TED (15) 3001A

(Revision-2015)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL-2020

ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT

[Maximum marks: 75] (Time: 2.15 Hours)

PART – A

(Answer any ***three*** questions in one or two sentences. Each question carries 2 marks)

I. (1). Define deforestation.

(2). List any four abiotic components of an ecosystem.

(3). Recall the meaning of ecological succession.

(4). Define nuclear pollution.

(5). Write the meaning of hazard. (3 x 2 = 6)

PART – B

(Answer any ***four*** of the following questions. Each question carries 6 marks)

II. (1). Differentiate between renewable and non-renewable resources.

(2). Explain the relationship between hazard, disaster, vulnerability, risk and capacity.

(3). Explain the concept of food chain and food web.

(4). List and brief about any two nuclear hazards occurred.

(5). Identify the causes of land degradation.

(6). Discuss the causes of biodiversity loss.

(7). Explain the concept of ecological succession and its characteristics. (4 x 6= 24)

PART – C

(Answer ***any of the three units*** from the following. Each question carries 15 marks)

UNIT –I

III. List and discuss conventional and non-conventional sources of energy. (15)

OR

IV. Discuss the problems caused to the environment due to. (15)

(a). Dam construction. (b). Mining.

UNIT-II

V. Explain the causes of global warming and its effects on environment. (15)

OR

VI. Explain the concept and role of biodiversity and the need to conserve that. (15)

UNIT-III

VII. Briefly discuss various types of pollution and its impacts on environment. (15)

OR

VIII. Discuss the types of solid wastes, its impacts and management. (15)

UNIT-IV

IX. Explain the types of disasters, its impacts and causes. (15)

OR

X. (a). Discuss the various phases of disaster management cycle. (8)

(b). Explain the importance of hazard zonation map. (7)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL-2020

ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT

[Maximum marks: 75] **ANSWER KEY** (Time: 2.15 Hours)

PART – A

(Answer any ***three*** questions in one or two sentences. Each question carries 2 marks)

I. (1). **Define deforestation -** Deforestation is the permanent removal of trees from land which is then converted to a non-forest use.

(2). **List any four abiotic components of an ecosystem -** rain, temperature, light, wind

(3). **Recall the meaning of ecological succession**

Ecological succession is a continuous change or origination of a biological community

(4). **Define nuclear pollution**. - *Any undesirable effect caused to the environment due to radioactive substances or radiations is called nuclear pollution.*

(5). Write the meaning of hazard. - A hazard is a situation that poses a level of threat to life, health, property or environment **(3 x 2 = 6)**

PART – B

(Answer any ***four*** of the following questions. Each question carries **6** marks)

II. (1). **Differentiate between renewable and non-renewable resources**. –

Renewable Energy	Nonrenewable Energy
• *It can be used again and again throughout its life.*	• *It cannot be used again and again but one day it will be exhausted.*
• *These are the energy resources which cannot be exhausted.*	• *They are the energy resources which can be exhausted one day.*
• *It has low carbon emission and hence environment friendly.*	• *It has high carbon emission and hence not environment friendly.*
• *Cost is low*	• *Cost is high.*
• *Solar energy, wind energy, tidal energy etc are the examples of renewable resources.*	• *Coal, petroleum, natural gases are the examples of non-renewable resources*

(2). **Explain the relationship between hazard, disaster, vulnerability, risk and capacity**

HAZARD

- *A hazard is a situation that poses a level of threat to life, health, property or environment*

DISASTER

- *Extreme unexpected events which causes great loss of life and/or property and create severe disruptions to human activities.*

.

Vulnerability:

- *The extent to which a commodity, structure, services or geographical areas are likely to be damaged or disputed by the impact of a particular hazard, on account of their nature, construction and proximity to hazardous terrains or a disaster prone area.*

Risk

- Expected losses (lives lost, persons injured, damages to property and disruption of economic activity) due to a particular hazard.

