ULTIMATE KCET

CRASH COURSE 2026

Botany | Lecture - 01

Organisms and population; Ecosystem ,Biodiversity and conservation

By – Chaitra Ma'am

Topics to be covered

1. O.P. Ecosystem, BDC.
2. PYQs + Synopsis
3.
4.

Question

The interaction between the organisms of one of the following pairs is an example for commensalism.

predators

A Cattle or sheep and grass (Prey) - predation

B Wasps and fig tree - mutualism

C Orchid and mango tree ✓

D Cuckoo and crow - Brood parasitism

parasite host

Question

The success of mammals on earth is largely because

A. they have the ability to maintain constant body temperature (warm blooded)

B. they can conform to the changes in the environment - cold blooded

C. they can take care of their young ones as they have mammary glands to suckle them

D. they can reduce metabolic activity and go into a state of dormancy during unfavourable conditions in the environment.

Question

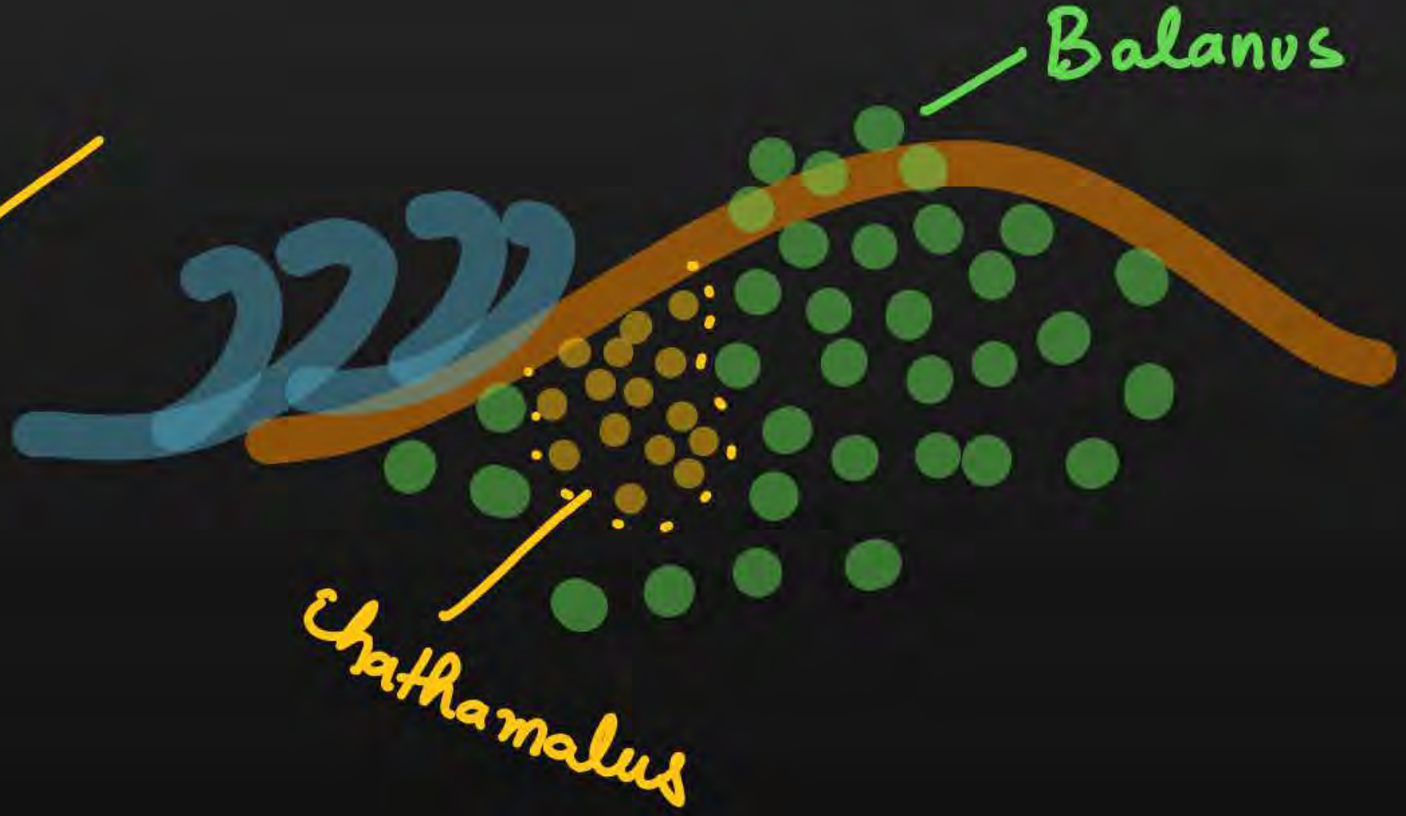
Connell's field experiment on the rocky sea coast of Scotland, where larger Barnacle Balanus dominates the intertidal area and removes the smaller Barnacle Chthamalus. This happened due to

