Environmental Science and Technology

(End Exam- 2022)

Section-I: Match the Following [write number in the bracket] (15 Marks) **[COs-1to6]**

A.	**Computer components**	**Chemical constituents**	
1.	Printed circuit boards	a. Cadmium	[2]
2.	Computer batteries	b. Poly Chlorinated Bi-phenyls	[3]
3.	Capacitors and transformers	c. Poly Vinyl Chloride	[5]
4.	Switches & flat screen monitors	d. Lead & cadmium	[1]
5.	Cable insulation/coating	e. Mercury	[4]
B.	**Vegetation**	**Climatic conditions**	
1.	Chapparal	a. Bitter cold, high winds and thus no trees	[5]
2.	Temperate Grasslands	b. Receives lots of moisture as rain or snow	[4]
3.	Temperate Deciduous	c. Mid-latitudes with moderate moisture	[3]
4.	Coniferous forest	d. Marked by seasonal drought and fires	[2]
5.	Tundra	e. Mild rainy winters long, hot, dry summers	[1]

C.	**Gases**	**GWP**	
1.	CH4	a. 21	[1]
2.	HFCs	b. 310	[4]
3.	SF6	c. 92,00	[5]
4.	N2O	d. 11,700	[2]
5.	PFCs	e. 23,900	[3]
D.	**Source Material**	**Pollutant**	
1.	Pipe Insulation	a. Methyl chloride	[4]
2.	Furniture	b. Chloroform	[2]
3.	Air fresheners / moth balls	c. Mold, bacteria	[5]
4.	Paint stripper / thinner	d. Para dichloro benzene	[3]
5.	Heating and cooling ducts	e. Asbestos	[1]
E.	**Year**	**Act/Rule**	
1.	2010	a. The Biomedical waste Rules	[5]
2.	1972	b. The Biological Diversity Act	[4]
3.	1986	c. The Wildlife Protection Act, Rules	[2]
4.	2002	d. Wetland Rules	[1]
5.	1998	e. The Environment Protection Act	[3]

Section-II: Choose the Correct Answer and write in the bracket (5 marks) **[CO-1to6]**

1. What is the meaning of the word "endemic" [a]

a. Rare and occur only in a few locations b. Rare and occur everywhere

c. Abundant and seen everywhere d. Abundant and only in few locations

2. A "green transport plan" is: [a]

a An environmentally acceptable travel plan devised by a local authority for its area

b An internationally agreed strategy for reducing the impact of international transport activity on the global environment

c A plan devised by a company or organization to reduce the environmental impact of the transport demands generated by itself and its employees

d The government's plan for a sustainable transport sector

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3. The Government of India approved the EIA notification in the year [c]
a 1996 b 1998 c 1994 d 1998

4. Which of the following statements is false? [c]
a Inorganic nutrients are recycled in an ecosystem
b Energy flows through the ecosystem in the form of carbon-carbon bonds
c Energy is recycled in an ecosystem
d Respiration process release energy

5. Which of the following adjustments would be made to any increase in GDP in order to derive an 'Index of Sustainable Economic Welfare'? [d]
a. Subtract the monetary value of non-defensive public expenditures
b. Subtract the monetary value of personal consumption
c. Subtract the monetary value of capital formation
d. Subtract the costs of environmental degradation

6. In an ecosystem, the flow of energy is [c]
a. Bidirectional b. Cyclic c. Unidirectional d. Multidirectional

7. Sustainable development will not aim at [d]
a Social economic development which optimizes the economic and social benefits available in the present, without spoiling the likely potential for similar benefits in the future
b. Reasonable and equally distributed level of economic wellbeing that can be perpetuated continually
c. Development that meets the needs of the present without compromising the needs of future generations to meet their own needs
d. Maximizing the present-day benefits through increased resource consumption