- $\boxed{\text{Risk = hazard X vulnerability}}$

Capacity:

- *Ability and measures taken by individual/community to be less affected by the disaster.*

(3). **Explain the concept of food chain and food web.**

Food chain

- Transfer of food energy from green plants through a series of organisms with repeated eating and being eaten is called food chain

- Example :

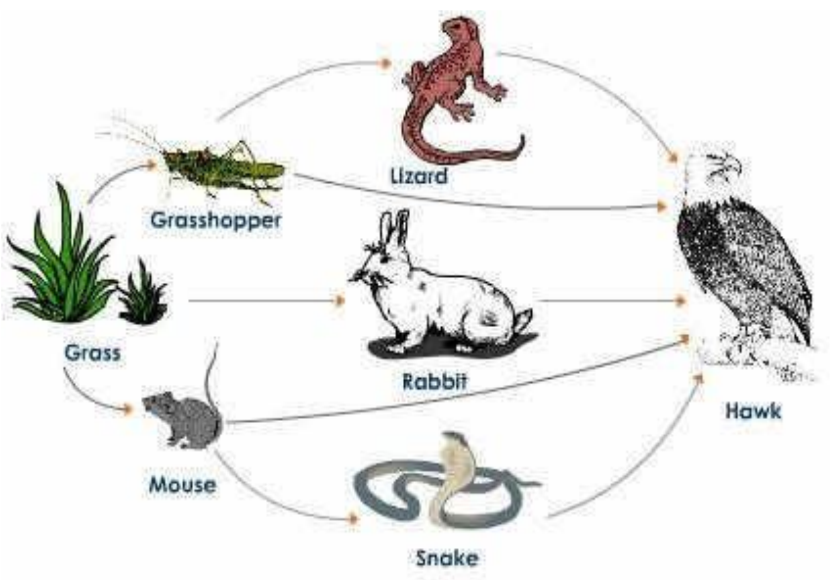
grass → Grass hopper → frog → snake → eagle

FOOD WEBS

CHERPULASSERY,PALAKKAD

- *Food web is a network of interconnected food chains existing in an ecosystem.*

- *One member may be a member of several different food chains.*



(4). List and brief about any two nuclear hazards occurred.

1) CHERNOBYL DISASTER

The **Chernobyl disaster** was a nuclear accident that occurred on Saturday 26 April 1986, at the No. 4 reactor in the Chernobyl Nuclear Power Plant, near the city of Pripyat in the north of the Ukrainian SSR in the Soviet Union . The **Bhopal disaster** or **Bhopal gas tragedy** was an industrial accident. It happened at a Union Carbide subsidiary pesticide plant in the city of Bhopal, India. On the night of 2-3 December 1984, the plant released approximately 40 tonnes of toxic methyl isocyanate (MIC) gas, exposing more than 500,000 people to toxic gases.

A mixture of poisonous gases flooded the city, causing great panic as people woke up with a burning sensation in their lungs. Thousands died immediately from the effects of the gas. Many were trampled in the panic that followed. The first official immediate death toll was 3,598 in 1989. Another estimate is that 8,000 died within two weeks, that an additional 8,000 have since died from gas-related diseases

