

- Q1 c) Interactive studies of organisms among themselves and their physical environment is called ecology. This interaction tends to result in grouping of organisms called ecological hierarchy - this includes
- Organism → Population → Community → Ecosystem → Landscape
- Q2 a) @ organism level ecology is called physiological ecology - which attempts to understand how organisms are adapted to their environment to survive and reproduce. Elements that influence adaptations - temperature, water, light and soil.
- Q3 b) Shelford's law of tolerance is a principle developed by American zoologist V. Ernest Shelford (1913); it states that - distribution of species is controlled by environmental factor for which organism has lowest range of tolerance, the organisms which have wide range of tolerance will be well distributed.
- Q4 d) Adaptation is an evolutionary process where an organism becomes better suited to its habitat - takes generations. Adaptive variations/radiations is relatively fast evolution of many species from single common ancestor.

- Q5 c) Heliophytes are plants that best grow in full sunlight. These have thicker stem, short internodes many branches, well developed roots, thick leaves. Intense light favours formation of flowers, fruits and seeds.
- Q6 d) A thermocline - called metalimnion in lakes is a thin, distinct layer of water in which temperature changes rapidly.
It is intermediate layer between epilimnion & hypolimnion.
- Q7 c) Large expanse of tropical, subtropical land receives seasonal annual rains between 60-120cm, thus do not support extensive trees.
- Q8 b) The profundal zone of an inland water body as lake/pond is located below the range of effective light penetration, thus primary production do not prevail.
- Q9 d) Sciophytes - grows in shades
Psammophytes - grows in sandy surface
Both the given statements are incorrect.
- Q10 b) The flow of energy in the ecosystem is unidirectional because the energy lost as heat from the living organisms of food chain cannot be reused by plants in photosynthesis.

- Q11 a) The ecological efficiency is ratio of net productivity (amount of energy) at one trophic level to net productivity at level below
- $$NPP(\text{Trophic level } x) : NPP(\text{Trophic level } x-1)$$
- Ecological efficiency varies depending on organisms involved, but usually range from 5-20%.
 - This means that 80-95% of energy at one level never transfers to the next.
- Q12 c) Lincoln index provides way to measure population size of individual species - it was developed by F. Charles Lincoln.
- The ability of population to increase under ideal envt'l condition is called biotic potentials
- Q13 d) A biocenosis, coined by Karl Möbius (1877) describes interacting organisms living together in a habitat. It is an association of different organisms forming a closely integrated community.
- Q14 c) Underneath frozen fresh upper layer, the water remains in its liquid form and does not freeze. Also oxygen is trapped beneath the layer of ice.

Q15 a) Standing state / quality is amount of nutrient present in soil.

standing crop is amount of biomass present in an ecosystem.

Q16 a) The number of organism in food chain can be represented graphically in a pyramid - Sir Charles Elton - Each bar representing the number of individuals in each trophic level of food chain. It can be upright and inverted.

Q17 b) Adaptation rules

Bergmann - species of larger size is found in colder areas

Allen - limbs of species in colder climate will be shorter

Gloger - heavy pigmented forms are found in humid environment

Rensch - biological rule concerning the relationship between ~~sexual~~ sexual size.

Q18 a) Climax community is ultimate / final stage of succession, remaining relatively unchanged until destroyed by an extreme event.

Q19 a) Chemotrophs are producers, producing food energy and matter by process of chemosynthesis

Q20 a) All given pairs are correct.

Q21 c)

Shikari Devi	- Himachal Pradesh
Bhadra	- Karnataka
Tikarpara	- Odisha
Panchmar	- Madhya Pradesh

Q22 b) Bioaccumulation is entry of pollutants in the food chain.

Biomagnification is tendency of increasing concentration of pollutants from one trophic level to the other. If pollutants are short lived, it will be broken down before it becomes dangerous.

Q23 c) A nutrient cycle may be referred as perfect/imperfect

Perfect cycle is one in which nutrients are replaced as fast as they are utilized - gaseous cycle

Imperfect cycles are sedimentary cycle where some nutrients are lost or locked and are not available for immediate recycling.

Q24 b) Majority of world's supply of water is in the oceans about 97.6%.

Ice sheets and glaciers hold a large amount of fresh water - 1.86%.

Ground water, river, lake, soil moisture and atmosphere accounts for rest of share with decreasing order.

Q25 a) Habitat Niche - where it lives

Food Niche - what is consumed or decomposed

Reproductive Niche - how and when it reproduces

Phys/chem Niche - temp, land, humidity requirements.