A Predation

B Competition

C Parasitism

D Mutualism.



Question

In which type of interactions, both the interacting organisms do not live close together?

A Predation

B Parasitism

C Mutualism

D Competition

Question

A population is correctly defined as having which of the following characteristics?

(A) Inhabiting the same geography area ✗

(B) Individuals belonging to same species ✓ ; Species ⇒ organisms can interbreed

(C) Possessing a constant and uniform density and dispersion ✗

A. A and B only

B. B and C only

C. A and C only

D. B only ✓

Population attributes

- Birth rate → No. of birth / initial no. → per capita
- Death rate → No. of death / initial no. → per capita
- Population density → 'N' → calculate - Total no
  - percent cover = plants
  - Relative density = e.g. fishes
    - Pug marks / fecal pellet
      - lion
      - Tiger
- population age → pyramids → Expanding
  - Stable
  - declining
- Sex ratio → No of females : No of males

Question

All the following interactions are mutualism, except

A association of algae and fungi in lichens

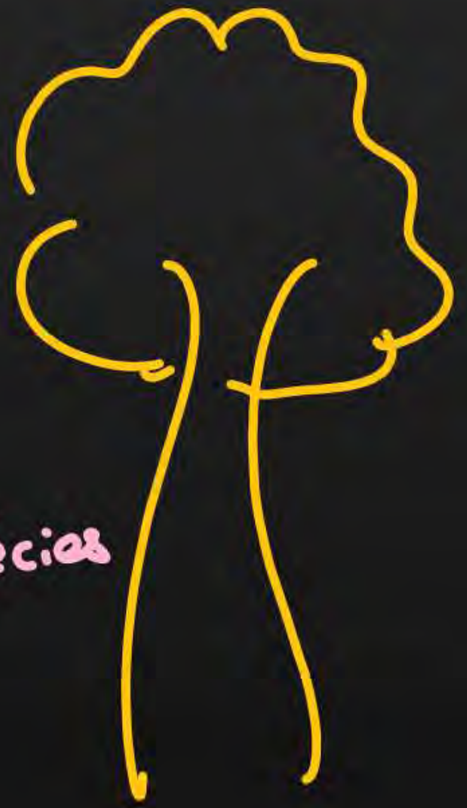
B association of fungi and roots of higher plants in mycorrhiza

C plant and animal relation for pollination

D association of cattle egret and grazing cattle. – Commensalism

Question

Mac Arthur's vision of 5 closely related species of warblers living on same tree were able to avoid competition and co-exist by behavioural difference. This is an example for



A. competitive release

B. resource partitioning

C. competitive exclusion principle

D. adaptive radiation.

Chathamalus & Balanus

Warbler's

Superior species ⇒ affects inferior species

Goat & Abingdon tortoise.

Gause's competitive exclusion principle

- Two closely related species competing for same resources cannot live together indefinitely; inferior species go extinct.

↓

disproved by Warbler's

Question

The interaction between "Cuckoo and Crow" is an example for

A Competition

B Predation

C brood parasitism

D mutualism

Question

Verhulst-Pearl logistic growth is described by the equation $\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$, where '$r$' and '$K$' represent

A r-intrinsic rate of natural decrease, K-carrying capacity

B r-intrinsic rate of natural increase, K-carrying capacity

C r-extrinsic rate of natural increase, K-productive capacity

D r-extrinsic rate of natural decrease, K-carrying capacity.