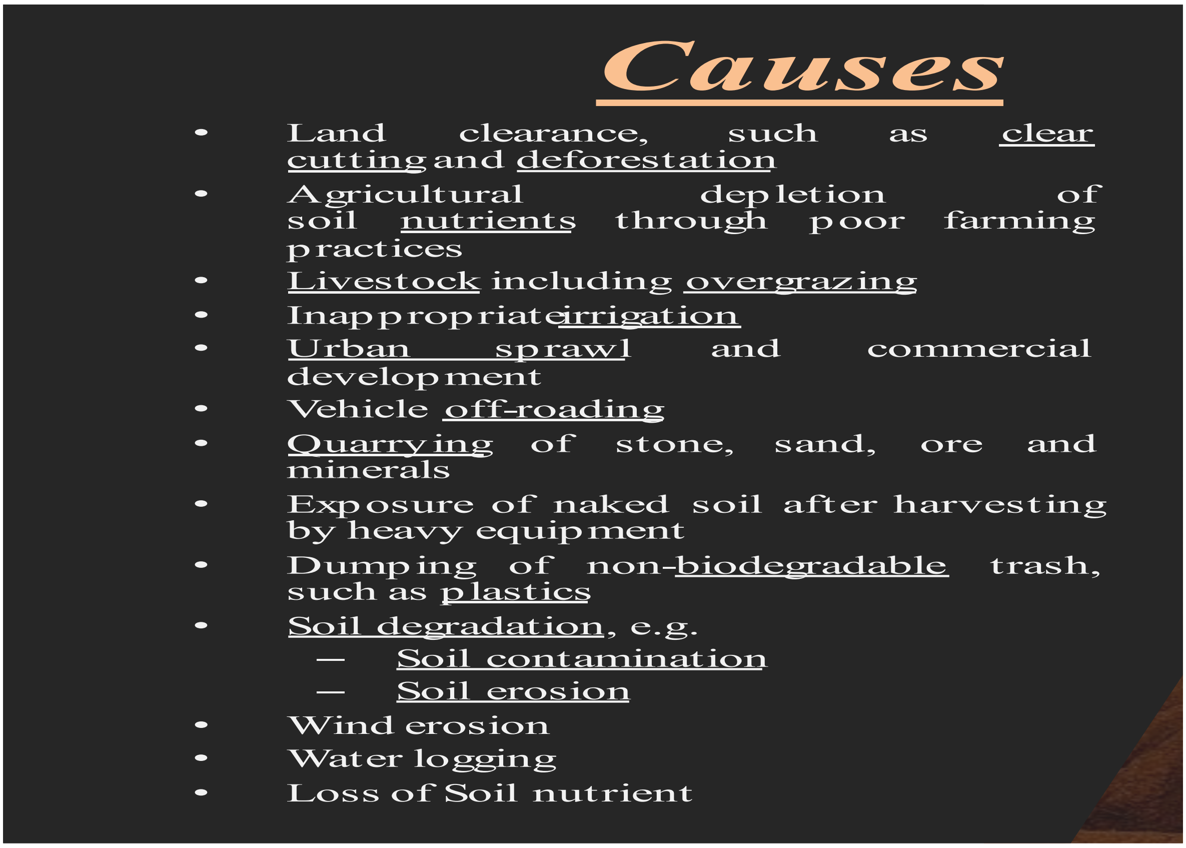
2) BHOPAL DISASTER

The **Bhopal disaster** or **Bhopal gas tragedy** was an industrial accident. It happened at a Union Carbide subsidiary pesticide plant in the city of Bhopal, India. On the night of 2-3 December 1984, the plant released approximately 40 tonnes of toxic methyl isocyanate (MIC) gas, exposing more than 500,000 people to toxic gases.

A mixture of poisonous gases flooded the city, causing great panic as people woke up with a burning sensation in their lungs. Thousands died immediately from the effects of the gas. Many were trampled in the panic that followed. The first official immediate death toll was 3,598 in 1989. Another estimate is that 8,000 died within two weeks, that an additional 8,000 have since died from gas-related diseases

The **disaster** happened because water entered a tank containing Methyl isocyanate. This **caused** a chemical reaction which resulted in the buildup of much Carbon dioxide, among other things. The resulting reaction increased the temperature inside the tank to reach over 200 °C (392 °F).

(5). Identify the causes of land degradation.



(6). Discuss the causes of biodiversity loss.

- Climate change.
- Pollution.
- Destruction of habitats.
- Invasive alien species.
- Overexploitation of the natural environment.
- Extinction of species.
- Threat to human beings.
- Proliferation of pests.

(7). **Explain the concept of ecological succession and its characteristics.**

- Ecological succession is a continuous change or origination of a biological community.
- It is because the new plant and animal species come into an area and alter the environmental conditions.
- The complete process of succession may takes hundreds or thousands of years and introduce a number of intermediate communities.
- It is a gradual process by which ecosystems change and develop over time.

- 3 types

1. Primary succession
2. Secondary succession
3. Aquatic succession

- Primary succession : It is the series of community changes which occur on an entirely new habitat which has never been colonized before. Slow process.

Eg: a newly quarried rock face or sand dunes

- Secondary succession : Series of community changes which takes place on a previously colonized, but disturbed or damaged habitat.

Eg : after felling trees in a woodland, land clearance or fire

- Aquatic succession: Natural succession seen in lakes or ponds in which they are gradually filled and taken over by the surrounding terrestrial ecosystem.

(4X 6 = 24)

PART – C

(Answer ***any of the three units*** from the following. Each question carries **15** marks)

UNIT –I

III. **List and discuss conventional and non-conventional sources of energy.** (15)

Conventional sources	Non conventional sources
1. The sources of energy which are in use from the past are called as conventional sources of energy.	The sources of energy which are in use only from the recent times are termed as Non-conventional sources of energy.
2. These sources are exhaustible in nature.	These energy sources are inexhaustible in nature.
3. Coal, Petroleum, natural gas, electricity, etc., are some examples of Conventional sources of energy.	Tidal energy, wind energy, solar energy, etc., are some examples of non-conventional sources of energy.
4. These sources are polluting the environment.	These sources do not pollute the environment and can be said as eco-friendly sources.

