (B) Ecological drift
(C) Environmental resistance
(D) None of these

10. The ecologically fixed and genetically irreversed species are called
(A) Ecotone
(B) Ecological equivalents
(C) Ecotype
(D) None of these

11. Biogenetic law was putforward by
(A) E. Haeckel (B) Charles Darwins
(C) Karl von Bear (D) Lamarck

12. Agrostology is related with the study of
(A) Agricultural growth (B) Epiphytes
(C) Grasses (D) Nematode diseases

13. The plants and animals living in a given area form
(A) Biological community (B) Ecotone
(C) Biome (D) Consociation

14. Phytotron is a device by which
(A) Mutations are produced in plants
(B) Plants are grown in controlled environment
(C) Protons are liberated
(D) Leaf fall occurs on abscission layer

15. Name the famous plants ecologist
(A) Jagdish Chandra Bose (B) Birbal Sahani
(C) Ramdeva Misra (D) Charles Darwin

16. 'Eco' term refers as
(A) Biosphere (B) Environment
(C) Organisms (D) Plants

17. The major characteristics of the vegetation of a locality are controlled by
(A) Man only
(B) Mainly by climate
(C) Animals only
(D) Altitude of place only

18. Ozone layer depletion or hole in ozone layer is being found in
(A) North pole (B) South pole
(C) Russia (D) None of the above

19. The resource which regulates the flow of energy in desert ecosystem is the availability of
(A) Light (B) Water
(C) Minerals (D) Heat

20. Which of the following ecological factor exerts a direct effect
(A) pH (B) Topography
(C) Mineral elements (D) Humidity

Exercise # 3 PART - 1 MATRIX MATCH COLUMN

1. Match the following with correct combination

Column - I	Column - II
(A) Mutualism	(i) Tiger and deer
(B) Commensalism	(ii) Cuscuta on Cissus
(C) Parasitism	(iii) Sucker fish and shark
(D) Predation	(iv) Crab and sea anemone

(A) A - (i), B - (ii), C - (iii), D - (iv)
(B) A - (iv), B - (iii), C - (ii), D - (i)
(C) A - (i), B - (iii), C - (ii), D - (iv)
(D) A - (ii), B - (iii), C - (i), D - (iv)
(E) A - (iv), B - (ii), C - (iii), D - (i)

2. Match the following and choose the correct combination from the options given below.

Column - I (Population interaction)	Column - II (Examples)
(A) Mutualism	(1) Ticks on dogs
(B) Commensalism	(2) Balanus and Chathamalus
(C) Parasitism	(3) Sparrow and any seed
(D) Competition	(4) Epiphyte on a mango branch
(E) Predation	(5) Orchid Ophrys and bee

(A) A-1, B-5, C-4, D-3, E-2
(B) A-2, B-1, C-5, D-4, E-3
(C) A-3, B-2, C-1, D-5, E-4
(D) A-4, B-3, C-2, D-1, E-5
(E) A-5, B-4, C-1, D-2, E-3

3. Column I represent the size of the soil particles and Column II represents type of solid components. Which of the following is correct match for the Column I and Column IL

Column - I	Column - II
(A) 0.2 to 2.00 mm	(i) Slit
(B) Less than 0.002 mm	(ii) Clay
(C) 0.02 to 0.2 mm	(iii) Coarse sand particle
(D) 0.002 to 0.02 mm	(iv) Fine sand particle

(A) A - (ii), B - (iii), C - (iv), D - (i)
(B) A - (iv), B - (i), C - (iii), D - (ii)
(C) A - (iii), B - (ii), C - (iv), D - (i)
(D) None of the above

4. Match list I with list II and choose the correct option

Column - I	Column - II
(A) Pacific salmon fish	(1) Verhulst-Pearl Logistic growth
(B) Nt =Noert	(2) Breeds only once in lifetime
(C) Oyster	(3) Exponential growth
(D) dN/dt = rN (K – N/K)	(4) A large number of small sized offsprings