Q26 c) Eutrophic - lakes rich in nutrients and high productivity

Oligotrophic - lakes with low nutrients and thus low productivity

Hydrarch - aquatic succession

Xerarch - barren land succession

Q27 c) Based on adaptive characters xerophytes can be

Ephemerals - are drought escapers, completing their life cycle in one season

Succulents - are drought enduring plants, they have capacity to store water

Non succulents - are drought resistant plants - true xerophytes.

- Q28 a) Epiphytes grow perched on supporting plants
Tropophytes are plants adapted to climatic conditions with periods of heavy rain followed by drought.
- Q29 d) Autecology is ecology of individual species that is also called species ecology
- Q30 c) Capillary water held between pore spaces of soil particles and angles between them is the most important form of water available to the plants.
- Q31 b) Charles Elton was first to use the term niche, that is not only where organism lives, but sum total of env'tal requirements
Taxonomically different species occupying similar habitats in different geographical regions are called ecological equivalents.
Grp of species with comparable role and niche dimensions within a community is called guilds
- Q32 c) All pairs are correct
Phototropism of plant/Organism in response to light is positive phototropism - towards light
Negative phototropism - away from light.

Q33 d) Top forest cover gain

- Andhra Pradesh
- Telangana
- Odisha
- Karnataka
- Jharkhand

worst forest cover loss

- Assam Pradesh
- Manipur
- Nagaland
- Mizoram
- Meghalaya.

→ FSI have registered 177% increase in the forest fire incidences - making it the most important challenge

Q34 c) Four wheels of Zero Budget Natural Farming are

- Bijamitra — seed treatment
- Jiwamitra — soil treatment
- Mulcherip — soil protection
- Waaphasa — soil enrichment

Q35 d) All four are ecosystem services.

Q36 a) Green Rating for Integrated Habitat Assessment

GRHA is promoted by Ministry of New and Renewable Energy for green rating for houses

Q37 b) All are considered to be major air pollutants - the primary air pollutants - generated by combustion, evaporation

Q38 c) India became signatory of UNCCD in 1994
Reversing land degradation and accelerating positive achievement for people is core agenda of Land degradation Neutrality - (2018-30)

Reduce - Reverse - Restore - are its pillars

Q39 d) Reefs type found in country -

- Fringing reef - Gulf of Mannar, Gulf of Kutch
Andaman & Nicobar Islands
- Oceanic Atolls - Lakshadweep group of islands
- Platform reefs - Gulf of Kutch

As coral needs sunlight to survive, water transparency levels should be high for coral habitat.
Gulf of Khambhat - mouth of R. Narmada, R. Tapi, R. Mahi and R. Sabarmati - have low water transparency thus do not have coral reefs.

Q40 c) Soil impoverishment relates to removal of nutrients from soil. It is also called reverse fertilization.

Q41 e) Nudation is initiation of new plant succession by major environmental disturbances as caused by volcanic eruption

It is followed on by Invasion - Competition - Reaction and Stabilization.

Q42 b) Oxisol, typical to rainforests of tropics are having characteristics of low nutrient reserves, extremely leached thus infertile.

Q43 d) The leaves perform three main functions -

- manufacturing of food
- interchanging of gases both atmosphere and plant body
- transpiration of water

Q44 b) When water is lost from aerial parts of plants it forms - transpiration.

When water is lost in form of liquid from margins of leaves - Guttation

Q45 e)

Dudhwa	-	Uttar Pradesh
Panna	-	Madhya Pradesh
Pench	-	Madhya Pradesh
Inetravati	-	Chattisgarh.

Q46 d) An ecosystem is interaction of living and non living things in an environment

A biome is a specific geographic area known for species living there.

Q47 b) Biogas is mixture of gases produced by the breakdown of organic matter in absence of oxygen.
Biogas is primarily methane and CO_2

Q48 b) In oceanography a halocline (salt slope) is characteristic of salinity gradient vertically within a body of water.

Q49 a) MoEFCC migratory birds action plan is to provide protection to 20 wetlands

The Action plan will demarcate boundaries of cluster under Wetland rules 2017

India includes three flyways - Central Asian, East Asian Australian and Asian East African of approximate 370 migratory species 310 are water birds.

