



ESE 2018

Prelims Paper - I



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**BASICS OF
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Basics of Energy and Environment

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PREFACE

The laws of nature are absolute, and if not given due respect while framing policies, programmes, and during execution of projects, can pose a serious threat to the very existence of human life. Man in his evolution stumbled upon various sources of energy. Starting from wood, coal, gasoline, nuclear energy to renewable energy, every paradigm shift in energy brought about new challenges in limiting the damage caused to the environment.

This book **Basics of Energy and Environment** builds upon your understanding about the complexities in addressing environmental issues, bit by bit, through detailed diagrams, natural cycles, analysis, linkages and statistics. Starting with the basic definitions of the fundamental units of environment, the book builds upon the complex web of ecosystem and ecology. Further, it goes on to map the ecological depletion, change in climate, and its impact on the various environmental processes.

No individual, country, or society howsoever powerful can survive the challenge of climate change on its own. This wisdom, arrived through various international conventions and treaties, has been beautifully constructed in a time line while decoding and analysing every single move, which built upon our collective consciousness to this day.

The book organically builds upon the thought process, where you learn the complex interchanges of energy and environment in an effortless manner. Thus, you will be able to derive upon correct answers whatever be the spin given to the questions by UPSC. Energy and environment is a hot topic, and this book ensures that you do not miss out on any question in Engineering Services Exam (ESE).

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Questions

1. Which of the following ecological pyramid is always upright?
 - (a) Pyramid of number
 - (b) Pyramid of biomass
 - (c) Pyramid of energy
 - (d) None

2. Which of the biogeochemical cycle match with their prime representatives?
 - (a) Sedimentary cycle- Carbon cycle
 - (b) Gaseous cycle – nitrogen cycle
 - (c) Sedimentary cycle- nitrogen cycle
 - (d) Gaseous cycle – phosphorous cycle

3. The basic level of ecological organization starts with _____.

(a) Population	(b) Community
(c) Individual	(d) Ecosystem

4. Which among the following is the coldest layer of Earth's atmosphere?

(a) Mesosphere	(b) Stratosphere
(c) Troposphere	(d) Ionosphere

5. What is the range of electromagnetic spectrum for visible region?

(a) 400-700 nm	(b) 0.4-0.7 nm
(c) 0.1-0.2 nm	(d) 20-25 nm

6. Which among the following soil water is available and utilized by plants?
 - (a) Hygroscopic water
 - (b) Capillary water
 - (c) Gravitational water
 - (d) Chemically bound water

7. What is correct for the term "lapse rate"?
 - (a) It is vertical temperature gradient over earth's surface.
 - (b) Its value is 6.5 degree Celsius/1000m elevation.
 - (c) Both A and B are correct.
 - (d) None of the above.

8. Habitat is _____.
 - (a) A place where organisms live.
 - (b) Niche is habitat.
 - (c) Both A and B.
 - (d) None.

9. Choose the correct order
 - (a) Organism-population-ecosystem-community-landscape-biome-biosphere
 - (b) Organism-population-community-ecosystem-landscape-biome-biosphere
 - (c) Organism-community-population-ecosystem-landscape-biome-biosphere
 - (d) Organism-community-population-ecosystem-biome-landscape- biosphere

10. Animals who can maintain their body temperature at constant level irrespective of atmosphere are known as____
 - (a) Poikilothermic animals
 - (b) Warm blooded animals
 - (c) Cold blooded animals
 - (d) Both A and C

11. Which among the following is incorrect?
 - (a) Oceans cover 2/3rd of the earth's surface
 - (b) Tropical rain forest and savannas together account for 60% of terrestrial Net Primary Productivity.
 - (c) Rate of biomass production per unit area is called productivity.
 - (d) None

12. Choose the correct statement :
 - (a) Food chain is relatively short
 - (b) Food chain have 3-5 trophic links with 15-20 species
 - (c) 10% of the energy store in organic matter of each trophic levels is converted to organic matter at next trophic level
 - (d) All of the above

