

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Define Eutrophication.
2. What is an ecological pyramid ?
3. Define air pollution.
4. What is a landslide ?
5. Define vulnerability.

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Explain landslide and its causes.
2. Discuss various problems affecting food security.
3. Explain different types of ecosystem.
4. What are the sources of Marine pollution ?
5. Describe various sources of thermal pollution.
6. List out the environmental effect of drought.
7. Describe the mitigation strategy for flood disaster.

(5×6 = 30)

PART — C  
(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Demonstrate the problem due to deforestation. 8  
(b) Appraise the effect of modern agricultural technology. 7

OR

- IV (a) Analyse the disadvantage of large dams. 8  
(b) Explain the uses of minerals. 7

UNIT — II

- V (a) Discuss the basic concept of food chain. 8  
(b) Write down the characteristics of a forest eco system. 7

OR

- VI (a) Describe ecological succession. 8  
(b) Explain consumers based on their mode of consumption. 7

UNIT — III

- VII (a) What are the sources of water pollution ? 8  
(b) Describe briefly on sewage treatment process. 7

OR

- VIII (a) Discuss various methods of waste management. 8  
(b) What are the sources of pollution ? 7

UNIT — IV

- IX (a) What is a TREM card and explain the emergency procedure in Truck/Tanker accidents. 8  
(b) List out causes and consequences of nuclear explosion. 7

OR

- X (a) Discuss Bhopal tragedy. 8  
(b) Explain land use zoning. 7

①

⑭

## SCHEME OF VALUATION

/ B

Rev (15)

Course Code 3001

Course Title ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT

Qn. No	Scoring Indicators	Split up score	Sub total	Total
1.	Eutrophication means over nourishment. Due to this lakes get invaded by algal blooms, these algae grows very fast by rapidly using up nutrients, they often are toxic and badly affect the food chain.	1	1	2
2.	Ecological pyramids are graphic representations of trophic levels in an ecosystem	2	2	2
3.	Air pollution means any solid, or liquid or gaseous substances present in the atmosphere in such concentrations that may tend to be injurious to human beings or other living creatures or plants or property or enjoyment.	2	2	2
4.	Landslide can be defined as the downward and outward movement of slope forming materials composed of rocks, soils, artificial fills or combination of all these materials along surfaces of separation by falling, sliding and flowing either slowly or quickly from one place to another.	2	2	2
5.	The extent to which a community, structure, services or geographic area is likely to be damaged or disrupted by the impact of particular hazard, on account of their nature, construction and proximity to hazardous terrains or a disaster prone area.			

part B

II	<p>1. During construction of roads &amp; mining activities huge portion of fragile mountainous areas are cut and thrown into adjacent areas and streams. These land masses weaken the already fragile mountain slopes and lead to landslides called man made land slides</p> <p><u>causes:</u></p> <ul style="list-style-type: none"> <li>- removal of vegetation</li> <li>- underground mining</li> <li>- transport</li> <li>- addition of weight</li> <li>- Ground water level</li> </ul>	1	1	
2.	<ul style="list-style-type: none"> <li>- population growth</li> <li>- Global water crisis</li> <li>- poor agricultural practices</li> <li>- Land degradation</li> <li>- Land deals / real estate</li> <li>- Hybridization</li> <li>- climate change</li> </ul>	1	1	6
3.	<ul style="list-style-type: none"> <li>- natural ecosystem (forest, ocean, grassland etc)</li> <li>- Artificial ecosystem (aquarium, dam, crop field, garden etc)</li> </ul>	4	6	6
	<p>Based on habitat</p> <ol style="list-style-type: none"> <li>i. - Terrestrial ecosystem (desert, forest, grassland etc) it is also called biomes</li> <li>ii. Aquatic ecosystem: - marine, freshwater</li> </ol> <p>Fresh water — [ Lentic                           Lotic</p>	2	2	6

4.	<ul style="list-style-type: none"> <li>- municipal waste and sewages discharged into sea</li> <li>- pesticides and fertilizers from agriculture field</li> <li>- petroleum &amp; oil washed from roads -</li> <li>- ship accidents</li> <li>- off-shore oil exploration</li> <li>- dry docking</li> <li>- pollution due to organic waste</li> <li>- pollution due to oil</li> <li>- Tanker accidents</li> <li>- volcanic eruption</li> <li>- deep sea mining etc.</li> </ul>	6x1	6	6
5.	<ol style="list-style-type: none"> <li>i. - Industries (hydro electric power plants, coal fired power plants, nuclear power plants, industrial effluents from power, textile, paper &amp; pulp industries)</li> <li>ii. urban run-off: storm water discharged to surface water from roads and parking lots can also be a source of elevated water temp.</li> <li>iii. Domestic sewage: municipal sewage has a higher temp.</li> </ol>	3	3	
6.	<ul style="list-style-type: none"> <li>- Increased desertification - Damage to animal species</li> <li>- Reduction and degradation of fish and wild life habitat</li> </ul>	1	1	6