(A) A-4, B-3, C-1, D-2
(B) A-3, B-4, C-1, D-2
(C) A-3, B-1, C-4, D-2
(D) A-2, B-3, C-4, D-1
(E) A-2, B-4, C-3, D-1

Exercise # 4 PART - 1 PREVIOUS YEAR (NEET/AIPMT)

1. Special kinds of roots called pneumatophores are characteristics of the plants growing in
(A) sandy soils
(B) saline soils
(C) marshy places and salt lakes
(D) dryland regions

2. What is true for individuals of same species?
(A) Live in same niche
(B) Live in same habitat
(C) Interbreeding
(D) Live in different habitats

3. Two different species cannot live for long duration in the same niche or habitat. This law is
(A) Allen's law
(B) Mendel's law
(C) Gause's competitive exclusion principle
(D) Weismann's theory

4. Which of the following is a correct pair?
(A) Cuscuta - Parasite
(B) Dischidia - Insectivorous
(C) Opuntia - Predator
(D) Capsella - Hydrophyte

5. Which type of association is found in between entomophilous flower and pollinating agent
(A) Mutualism (B) Commensalism
(C) Cooperation (D) Co-evolution

6. Choose the correct sequence of stages of growth curve for bacteria
(A) lag, log, stationary, decline phase
(B) lag, log, stationary phase
(C) stationary, lag, log, phase
(D) decline, lag log phase

7. The semilog of per minute growing bacteria is plotted against time. What will be the shape of graph?
(A) Sigmoid
(B) Hyperbola
(C) Ascending straight line
(D) Descending straight line

8. Mycorrhiza is an example of
(A) endoparasitism (B) decomposers
(C) symbiotic relationship (D) ectoparasitism

9. Diffuse porous woods are characteristic of plants growing in
(A) temperate climate (B) tropics
(C) alpine region (D) cold winter regions

10. In which one of the following habitats does the diurnal temperature of soil surface vary most ?
(A) Shrubland (B) Forest
(C) Desert (D) Grassland

11. What is a keystone species?
(A) A species which makes up only a small proportion of the total biomass of a community, yet has a huge impact on the communitys organisation and survival
(B) A common species that has plenty of biomass, yet has a fairly low impact on the community's organisation
(C) A rare species that has minimal impadct on the biomass and on other species in the community
(D) A dominant species that constitutes a large proportion of the biomass and which affects many other species.

12. In which one of the following pair is the specific characteristic of soil not correctly matched ?
(A) Laterite - Contains aluminium compound
(B) Terra rossa - Most suitable for roses
(C) Chernozems- Richest soil in the wold
(D) Black soil - Rich in calcium carbonate

13. Which one of the following pairs is mismatched ?
(A) Savanna - *Acacia trees*
(B) Prairie - Epiphytes
(C) Tundra - Permafrost
(D) Coniferous - Evergreen trees

14. Animals have the innate ability to escape from predation. Examples for the same are given below. Select the incorrect example
(A) enlargement of body size by swallowing air in puffer fish
(B) melanism in moths
(C) poison fangs in snakes
(D) colour change in *Chamaeleon*

MOCK TEST

1. Match mean annual precipitation in column I with the biome in column II and choose the right option.

Column I	Coumn II
(i) 0-50 cm	(A) Tropical forest
(ii) 50-100cm	(B) Coniferous forest
(iii) 150-100 cm	(C) Grassland
(iv) 50-250 cm	(D) Desert

(A) (i)-D,(ii)-C,(iii)-A, (iv)-B (B) (i)-C,(ii)-A,(iii)-B, (iv)-D
(C) (i)-C,(ii)-D,(iii)-A, (iv)-B (D) (i)-B,(ii)-D,(iii)-A, (iv)-C
(E) (i)-D,(ii)-A,(iii)-C, (iv)-B