8. One of the predictions of climate change models is that parts of the world will be subject to drastic climate change: wet areas may experience drought, and dry areas may experience excess water due to changes in rainfall patterns and/or changes in sea levels. However, recent research shows that there has been very little change in world-wide drought since 1950. This shows that: [b]
a. Global warming is not happening
b. We must nevertheless not ignore the importance of water as a crucial resource
c. As most of the earth's surface is covered by water, we have even less to worry about.
d. Worries about rising sea levels are misplaced

9. A high Biological Oxygen Demand (BOD indicates that: [d]
a. water is pure b. absence of microbial action
c. Low level of microbial pollution d. High level of microbial pollution

10. Country that has started accounting emission in nation income under the name of National Accounting Matrix Including Environmental Accounts is [a]
a. The Netherlands b Namibia c Indonesia d Norway

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Section III: Fill in the blanks (15 marks) **[COs-1to6]**

1. An example of "Local industries" was taken to discuss **Integrate Material and energy flow** Principle of green engineering.
2. Number of Ramsar sites in India as on Aug 2022 **75**
3. **Grasshopper and global distillation** phenomenon is responsible for accumulation of pollutants in arctic region
4. **Hypercane** is a hypothetical class of extreme tropical cyclone that could form if ocean temperatures reach approximately 50 °C
5. The complex network of interconnected food chains is called **Food Web**
6. **Wild Me** is an open-source AI technology/platform to identify and track wildlife
7. **Sunderlal Bahuguna** (person) led both Chipko and Tehri dam movement
8. The organism which consumes decaying organic matter is **Detrivores**
9. Mississippi River network is an example of **Eutrophication** environmental problem.
10. The word Klima in Climatology stands for Slope
11. **Nuclear** projects are not eligible under CDM
12. **Basel** convention is framed to regulate trans-boundary movement of hazardous waste
13. If the dry biomass of a tree is 2 tons, then it contains around **ONE** tons of carbon
14. **TRASE** platform maps the links between food importing countries and the places where the food is produced.
15. Methane reduction from livestock can be achieved by adding **Seaweed** to cattle feed

Section-IV: Expand (5 marks) **[COs-1, 2, 6]**

a. CER Certified Emission Reductions
b. EDP: Eco Domestic Product
c. IPCC Intergovernmental Panel on climate Change
d. IUCN International Union for Conservation of Nature
e. SSRRS Soil Suction Radon Reduction System

Section-V: What is (5 marks) [one or two sentences] **[COs-1,3,5]**

a. Green Tax

Green tax or environmental tax is a tax imposed on environmental pollutants or on goods whose repeated use contributes to pollution

b. Ramsar Convention

The Ramsar conservation an international treaty for the conservation and sustainable use of wetlands

c. Kyoto protocol

A global legal instrument (international agreement) to protect the climate system and stabilize GHG emissions

d. Green certificate

A tradable asset which proves that electricity has been generated by a renewable (green) energy source

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e. Trophic cascade

Trophic cascade are powerful indirect interactions that can control entire ecosystems, occurring when a trophic level in a food web is suppressed

Section VI: Give an example (5 marks) **[COs-1, 5]**

a. Source isolation strategy in indoor air quality maintenance
copy machine areas, food service stations, and bathrooms

b. No Money: No Existence
Grand Parent Services; Feminist work: Barter system in Third world countries

c. Carbon capturing company: Climeworks; Carbon Engineering; Global Thermostat

d. Green website: EvenGreener. blubolt PRO; City Museum. Atomicdust PRO

e. Non-Marketed Environmental Goods: fuelwood gathering, Meat and food gathered for consumption, medicinal plants, irrigation water

Section VII: Differentiate between (10 marks) **[COs-3,4, 5]**

a. Thick and Thin client
A thick client is a computer that does not require a connection to a server system to run while Thin Clients are small, silent devices that communicate with a central server

b. Kyoto protocol and Paris Agreement
The KP required only developed countries to reduce emissions, while the Paris Agreement recognized that climate change is a shared problem and called on all countries to set emissions targets

c. Libertarian and Ecological Extension
Libertarian echoes a civil liberty approach and commitment to extend equal rights to all members of a community while Ecological extension places emphasis not on rights, but on recognition of fundamental interdependence of all biological entities.