Question

In Amphibians and Reptiles, the body temperature changes corresponding to external temperature. The organisms which show this kind of response is termed as

A partial regulators

B Regulators

C Thermophiles

D conformers

Question

Read the statements and chose the correct answer.

Statement I: The Monarch butterfly feeds on poisonous weeds during its caterpillar's stage.

Statement II: It helps butterfly to become distasteful to its predator.

prey adaptations
- camouflage
- Monarch butterfly
- Calotropis - Cardiac glycosides
- Nicotine, Strychnine
- Thorns & spines

A. Statement I is true, Statement II is false

B. Statement I is true and Statement II is its correct explanation

C. Both Statement I and II are false

D. Both Statement I and II are true, but Statement II is not the correct explanation of Statement I

Question

From the given options, identify the correct combination of population interactions the correspond to the symbols given here

A Parasitism Competition Mutualism

B Predation Competition Commensalism

C Mutualism Competition Commensalism

D Mutualism Parasitism Amensalism

Question

Which of the following features of plants is not hepty in adapting to desert life?

A. Absence of trichomes on leaf surface

B. Presence of thick cuticle on the leaf surface

C. Leaves modified into spines

D. Presence of sunken stomata

Question

In the following equation of Verhulst-Pearl logistic growth, the letter 'r' denotes ___

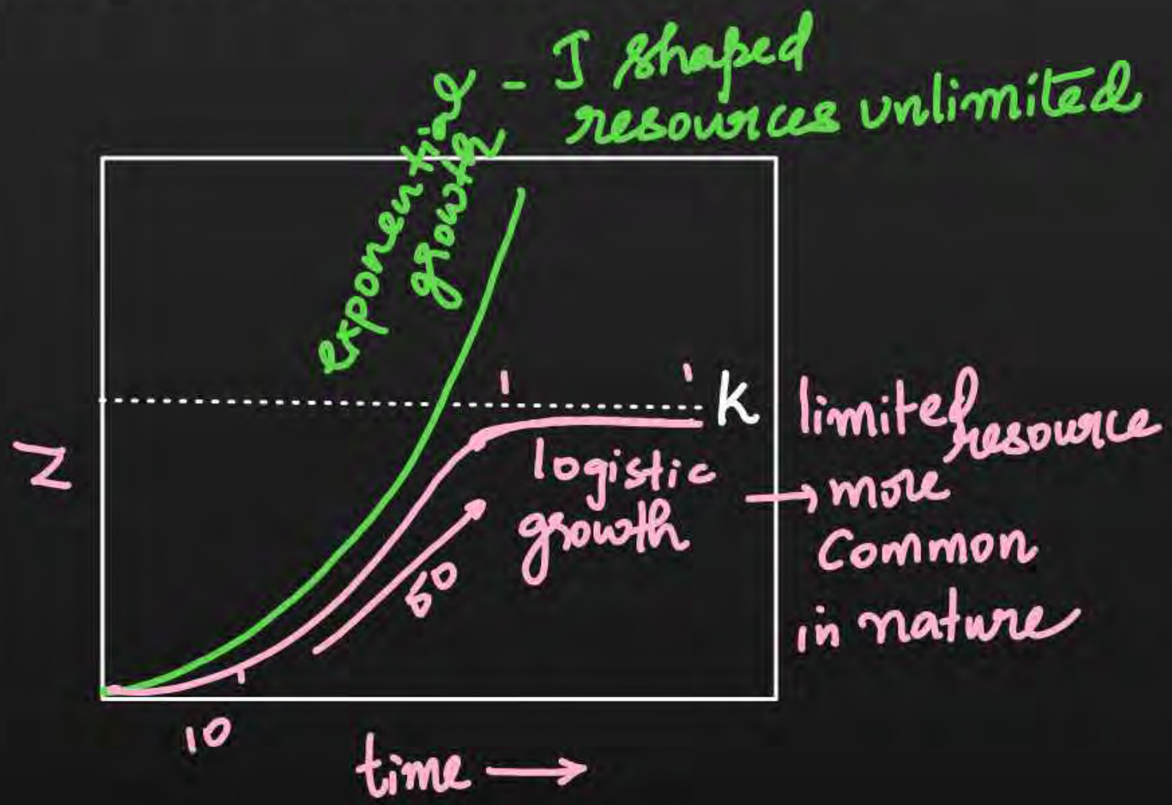
$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$ - logistic growth curve