13. Food web ____
- Represents feeding relationship between organism in an ecosystem
 - Consists of interlocking food chain.
 - None of the above
 - A and B both
14. Choose the correct match :
- Autotrophs- produce own food
 - Consumers- plants
 - Omnivorous- producers
 - Carnivorous- eat both plants and flesh
15. Depict the ecological pyramid for a situation of a single tree along with its dependent insect population :
- Upright
 - Always upright
 - Inverted
 - A and B
16. Which of the following is included in biodiversity?
- Genetic and species diversity
 - Climatic and species diversity
 - Cultural and ecosystem diversity
 - Lingual and cultural diversity
17. What was the main aim of Man and Biosphere (MAB) Program (1971)?
- Improve relationship between people and environment
 - Improve relationship in between man
 - This program is invalid, never existed.
 - Improve the water level in the biosphere
18. Which is true for natality?
- Ability of an individual to produce new individual
 - Refers to death of an individual
 - It is the measure of death rate
 - A and B.
19. Choose the incorrect definition :
- Temperature- degree of hotness and coldness
 - Estuary-transition area between river and sea.
 - Ecology- relationship between organism and their environment
 - Niche- is a habitat or place to live.
20. Cycle of which nutrient has both lithospheric and gaseous phase?
- Sulphur
 - Carbon
 - Nitrogen
 - All of the above
21. Ecotone is ____ .
- A transition zone
 - Zone of vegetation separating two types of community
 - High diversity region
 - All of the above
22. Choose the example of positive interaction (one or both benefit each other, no harm to any of the species interacting) :
- Mutualism
 - Ammensalism
 - Commensalism
 - A and C both
23. Choose the odd one out :
- Mutualism
 - Ammensalism
 - Competition
 - Parasitism
24. Tropical orchids use trees or their branches for support without harm or benefit to the tree is an example of :
- Commensalism
 - Mutualism
 - Ammensalism
 - Competition
25. Rhizobium (Nitrogen fixing bacteria) lives in root nodules of legumes and derives nutrition from host plant. In return it fixes atmospheric nitrogen and make it available to plant is an example of:
- Commensalism
 - Mutualism
 - Ammensalism
 - Competition
26. What makes a phosphorous cycle differ from carbon and nitrogen cycle?
- Absence of liquid phase
 - All three are same
 - Absence of gaseous phase
 - Presence of liquid phase
27. Which among the following is correct for succession?
- Succession is unidirectional progressive series of a change
 - Climax community marks the end point of succession
 - Both are incorrect
 - Both a and b are correct

28. Which stage is the temporary stage in successional process?
 (a) Seral stage (b) Climax stage
 (c) None (d) Both a and b
29. Which of the following is not related to the primary succession?
 (a) Bare areas
 (b) Pioneer species
 (c) No community existed before
 (d) Grassland
30. Which among the following are extinct species?
 (a) Gharial
 (b) Blue-billed duck, solitary eagle
 (c) Dodo, passenger pigeon
 (d) Polar bear vulnerable to extinction
31. Which of the following are endangered species?
 (a) Giant panda, snow leopard
 (b) Tiger, Indian rhinoceros
 (c) Dodo
 (d) Both a and b
32. Which of the following belongs to in-situ conservation?
 (a) Naturally occur
 (b) Sacred grooves, national park
 (c) Wild life sanctuaries
 (d) All of the above
33. Which of the following does not belong to ex-situ?
 (a) Zoos (b) National parks
 (c) Gene banks (d) Botanical garden
34. What are the key features of a region to qualify as a hot-spot?
 (a) Must contain at least 1500 species or vascular plants (>0.5% of world's total endemics)
 (b) Must have lost 70% of original habitat
 (c) Richest and most threatened reserves of plants and animals
 (d) All of the above
35. Which national park in India has a substantial population of Great Indian one horned rhino?
 (a) Rajaji National Park
 (b) Jim Corbett National Park
 (c) Kaziranga National Park
 (d) Bandipur National Park
36. Which among the following are biotic province of Indian desert?
 (a) Ladakh mountains (trans Himalayas)
 (b) Thar, kutch
 (c) Punjab, gujrat-rajwara (semi-arid)
 (d) Western ghats mountains (western ghat)
37. Ecological pyramid :
 (a) Based on the rate of energy flow is always upright
 (b) Graphically represent the trophic structure and function
 (c) Producers occupy the base of pyramid
 (d) All are correct
38. Which of the following level possess the greatest amount of free energy?
 (a) Decomposers
 (b) Secondary consumers
 (c) Producers
 (d) Tertiary consumers
39. _____ is not recycled in an ecosystem.
 (a) Nitrogen (b) Energy
 (c) Water (d) carbon
40. Which of the following statement is correct?
 (a) Niche is a habitat where organisms live
 (b) The niche includes the behavioral characteristics of organisms
 (c) Both are correct
 (d) Both are incorrect
41. Which of the following is correct concept of competitive exclusion?
 (a) Two species cannot share the same niche in a habitat
 (b) Two species cannot co exist in same habitat
 (c) Intraspecific competition results in best adapted individual
 (d) Competition is positive interaction