d. Green computing and Green Engineering
Green computing is the environmentally responsible and Eco-friendly use of computers and their resources and Green Engineering is is the process and design of products aiming to conserve natural resources leading to sustainability goals.

e. Emission trading and Joint Implementation under Kyoto protocol
ET- The Protocol allows countries that have emission reduction commitments (Annex I countries) and that have emissions units to spare, as compared to their commitments, to sell this excess capacity to other Annex I countries that are over their targets. And JI Allows industrialized (annex I) countries to meet part of their commitments by paying for projects that reduce emissions in other annex I countries

Section IX: Brief account (10 marks) [3- 4 sentences] **[COs-1, 2, 5, 6]**

a. Why there will be more lightening process in the event of climate change?
Lightning occurs when electrical charges build up within the water vapor of a cloud. Warmer temperatures due to global warming mean there will be more water vapor trapped in the atmosphere, leading to more lightning

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b. How Denim manufacturing impacts the environment?
Large water consumption for denim fibre production, the use of fertilizers and chemical dyes during manufacture lead to eutrophication.

c. Write about any topic of EVST course, not given in this question paper.

d. Define sustainability. Under which category of sustainability do you place Green Accounting relating to Hicksian income concept? Why?
Economic and social development that meets the needs of the current generation without undermining the ability of future generations to meet their own needs.
GA conforms to Weak Sustainability because investing capital in any form is more feasible than only investing in a renewable environmental resource.

e. Advantages of blue carbon habitat restoration [3 points]
store **three to five times** more carbon than upland tropical forests, mostly in soil (carbon sequestration); providing nursery grounds for wildlife; and offering protection against coastal storms

Section X: Give a short account (**Any Two**) 10 marks **[COs-1, 4]**

a. Types of environmental ethics
Anthropocentrism
It is the idea that the Earth and its resources exist for human consumption. According to Anthropocentrists, environmental ethics involve protecting the Earth for the use of future generations. Instrumental importance of non-human species and not intrinsic importance.
Biocentrism
All natural things have intrinsic value. The environment is seen as an end in itself, and not valued only as a means to human ends. In biocentric view, we have a moral duty to protect the environment and living things even when they do not benefit our interests.
Ecocentrism Philosophy believes the importance of an ecosystem as a whole. Humans are only one part of a complicated system that is the Earth. Equal importance is given to living and non-living components of ecosystems. Holistic school of thought that sees little importance in individuals.

b. Diamonds from air pollution
Purchasing Co2 from Climeworks'-shipping it to the US, where the diamonds are grown. CO2 is put through a proprietary process to convert it into high purity CH4. CH4 is then injected directly into the diamond reactors, where "chemical vapor deposition" is used to grow rough diamond material over the course of several weeks. The chemical vapor deposition involves heating gasses to very high temperatures under near-vacuum conditions. Once the diamonds finish growing, they're shipped to Surat, India, where they're cut and polished before being sent back to New York City's for sale. Each carat removes the equivalent of 20 tons of carbon (half energy consumption/avoid 127 gallons of water).

c. Ventilation measurement Methods

A. In naturally ventilated buildings

- By *Infiltration* measurement. Infiltration is reported as *air change per hour* (ACH) – the average rate at which indoor air is replaced by fresh outdoor air.ACH is a rough guideline for different building conditions, given by ASHRAE. For e.g., in "*air tight buildings*" ACH is 0.1 to 0.2, in "*leaky building*", ACH is 2.0 to 3.0.

- *Tracer gas technique* is employed to measure infiltration. Non-reactive gases, e.g. SF_6/NO are used as tracer gases with the assumption that the loss of tracer gas is only due to ventilation/ exfiltration.