A. Population density

B. Extrinsic rate of natural increase

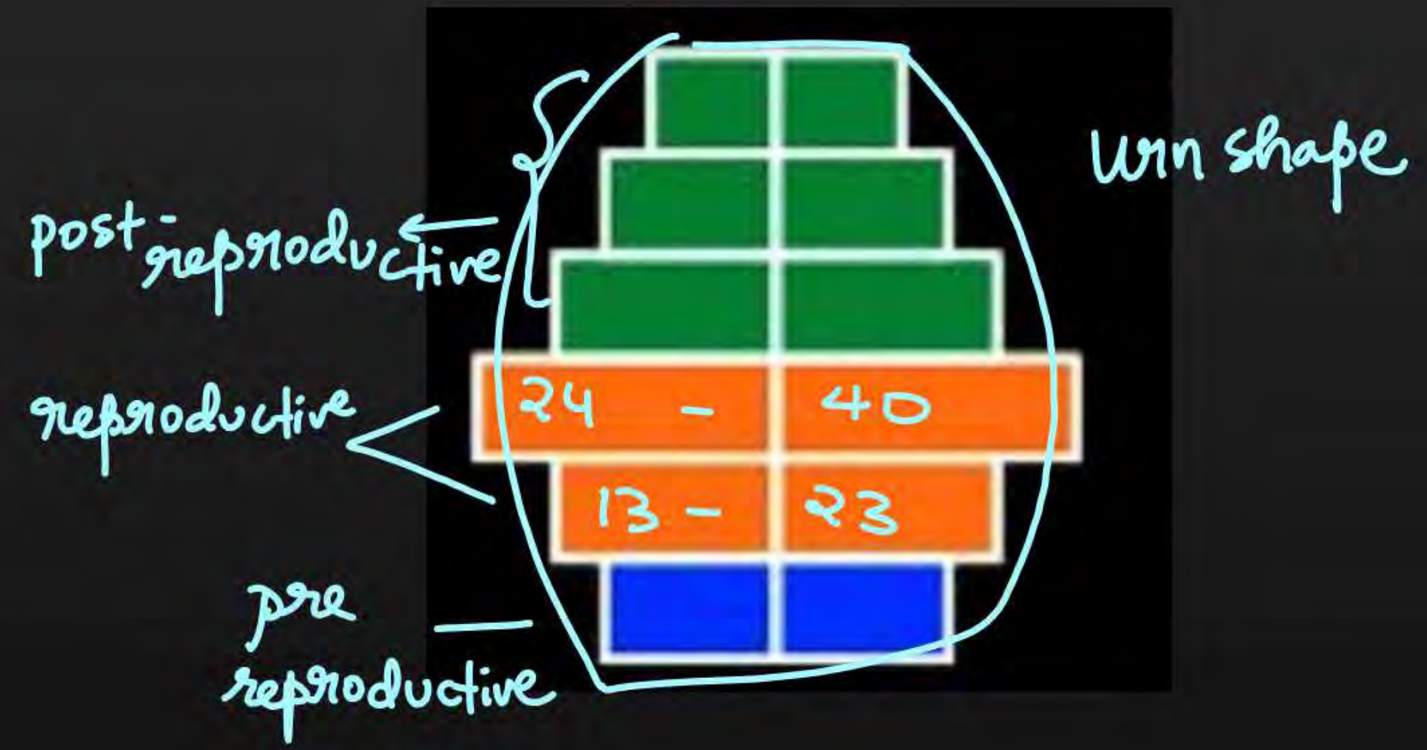
C. Intrinsic rate of natural increase

D. Carrying capacity



Question

The shape of the pyramids reflects the growth stats of the population. Identify the type of age pyramid represented below for human population.