2. Benthic organisms are affected the most by
(A) Light reaching the forest floor (B) Surface turbulence of water
(C) Sediment characteristics of aquaticv ecosystems (D) Water-holding capacity of soil

3. Large woody vines are more commonly found in
(A) Temperate forests (B) Mangroves (C) Tropical rainforests (D) Alpine forests

4. Major ecological community of plants and animals extending over large natural areas is known as
(A) Bioregion (B) Biosphere (C) Biota (D) Biome

5. Which one of the following is not a method of soil conservation?
(A) Mulching (B) Overgrazing (C) Strip cropping (D) Crop rotation

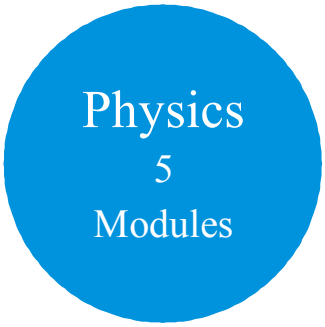
6. Many fresh water animals cannot live for long in sea water mainly because of the
(A) Change in the atmosphere (B) Change in the levels of thermal tolerance
(C) Variations in light intensity (D) Osmotic problems they would face
(E) Change of temperature and light

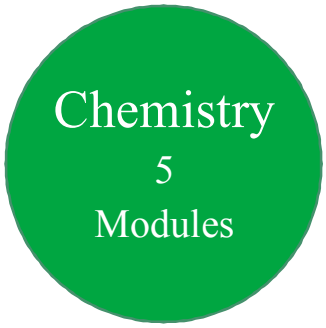
7. Some desert beetles can survive on "metabolic water",without ever drinking liquid water which
(A) Is a breakdonw product of pyruvate inside the mitochondria, along with carbon dioxide
(B) was produced as water in the organisms they eat
(C) is a breakdown product from glycolysis in the cytoplasm
(D) is absorbed from the air along with respiratory oxygen

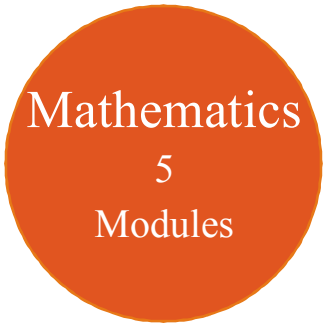
8. Which of the following statements regarding responses of organisms to abiotic factors is false ?
(A) All birds and mammals are capable of thermoregulation.
(B) Majority of animals and nearly all plants cannot maintain a constant internal environment.
(C) Shivering is a kind of exercise which prduces heat and raises body temperature.
(D) Very small animals are commonly found in polar regions ar they have to spend less energy to generate body heat.
(E) Diapause is a stage of suspended development seen in zooplanktons.

9. The animals that rely on the heat from environment than metabolism to raise their body temperature are, in strict sense, called
(A) Ectothermic (B) Poikilithermic (C) Homeothermic (D) endothermic