B. In mechanically ventilated buildings

- ACH is measured by CO_2 concentration. It is a good *surrogate index* to determine the proper ventilation in HVAC buildings. ASHRAE model for measuring infiltration in HVAC buildings is –

$$Q = G/ C_i - Ca$$

Minimum recommended ventilation rate (Q) by ASHRAE is *8L/sec. per person* to maintain the *indoor concentration of CO_2 as 700 ppm*.

Section XI: Given a detailed account (10 marks) **[COs-5, 6]**

What is SNA? Define its framework? Why the concept of SNA remained so popular for longer time? How SNA is different from SEEA? How natural assets are classified in SNA and SEEA?

SNA: System of National Accounts (1)
Framework: GNP = C + I +G + (X – M) + (R - P) (2)
NNP = GNP - D
GDP = C + I +G + (X – M)
Where:
C = Consumption; I = Investment; D = Depreciation; X = Exports; M = Imports
R = Received, P = Paid; G= for government expenditure = good and services consumed by the Government

Popular (2.5)

1. Importance of Economic Growth (*post war depression)*
2. No One Thought about the Environment
3. Dominance of the Market System (*ex.green house effect*)
4. Difficulty of Accounting for the Environment (*car vs nature)*
5. Difficulty in Introducing a New System (*satellite accounts*)

Different form SEEA (2)
The SEEA (1993) expanded and complemented SNA with flow and stock accounts of natural resources in monetary units and for the calculation of environmental-adjusted GDP or **Green GDP**.
Classification of assets (2.5)
Asset boundaries of both SEEA and SNA, in respect of cultivated assets and sub-soil assets are same.
Air is included only in SEEA and not in SNA.
SNA land includes - water surfaces such as lakes and rivers and in some instances also ground water.
SEEA excludes these categories from land but includes them under Water. SEEA land includes ecosystems.
SNA water resource is restricted to aquifers.

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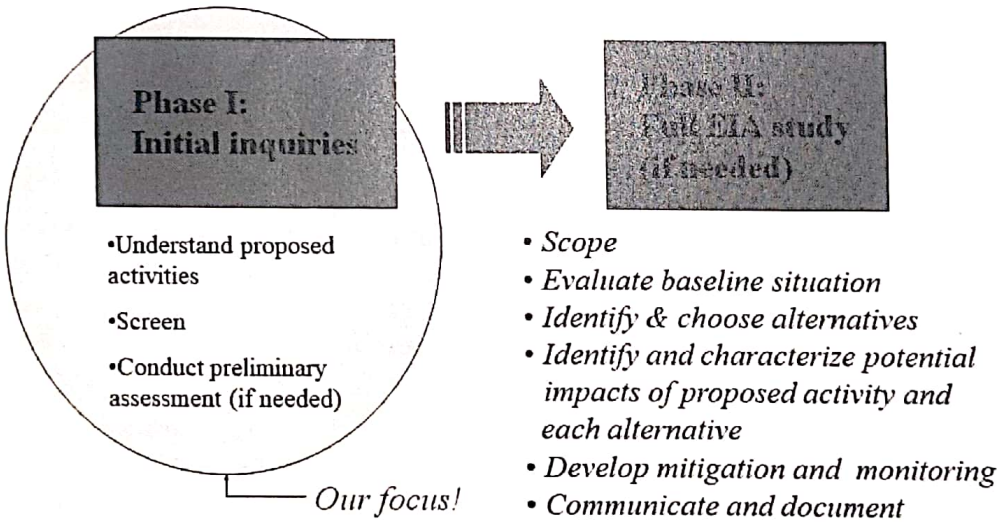
OR

An Investor wants to put up an Industrial Plant for the manufacture of paper and its derivatives for both local and external market. The Investor intends to establish the paper manufacturing mill in a relatively wet and forested upper parts of Laikipia District in the slopes of Mt. Kenya. Apart from the paper mill, the Investor will also provide infrastructure and social amenities in the region. In view of the socio-economic and bio-physical environmental implications that may result due to the proposal, there has been public debate particularly on the loss of habitat/biodiversity and competition for scarce water resources in the region. Assuming your consultancy firm has won a contract to undertake Environmental Impact Assessment (EIA) study on this proposed project:

Discuss the logical steps in the EIA process that your study team is likely to follow in order to achieve the task assigned to you. Justify the formation of the Interdisciplinary Team for this EIA study.