A. Declining

B. Expanding

C. Ascending

D. Stable

Question

Identify the correct statement/s from the following

I. Cuscuta is a chlorophyllous endoparasite.

II. The human liverfluke needs only one host to complete its life cycle.

III. The life cycle of endoparasite is more complex due to their extreme specialisation.

IV. During the course of evolution, the host bird's egg have evolved to resemble the eggs of the parasitic bird.

(A) I, II, III

(B) II, IV

(C) Only III

(D) I, III and IV

Question

Relate Column I with Column II with regard to predatory behaviour.

Column I		Column II	
A	Calotropis	i	Invertebrates
B	Pisaster	ii	Distasteful
C	Monarch butterfly	iii	Cryptically coloured
D	Frogs	iv	Cardiac glycosides

A (A)-(iv); (B)-(i); (C)-(iii); (D)-(ii)

B (A)-(iv); (B)-(i); (C)-(ii); (D)-(iii)

C (A)-(ii); (B)-(iv); (C)-(i); (D)-(iii)

D (A)-(iii); (B)-(i); (C)-(ii); (D)-(iv)

Question

Population size keeps changing depending on different factor/s such as

A food availability

B predation pressure

C adverse weather

D all of the above

Question

Average natality rate in our village is 25 , average mortality is 24 , immigration 2 and emigration 3 and the net increase in population is

A. 10

B. 0

C. 27

D. 5

+ B = Natality = 25

− D = Mortality = 24

+ I = immi - 2

− E = emmi - 3

during new habitat formation

Population density

$N_{t+1} = N_t + [(B+I) - (D+E)]$

$= [(25+2) - (24+3)]$

$27 - 27$

$= 0$

Question

Cuscuta is an example of

→ heterotrophic - parasitic

A Ectoparasitism ✓

B brood parasitism

C Predation

D endoparasitism.

Question

In the equation GPP – R = NPP (2023)
GPP is Gross Primary Productivity
NPP is Net Primary Productivity.
R here is

(A) Reproductive allocation

(B) Photosynthetically active radiation

(C) Respiratory quotient

(D) Respiratory loss ✓

amt of biomass produced per year!

Productivity

1° plants
- GPP
- NPP

- amt of biomass produced by plant anually.
- GPP = Total amt of biomass

GPP - R = NPP

2° Consumers
- amt of biomass synthesized newly by consumers anually

Question

The amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis is called: (2022 Re)

A. Net primary production

B. Secondary production

C. Primary production

D. Gross primary production

Question

In the equation GPP- R = NPP. (2021)
R represents:

A Retardation factor

B Environnent factor

C Respiration losses

D Radiant energy

Question

In relation to gross primary productivity and net primary productivity of an ecosystem, which one of the following statements is correct? (2020)

(A) Gross primary productivity is always more than net primary productivity.

(B) Gross primary productivity and net primary productivity are one and same.

(C) There is no relationship between Gross primary productivity and net primary productivity

(D) Gross primary productivity is always less than net primary productivity.

Question

Identify the correct statements: (2023)

A. Detrivores perform fragmentation

B. The humus is further degraded by some microbes during mineralization.

C. Water soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.

D. The detritus food chain begins with living organisms.

E. Earthworms break down detritus into smaller particles by a process called catabolism.

Choose the correct answer from the options given below:

(A) D, E, A only A, B, C only (C)

(B) B, C, D only C, D, E only (D)

Question

Given below are two statements: (2022)

Statement I: Decomposition is a process in which the detritus is degraded into simpler substances by microbes.

Statement II: Decomposition is faster if the detritus is rich in lignin and chitin.

In the light of the above statements, choose the correct answer from the options given below.

(A) Statement I is incorrect but Statement if is correct

(B) Both Statement I and Statement II are correct

(C) Both statement I and statement II are incorrect

(D) Statement I is correct, but Statement II is incorrect

fast → warm
→ O_2 - optimum
→ rich in 'N_2' & water soluble sugars.