- Lack of food and drinking water
- Disease
- loss of wildlife in some areas and too many in others
- Damage to plant species
- increased number and severity of fires
- wind and water erosion of soils

6x1 6 6

7.

- Avoid residing on river banks and slopes on river sides
- Build at least 250 mts away from sea coast / river banks
- Build proper drainage systems
- construct the building with a plinth level higher than the known high flood level.
- construct the whole village or settlement on raised platforms higher than the high flood level
- construct buildings on stilts or columns with wall free space at ground level permitting free flow of water at ground level.

6x1 6 6

### part c

III a

- Food problems
- Ecological imbalance
- increasing  $CO_2$
- Floods leading to soil erosion

10 a

- Destruction of resources
- Heavy siltation of dams
- change in the microclimate
- Loss of bio-diversity
- Environmental pollution
- Global warming
- most humid regions changes to desert
- where forests are replanted, their replacement can mean a loss of quality
- some indigenous peoples way of life and survival are threatened by the loss of forest

expl	8	8
expl	8	8

b.

- Impacts related to high yielding varieties
- Fertilizer related problems
- nitrate pollution
- Eutrophication
- pesticide related problems
- Death of non target organisms
- water logging
- salinity problems

List	3	3
expl	4	4
		7

11 a.

- Dam construction and submerision leads to significant loss of farm land and forest and land submergence.

- Saltation of reservoirs, water logging and salination
- Significant and irreversible loss of species and ecosystems, deforestation and loss of bio-diversity affects agriculture.
- Displacement, rehabilitation and resettlement of tribal people
- Fragmentation and physical transformation of rivers.
- Displacement of people
- Impacts on lives, livelihoods, cultures and spiritual existence of indigenous and tribal people.
- Dislodging animal population
- Disruption of fish movement and navigational activities
- Emission of green house gases due to rotting of vegetation
- Natural disasters etc . .

5x1 8 8

IV b.

- developments of industrial plants and machinery
- Generation of energy eg: coal, lignite uranium
- construction, housing, settlements
- Defence equipments
- Transportation
- Communication - telephone wires cables, electronic devices

- 14b.
- medical system - particularly in Ayurvedic system
  - Formation of alloys
  - Agriculture - as fertilizers, seed dressings and fungicides.
  - Jewellery

7x 7 7

14a. The transfer of food energy from producers to decomposers through a series of organisms is called food chain.

A food chain consists of producers (green plants) consumers (animals) and decomposers (microorganisms)

3 3

Two types of food chain

1. grazing food chain: This type of food chain starts from the living green plants, goes to grazing herbivores and on to the carnivores. It directly depends on Sun.

3 3

Grass → grasshopper → frog → snake → micro organisms

2 2 8

2. Detritus food chain

The organic ~~wastes~~ wastes and dead matter derived from the grazing food chain are termed as detritus. This food chain starts with dead organic matter and then to organism feeding on detritus feeders.

- v b.
- Forest has warm climate with adequate rainfall
  - Forest has well defined seasons of about equal length
  - Forest protect biodiversity
  - Forest has tall and dense trees with many wild animals within the eco system.
  - The soil of forest is rich in organic matter and nutrients
  - Forest grow very slowly.
  - Forests provides various resources for human life

- v la.
- factories
  - Refineries
  - waste treatment facilities
  - mining
  - pesticides, herbicides and fertilizers
  - Human sewage
  - oil spills
  - Falling of septic systems
  - soap from washing
  - oil and antifoams leaking from automobiles
  - House hold chemicals
  - Animal waste
  - surface runoff

v1 b. Sewage treatment is the process that removes the majority of the contaminants from waste water or sewage and produces both a liquid effluent suitable for disposal to the natural environment and sludge.

Sewage is a mixture of domestic and industrial wastes. It is more than 99% water, but the remainder contains some ions, suspended solids and harmful bacteria that must be removed before the water is released into sea.