11th Class Modules Chapter Details

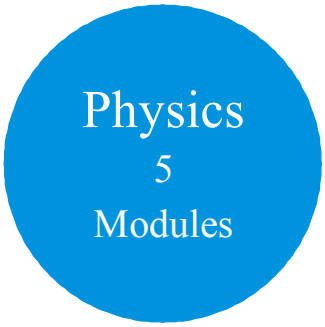


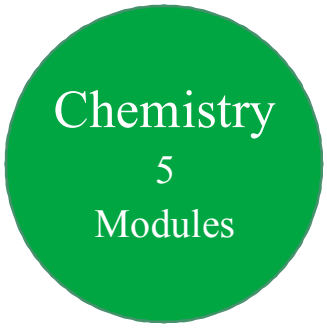


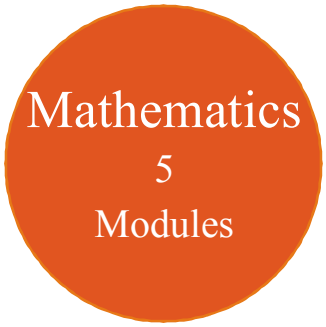


PHYSICS	CHEMISTRY	BIOLOGY
Module-1 1. Physical World & Measurements 2. Basic Maths & Vector 3. Kinematics **Module-2** 1. Law of Motion & Friction 2. Work, Energy & Power **Module-3** 1. Motion of system of particles & Rigid Body 2. Gravitation **Module-4** 1. Mechanical Properties of Matter 2. Thermal Properties of Matter **Module-5** 1. Oscillations 2. Waves	**Module-1(PC)** 1. Some Basic Conceps of Chemistry 2. Atomic Structure 3. Chemical Equilibrium 4. Ionic Equilibrium **Module-2(PC)** 1. Thermodynamics & Thermochemistry 2. Redox Reaction 3. States Of Matter (Gaseous & Liquid) **Module-3(IC)** 1. Periodic Table 2. Chemical Bonding 3. Hydrogen & Its Compounds 4. S-Block **Module-4(OC)** 1. Nomenclature of Organic Compounds 2. Isomerism 3. General Organic Chemistry **Module-5(OC)** 1. Reaction Mechanism 2. Hydrocarbon 3. Aromatic Hydrocarbon 4. Environmental Chemistry & Analysis Of Organic Compounds	**Module-1** 1. Diversity in the Living World 2. Plant Kingdom 3. Animal Kingdom **Module-2** 1. Morphology in Flowering Plants 2. Anatomy of Flowering Plants 3. Structural Organization in Animals **Module-3** 1. Cell: The Unit of Life 2. Biomolecules 3. Cell Cycle & Cell Division 4. Transport in Plants 5. Mineral Nutrition **Module-4** 1. Photosynthesis in Higher Plants 2. Respiration in Plants 3. Plant Growth and Development 4. Digestion & Absorption 5. Breathing & Exchange of Gases **Module-5** 1. Body Fluids & Its Circulation 2. Excretory Products & Their Elimination 3. Locomotion & Its Movement 4. Neural Control & Coordination 5. Chemical Coordination and Integration

12th Class Modules Chapter Details







PHYSICS

Module-1

1. Electrostatics
2. Capacitance

Module-2

1. Current Electricity
2. Magnetic Effect of Current and Magnetism

Module-3

1. Electromagnetic Induction
2. Alternating Current

Module-4

1. Geometrical Optics
2. Wave Optics

Module-5

1. Modern Physics
2. Nuclear Physics
3. Solids & Semiconductor Devices
4. Electromagnetic Waves

CHEMISTRY

Module-1(PC)

1. Solid State
2. Chemical Kinetics
3. Solutions and Colligative Properties

Module-2(PC)

1. Electrochemistry
2. Surface Chemistry

Module-3(IC)

1. P-Block Elements
2. Transition Elements (d & f block)
3. Co-ordination Compound
4. Metallurgy

Module-4(OC)

1. HaloAlkanes & HaloArenes
2. Alcohol, Phenol & Ether
3. Aldehyde, Ketone & Carboxylic Acid

Module-5(OC)

1. Nitrogen & Its Derivatives
2. Biomolecules & Polymers
3. Chemistry in Everyday Life

BIOLOGY

Module-1

1. Reproduction in Organisms
2. Sexual Reproduction in Flowering Plants
3. Human Reproduction
4. Reproductive Health

Module-2

1. Principles of Inheritance and Variation
2. Molecular Basis of Inheritance
3. Evolution

Module-3

1. Human Health and Disease
2. Strategies for Enhancement in Food Production
3. Microbes in Human Welfare

Module-4

1. Biotechnology: Principles and Processes
2. Biotechnology and Its Applications
3. Organisms and Populations

Module-5

1. Ecosystem
2. Biodiversity and Conservation
3. Environmental Issues