The EIA process



Composition of expert committee
Ecosystem management
Air/water pollution control
Water resource management
Flora/fauna conservation and management
Land use planning
Social sciences / rehabilitation
Project appraisal
Ecology
Environmental health

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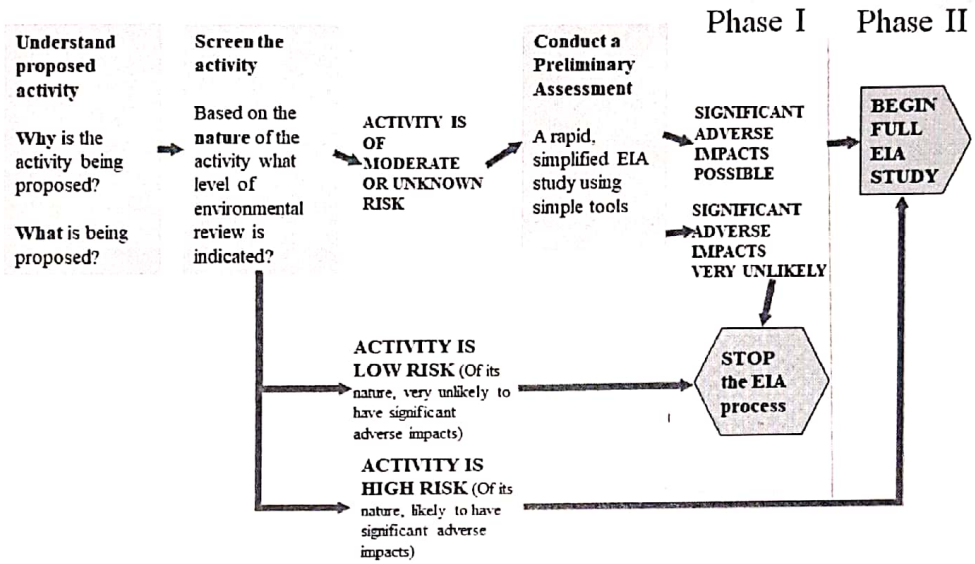
NGO representatives

Phase 1 of the EIA Process

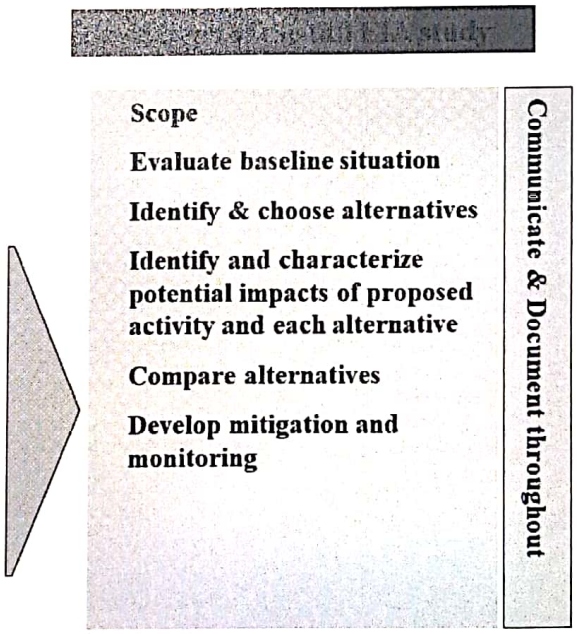


Phase 2 of the EIA process:

The Full EIA study

With a few additions, the basic outline of the preliminary assessment is the template for the steps involved in a full EIA study:

1. **Background (Development objective, list of activities)**
2. **Description of the baseline situation**
3. **Evaluation of potential environmental impacts**
4. **Mitigation & monitoring**
5. **Recommended Findings**



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