Pre treatment: Large solids and grits are removed by screening

Primary treatment: The water is left to stand so that solids can sink to the bottom and oil & grease can rise to the surface. The scum is washed off with water. Jet - These two substances are combined to form sludge.

Secondary treatment: The sludge is further treated in a sludge digester: Large headed tanks in which its chemical decomposition is catalysed by microorganisms. The sludge is largely converted into biogas a mixture of  $CH_4$  and  $CO_2$ , which is used to generate electricity for the plant.

V.M.K.

Land fill: disposal of waste is a land fill involves burying the waste. A properly designed and well managed landfill can be hygienic and relatively inexpensive method.

incineration: solid organic materials are subjected to combustion so as to convert them into residues and gaseous products.

Recycling: is a resource recovery practice that refers to the collection and reuse of waste materials.

Biological reprocessing: Recoverable materials that are organic in nature, such as plant material, food scraps, and paper products, can be recovered through composting and digestion processes to decompose the organic matter.

Energy recovery: The energy content of waste products can be harnessed directly by using them as a direct combustion fuel or indirectly by processing them into another type of fuel.

Pyrolysis and gasification: waste materials are heated to high temperatures with limited oxygen availability.

Avoidance and reduction methods: known as waste reduction

1 1

1 1

1 1

2 2

1 1

1 1

1 1

8

viii.

- volcanic activity
- Automobile emissions
- combustion of coal
- Acid rain
- noise pollution from automobiles & construction
- power plants
- manufacturing buildings
- Large ships
- paint fumes
- Aerosol sprays
- wild fires
- Nuclear weapons
- Dust from natural sources
- methane emitted by the digestion of food by animals
- smoke and carbon monoxide from wild fires etc.

7x1 7 7

ix.

TREM card (Transport Emergency cards) are written instructions to drivers of vehicles, ship's captains and rail personnel.

1 1

- if possible drive out of populated areas
- Identify the cargo, refer labels, TREM card instructions.
- In case of major leaks of highly inflammable gas/vapour, do not start the engine
- order on workers to leave the affected area

- secure the accident area & divert traffic
- remove affected persons for first aid
- In the event of electrical fire, isolate the battery of the vehicle
- Inform fire stations
- In case of leaks, see if it can be corrected easily
- contain small spills by covering with sand

ix b.

- An accident taking place in any nuclear reactor or in a facility using radioactive sources, leading to a large scale release of radioactivity in the environment.
  - a criticality accident in nuclear cycle facility where an uncontrolled nuclear chain reaction takes place advertently, leading to bursts of neutron and gamma radiations.
  - An accident during the transportation of radioactive material.
  - The use of radioactive material as a radiological dispersal device by terrorist for dispersing radioactive material to the environment.
  - A large scale nuclear disaster, resulting from a nuclear weapons attack (eg: Hiroshima, Nagasaki) which would lead to mass casualties and destruction of large areas and property

x9.

The Bhopal disaster, was a gas leak incident in India considered one of the world's worst industrial disasters.

- it occurred at the night of 2-3 December 1984 at union carbide India Limited (UCIL) pesticide plant in Bhopal, madhya pradesh.
- over 500,000 people were exposed to methyl isocyanate gas and other chemicals
- The toxic substance made its way in and around the shanty towns located near the plant
- Govt confirmed a total of 3787 deaths.
- others estimated death toll 8000 and other 8000 died in gas related diseases.
- In June 2010, seven employees, including the former UCIL chairmen were convicted in Bhopal of causing death by negligence and sentenced to two years and a fine of about 2000 dollars each, the max. punishment allowed by Indian law

Intro -	2	2
Expl.	6	6 8

x6.

Land use zoning can be defined as the segregation of land use into different areas for each type of use: agricultural, industrial, recreational and residential. The primary purpose of zoning is to segregate uses that are thought to be incompatible

2 2

24  
- in practice, zoning is used to prevent new development from interfering with existing residents or businesses and to preserve the "character" of a community.

- zoning may include regulation of the kinds of activities which will be acceptable on particular lots (such as open space, residential, agricultural, commercial or industrial)

- the densities at which those activities can be performed (from low density housing such as single family homes to high density such as high-rise apartment buildings)

- the amount of space the structure may occupy, height of buildings, the location of a building on the lot (setbacks), the proportions of the types of space on a lot as how much landscaped space, impervious surface, traffic lanes and whether or not parking is provided.

- By adopting land use zoning much amount of usage of land can be controlled to an extent

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