Q50 c) N ^o Terrapin	- Sundarbans
Clouded Leopard	- E ⁿ & NE ⁿ India
Humpback whale	- Arabian sea
Red Panda	- Sub Himalayas in NE India

Under Integrated development of wildlife habitat 21 recovery programs are active

Q51 d) Eco sensitive zones are notified under EPA 1986

It aims at regulating activities around PAs

• Permitted activities	- Organic farming
• Regulated activities	- resorts, commercial agriculture
• Prohibited activities	- mining, manufacturing.

- Q52 a) New road map of LDN - 2018-30 as Strategic Framework has been agreed upon to improve livelihood of >1.3 billion people
- Q53 a) The special report on Global warming of 1.5°C - highlights increasing risks to health livelihood and food security. World has already warmed up by 1°C since pre industrial times.
- Q54 a) Spatial/habitat Niche is physical space occupied by an organism.
Trophic Niche is trophic position of an organism in ecosystem.
Multidimensional/Hypervolume Niche is range of activities of organism depending on all aspects of environment.
- Q55 b) Under Air Quality Index (real time web monitoring)
- 8 Pollutants - PM₁₀, PM_{2.5}, NO_x, O₃, CO, SO₂, NH₄, Pb are monitored
- 6 health categories
- Good
 - Satisfactory
 - Moderate
 - Poor
 - Very Poor
 - Severe

Q56 a) 99% of flamingoes that migrates to Mumbai are lesser flamingoes
Sector, Uran, Mahul, Mulund are imp. habitat in Thane Creek Flamingo Sanctuary.

Q57 b) ISRO's Space Application Centre in collaboration with Kurukshetra University Outlined the causes of mass bleaching of corals in Indian Ocean coral reef region - Sea surface Temperature i.e. heat stress.

Q58 a) All the given pairs are correct

Q59 a) The episodic nature of earth's glacial and interglacial periods within the present geological age have been caused primarily by variations in earth's eccentricity, Axial tilt and Precession called Milankovitch cycles - proposed by Siberian astronomer Milthun Milankovitch

Q60 b) Rice and Water hyacinth are examples of tolerance to toxicity caused by Cadmium

Phytoremediation is the process of using plants to remove Cadmium from contaminated soil

stenohaline are organism that lives in small range of salinity.

- Q61 d) Based on pedogenesis (soil formation) soils are divided into -
- Residual soil - formed by weathering
 - Transported soil - deposited by transporting agents
- Q62 d) Holoparasites - are total parasites
Hemiparasites - are partial parasites
- Q63 a) Response of animals to abiotic factors includes
- Regulate - maintain homeostasis
 - Conform - failing to maintain homeostasis
 - Migrate - escape from stressful habitat
 - Suspend - becoming inactive
 - Hibernation - long winter sleep
 - Aestivation - avoiding summer related problem
 - Diapause - temporary pause in growth/develop
- Q64 d) Amount of light available for photosynthesis of plants is called photosynthetically Active Radiation (PAR). It is essential for plant growth.
- Q65 c) Autogenic - occurs as a result of biotic factors as in forest ecosystem tall plants provides growth possibilities to sciophytes

Allogenic - occurs as a result of abiotic factors as replacement of existing community due to soil erosion.

- Q66 a) Edward Wilson popularized the term biodiversity. Species diversity refers to number and richness of species in a habitat.
- Q67 a) Stupendemys is prehistoric, freshwater side necked turtle. Its fossil has been found in northern South America, in rocks dating from late Miocene to Pliocene.
- Q68 4) Dry ice is solid form of CO_2 , a molecule consisting of a single carbon atom bonded to two oxygen atoms.
It is used to flash freeze food or lab biological samples.
- Q69 c) There is the National Water Policy in pipeline to regulate overpressurised resource.
Many countries like Australia, South Africa and Israel have national policies of water planning.

Q70 a) Also called Atlantic Meridional Overturning Circulation (AMOC) is influenced by rising temperature in Indian Ocean. (IOR)

Warming of IOR generates additional precipitation which in turn draws more air from Atlantic. This reduces precipitation in Atlantic increasing salinity thus circulation.

Q71 c) Phytoplanktons / phototrophs are responsible for most of the transfer of CO_2 from the atmosphere to ocean - harvests light to convert inorganic to organic carbon.

Algae growth is optimal in warmer water

Q72 c) As graded approach to scale up urban sanitation ODF protocol have been launched. It is third party certification with six months validity.