Slow - low O_2
- rich in lignin & chitin

Question

Detritivores breakdown detritus into smaller particles. This process is called.
(2022)

A Decomposition

B Catabolism

C Fragmentation

D Humification

Question

The rate of decomposition is faster in the ecosystem due tom following factors EXCEPT: (2020-Covid)

A. Warm and moist environment

B. Presence of aerobic soil microbes

C. Detritus richer in lignin and chitin

D. Detritus rich in sugars

Question

Which of the following statements is not correct ? (2021)

A Pyramid of biomass in sea is generally upright. ✗

B Pyramid of energy is always upright. ✓

C Pyramid of numbers in a grassland ecosystem is upright. ✓

D Pyramid of biomass in sea is generally inverted. ✓

Question

Match the trophic levels with their correct species examplesm in grassland ecosystem. (2020)

	Column-I		Column-II
1.	Fourth trophic level ii	(i)	Crow
2.	Second trophic leveliii	(ii)	Vulture
3.	First trophic level iv	(iii)	Rabbit
4.	Third trophic level i	(iv)	Grass

A 1-(iii) 2-(ii) 3-(i) 4-(iv) 1-(iv) 2-(iii) 3-(ii) 4-(i) (C)

B 1-(i) 2-(ii) 3-(iii) 4-(iv) 1-(ii) 2-(iii) 3-(iv) 4-(i) (D)

Question

Which of the following statements is incorrect? (2020-Covid)

10% law

A. Energy content gradually increases from first to fourth trophic level

B. Number of individuals decreases from first trophic level to fourth trophic level

C. Energy content gradually decreases from first to fourth trophic level

D. Biomass decreases from first to fourth trophic level

Question

Which of the following ecological pyramids is generally inverted? (2019)

A. Pyramid of numbers in grassland

B. Pyramid of energy

C. Pyramid of biomass in a forest

D. Pyramid of biomass in a sea

Question

In an ecosystem if the Net Primary Productivity (NPP) of first trophic level is 100x (kcalm-2) yr–1, what would be the GPP (Gross Primary Productivity') of the third trophic level of the same ecosystem? (2024)

$\frac{100 \times 10}{100} = 10$

$\frac{10 \times 10}{100} = 1$

100x = 1st

10x = 2nd

1x = 3rd

GPP

(A) $10x(kcalm^{-2})yr^{-1}$

(B) $\frac{100x}{3x}(kcalm^{-2})yr^{-1}$

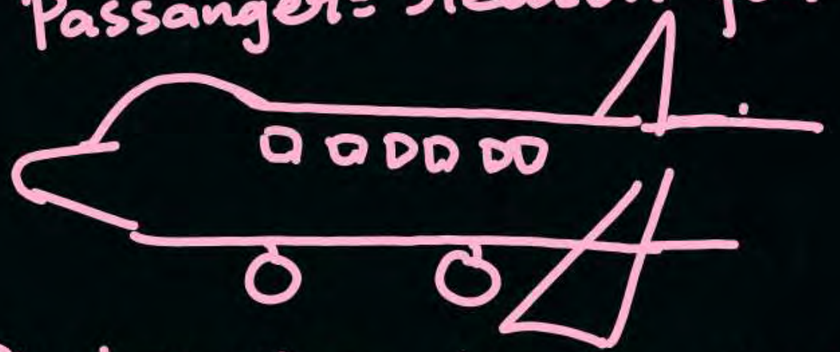
(C) $\frac{x}{10}(kcalm^{-2})yr^{-1}$

(D) $x(kcalm^{-2})yr^{-1}$ ✓

Question

In 'rivet popper hypothesis', Paul Ehrlich compared the rivets in an airplane to: (2023-Manipur)

Aeroplane = ecosystem
Rivet = species
Passanger = reason for extinction



Rivet on wings = keystone species

(A) species within a genus ✓

(B) genetic diversity

(C) ecosystem

(D) genera within a family

Question

Give the correct descending order of organisms with reference to their estimated number found in Amazon forest.