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42. Bio magnification refers to :
- (a) Local consumption of crops
 - (b) Slash and burn forest clearing
 - (c) Tendency of a compound to accumulate in an organism tissue
 - (d) Tendency of chemicals to increasingly concentrate at successive higher trophic level in a food chain
43. Species experiencing extremely high risk of extinction in immediate future is called
- (a) link species (b) rare
 - (c) endangered (d) vulnerable
44. Choose the incorrect statement :
- (a) Western ghats is one of the hotspot in India.
 - (b) Earth summit held in 1992 Rio de Janerio to prevent ozone depletion at stratosphere
 - (c) The Nanda Devi biosphere reserve is the first biosphere reserve in india
 - (d) The Eastern Himalyas is one of the hotspot in india
45. Which of the following is not a feature of shifting cultivation
- (a) Regular pesticide application
 - (b) Local consumption of crops
 - (c) Relatively small fields
 - (d) Slash and burn forest clearing
46. Denitrification (nitrates to N_2) is the process _____
- (a) Performed by viruses such as pseudomonas species
 - (b) Performed by bacterial species such as pseudomonas and clostridium in an anaerobic condition
 - (c) Performed under aerobic conditions
 - (d) Performed by viruses such as pseudomonas under aerobic condition.
47. Parasites are :
- (a) Host specific
 - (b) Able to live on host (ectoparasite-mites)
 - (c) Able to live inside host(endoparasites-bacteria in the gut og human)
 - (d) All of the above
48. Basis to recognize biodiversity hotspots are :
- (a) Their proximity to natural parks and reserves
 - (b) Degree to which species are threatened with extinction
 - (c) Number of endemic species
 - (d) b and c only

ANSWER KEY

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

EXPLANATIONS

- | | |
|---|---|
| <p>1. (c)
In Pyramid of energy some amount of energy looses when transferred from one successive level to another.</p> <p>2. (b)
Carbon cycle is gaseous cycle.
Nitrogen cycle is only in gaseous phase.
Phosphorous cycle is in sedimentary/lithospheric phase only.</p> <p>4. (a)
In mesosphere temperature is -90°C; as we goes up in the mesospheric layer the temperature decreases and the top layer of mesosphere is coldest.</p> <p>6. (b)
Hygroscopic water : is attached to soil not utilized by plant.
Capillary water : is water present in thin capillaries can be utilized by plants.
Gravitational water : is water percolates deep into the soil but not available to plants.</p> <p>10. (b)
In Poikilothermic animals, body temperature fluctuate with change in environmental temperature.
Animals who maintain their body temperature are called Warm blooded animals.</p> | <p>16. (a)
Genetic, species diversity and ecosystem diversity are elements of biodiversity.</p> <p>18. (a)
Natality is the ability of an individual to produce new individual.</p> <p>19. (d)
Niche is the some of all activity and relationship of a species by which it uses the resources in its habitat for a its survival and reproduction.</p> <p>22. (d)
Mutualism : both benefitted +VE interaction.
Ammensalism : 1 harm, other not affected.
Commensalism : 1 benefitted host unaffected.</p> <p>26. (c)
Phosphorous is lithospheric nutrient and have sedimentary phase only while nitrogen and carbon cycle has gaseous phase.</p> <p>29. (d)
Grassland ecosystem is a secondary succession because primary succession occur when there is no succession or production before.</p> <p>30. (c)
Gharial : critically endangered.</p> |
|---|---|

Blue-billed duck, solitary eagle : species at the lower risk.

Dodo, passenger pigeon : even the last individual had died.

Polar bear : vulnerable to extinction.

34. (d)

Key features of a region to qualify as a hot-spot are :

It must contain at least 1500 species or vascular plants (>0.5% of world's total endemics).

It must have lost 70% of original habitat.

It should have richest and most threatened reserves of plants and animals.

36. (b)

Ladakh mountains : trans Himalayas.

Thar, kutch : Indian desert.

Punjab, Gujrat-Rajwara : semi-arid.

38. (c)

With each successive trophic level energy is being lost. So, at producer level the energy is maximum.

41. (a)

Competition exclude one or both of the species from an ecosystem.

44. (b)

Earth summit held in 1992 Rio de Janerio was based on sustainable development.

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