Q73 a) During photosynthesis, plants takes CO_2 and H_2O from air and soil. Within the plant cell the water is oxidised (loses electrons) while CO_2 is reduced (gains electrons) This transforms / splits water into oxygen and CO_2 into glucose

Q74 b) all of them are monitored for LDN

- Q75 c) The National Tiger Conservation Authority in collaboration with Wildlife Institute of India has published document titled - Connecting Tiger populations for long term conservation, has mapped 32 major corridors through a Tiger Conservation Plan.
- Q76 b) The White Rumped vulture has suffered the most severe decline, followed by Indian Vulture and Egyptian Vulture.
- Q77 d) The Eaglenest Wildlife Sanctuary is home of Red Panda, Clouded leopard and over 500 bird species.
- Q78 b) Originally stretching to 230 hectares, encroached by paddy cultivators and excessive use of chemicals - as cause of concern
- Q79 a) all given statements are correct.
- Q80 b) Sand mining and overfishing were the causes of concern.

- Q81 c) Atal Bhujal Yojana is centre sector scheme also called Atal Jal, will promote panchayats led ground water management. It is mobilised in selected water stressed areas of seven states - Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, UP.
- Q82 a) The World Energy Trilemma Index, developed in partnership with World Energy Council, provides an objective rating of National energy system performance across three dimensions -
- Energy security
 - Energy equity
 - Environmental sustainability of energy systems
- Q83 b) length of growth period hardly plays role in growth as growth performance of trees depends just on few days. Warmer days in spring and autumn thus hardly contribute to wood growth which is important for CO₂ sink capturing.

Q 84 a) 'The Sunderbans and climate change' - made public in Convention on Conservation of Migratory Species (CMS) highlighted need for long term Coastal planning.

The forum comprised scientists from Wildlife Institute of India, World Wildlife fund for Nature, Wildlife Trust of India, Turtle survival alliance

Q 85 b) Jaldapara National Park had 5 Rhinos dead due to anthrax

Q 86 c) The National Zoological collection (NZC) is also designated as repository under Biodiversity Act 2002 for Access and Benefit sharing

Q 87 e) Montreux Record is register of Ramsar Sites where changes in ecological character have evolved

Keoladeo - Water shortage & unbalanced grazing

Loktak - deforestation, Pollin and Water hyacinth

80 Ramsar Sites nearly accounts for 80% of Indian Wetlands.

- Q88 a) In India Western Ghats (Dargoji Sloth Bear Sanctuary) Karnataka
- Q89 a) There are 36 industries in White category including biofertilizers, biopesticides, medical oxygen, cotton/hellen hosteries, organic manure etc.
- Q90 a) Sambar deer is found almost in entire India. but is mainly confined in Central India. Kanha, Corbett, Ranthambore, Gir, Dudhwa, are prominent-protected areas
- Q91 b) The National Policy on Biofuels promotes setting up of supply chain mechanism for biodiesel production from non edible oil seeds. It divides Basic biofuel (1G) - bioethanol, biodiesel
Adv biofuel (2G) ethanol, municipal solid waste
Third Gen (3G) - bio CNG.
- Q92 a) Net zero energy buildings combines energy efficiencies and renewable energy generation
Net zero energy cost - electricity bills
Net zero energy emissions - carbon equivalent GHGs

Net zero source energy - purchases/produces = consumption

Net zero site energy - produces renewables = consumption

Q93 a) Indian civets are also called Kasturi billi because of scent gland

In Indonesia these are captured from wild and fed on coffee beans for mass production of trendy coffee in world - Kopi Luwak.

Q94 a) Nearly after 2 decades after Supreme Court banned monoculture plantation (oil palm), there is reinitiation

Baratang - mainly inhabited by Jarawas

Komorta - tribal reserve (Aboriginals Regulation 1956)

Teresa - area of Nicobarase

Little Andaman - area of Ongc Tribe

are recommended areas

Q95 c) ProActive and Responsive facilitation by Interactive and Virtuous Environmental Single Window Hub works under MoEFCC as per the provisions of EPA (1986)

- Q96 b) Manas - One horned Rhino
Gir - Lion
- Q97 a) Higher amount of CO_2 in atmosphere leads to higher global temperatures, which is absorbed by water leading to its expansion
- Q98 a) Catarina Pupfish - Wetlands Mexico (Neclton)
- Q99 c) Buffer zone between two ecosystems is ecotone.
- Q100 c) Avg Net Primary Productivity ($\text{K Cal/m}^2/\text{yr}$)
Estuaries (Mangroves)
Tropical Rain Forest
Temperate Forest -
Tundra
Savannah
Temperate Grass - Prairies/steppes
Lakes/Streams - lentic/lotic
Oceans