(A) Plants 2
(B) Invertebrates 1
(C) Fishes 3
(D) Mammals 5
(E) Birds 4

Choose the correct answer from the options given below. (2022 Re)

A (B) > (A) > (C) > (E) > (D) (A) > (B) > (E) > (D) > (C) (C)

B (A) > (C) > (D) > (B) > (E) (B) > (A) > (E) > (D) > (C) (D)

Question

Frugivorous birds are found in large numbers in tropical forests mainly because of:
(2022 Re)

A. temperature conducive for their breeding

B. lack of niche specialisation

C. higher annual rainfall

D. availability of fruits throughout the year ✓

Question

Which of the following regions of the globe exhibits highest species diversity?
(2020)

A Madagascar

B Himalayas

C Amazon forests

D Western ghats of India

Question

According to Robert May, the global species diversity is about:
(2020)

A 20 million

B 50 million

C 7 million

D 1.5 million

Question

According to Alexander von Humboldt:
(2020-Covid)

A. Species richness increases with increasing area, but only up to limit

B. There is no relationship between species richness and area explored

C. Species richness goes on increasing with increasing area of exploration

D. Species richness decreases with increasing area of exploration

Z = 0.1 - 0.2
Z = 0.6 - 1.2
Z = 1.15

Question

Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?

(2023)

A Co-extinctions

B Habitat loss and fragmentation ✓

C Over exploitation for economic gain

D Alien species invasions - examples

Question

Which of the following is/are cause(s) of biodiversity losses?
(2023-Manipur)

A. Over-exploitation, habitat loss and fragmentation

B. Climate change only

C. Over-exploitation only

D. Habitat loss and fragmentation only

Question

Habitat loss and fragmentation, over exploitation, alien species invasion and co-extinction are causes for:

(2022)

A Natality

B Population explosion

C Competition

D Biodiversity loss

Question

Which of the following is the most important cause for animals and plants being driven to extinction?

(2019)

A. Habitat loss and fragmentation

B. Drought and floods

C. Economic exploitation

D. Alien species invasion

Question

The historic Convention on Biological Diversity, 'The Earth Summit' was held in Rio de Janeiro in the year:

(2023)

A 2002 - World Summit - Johannesburg

B 1992 ✓

C 1985

D 1986

Question

The World Summit on sustainable development held in 2002 in Johannesburg, South Africa pledged for:

(2022 Re)

A. Collection and preservation of seeds of different genetic strains of commercially important plants.

B. A significant reduction in the current rate of biodiversity loss.

C. Declaration of more biodiversity hotspots.

D. Increase in agricultural production.

Question

Match List-I with List-II:
Choose the correct answer from the options given below: (2020)

	List-I		List-II
A.	Sacred groves iv	(I)	Alien species
B.	Zoological park iii	(II)	Release of large quantity of oxygen
C.	Nile perch i	(III)	Ex-situ conservation
D.	Amazon forest ii	(IV)	Khasi Hills in Meghalaya

(A) A-IV, B-III, C-II, D-I A-IV, B-III, C-I, D-II (C) ✓

(B) A-II, B-IV, C-I, D-III A-IV, B-I, C-II, D-III (D)

Question

Western Ghats have a large number of plants and animal species that are not found anywhere else. Which of the following term is used to notify such species?

(2022 Re)

A. Vulnerable species

B. Threatened species

C. Keystone species

D. Endemic species

Question

Which of the following is not a method of ex situ conservation?
(2022)

A. Cryopreservation

B. In vitro fertilization

C. National Parks

D. Micropropagation

Question

In-situ conservation refers to:
(2022)

A. Conserve only extinct species

B. Protect and conserve the whole ecosystem

C. Conserve only high risk species

D. Conserve only endangered species

Question

In the following in each set a conservation approach and an example of method of conservation are given

A. In situ conservation - Biosphere Reserve

B. Ex situ conservation - Sacred groves

C. In situ conservation - Seed bank

D. Ex situ conservation - Cryopreservation

Select the option with correct match of approach and method: (2020-Covid)

A. A and D

B. B and D

C. A and B

D. A and C

Question

Which one of the following is not a method of in situ conservation of biodiversity?
(2019)

A Biosphere Reserve

B Wildlife Sanctuary

C Botanical Garden

D Sacred Grove

Question

The Earth Summit held in Rio de Janeiro in 1992 was called
(2019)

A. To reduce CO_2 emissions and global warming

B. For conservation of biodiversity and sustainable utilization of its benefits

C. To assess threat posed to native species by invasive weed species

D. For immediate steps to discontinue use of CFCs that were damaging the ozone layer

Thank You