OR

IV. Discuss the problems caused to the environment due to. (15)

(a). Dam construction. (b). Mining.

DAM CONSTRUCTION

PROBLEMS DUE TO DAMS

- Soil Erosion
- Species Extinction
- Spread of Disease
- Resettlement
- Landslides
- Continuous exploitation of forest wealth
- Flora and fauna are disturbed

1. The cost of construction is very high.
2. Sometimes takes decades for construction of dams.
3. High standard materials are required to built dams.
4. Regular maintenance of dams is necessary.
5. Relocation of people living in the surrounding areas of dams. Hence loss of farms and land.
6. The flow of river water is disturbed and may disturb the habitat of wildlife.
7. Risk of flood if dams break by earthquake
8. Dam construction leads to significant loss of farmlands and forest.
9. Conflicts for water takes place due to an unequal distribution of water.
10. Natural disasters.

MINING

IMPACTS DUE TO MINING

- Air Pollution
- Water Pollution (ground & surface water)
- Damage To Land
- Loss Of Biodiversity
- Long-Term Ill-effects Of Mining
- Occupational health hazards

- Unrefined materials are released when mineral deposits are exposed on the surface through mining. Diseases of the respiratory system and allergies can be triggered by the inhalation of such airborne particles.

- Mining also causes water pollution which includes metal contamination, increased sediment levels in streams, and acid mine drainage.

- The creation of landscape blots like open pits and piles of waste rocks due to mining operations can lead to the physical destruction of the land at the mining site

- Mining leads to a massive habitat loss for a diversity of flora and fauna ranging from soil microorganisms to large mammals. Toxins released through mining can wipe out entire populations of sensitive species

- A landscape affected by mining can take a long time to heal. Sometimes it never recovers. Species might be lost permanently.

- Noise and vibrations due to blasting and operation of the machines drive away the wild animals and birds from the nearby forests.

- Stress on local services and people

UNIT-II

V. **Explain the causes of global warming and its effects on environment.** **(15)**

Global Warming is the increase of Earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide, CFC emissions from burning fossil fuels or from deforestation, which trap heat that would otherwise escape from Earth.

Causes of global warming

1. Burning fossil fuels

- When we burn fossil fuels like coal, oil and gas to create electricity or power our cars, we release CO2 pollution into the atmosphere.

2. Deforestation & Tree-Clearing

- Plants and trees play an important role in regulating the climate because they absorb carbon dioxide from the air and release oxygen back into it.

3. Agriculture & Farming

- Some fertilizers that farmers use also release nitrous oxide, which is another greenhouse gas.

4. Power Plants

5. Transportation

6. Deforestation

- Deforestation to use wood for building materials, paper and fuel increases global warming in two ways -- the release of carbon dioxide during the deforestation process and the reduction in the amount of carbon dioxide that forests can capture.

7. Oil Drilling

- Burn-off from the oil drilling industry impacts the carbon dioxide released into the atmosphere.

8. Garbage

9. Volcanic Eruption

EFFECTS OF GLOBAL WARMING

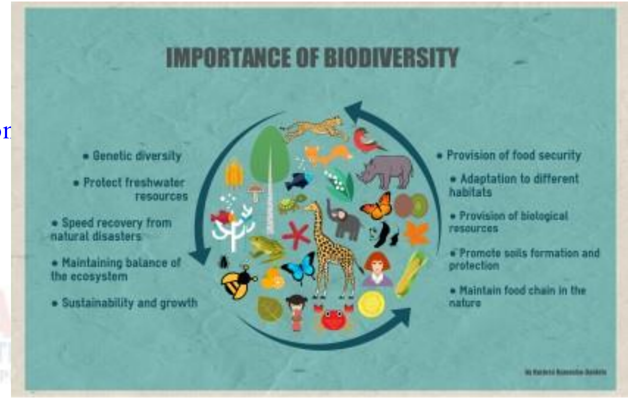
- Melting glaciers, early snowmelt, and severe droughts will cause more dramatic water shortages and increase the risk of wildfires
- Rising sea levels will lead to coastal flooding
- Forests, farms, and cities will face troublesome new pests, heat waves, and increased flooding. All those factors will damage or destroy agriculture and fisheries
- Disruption of habitats such as coral reefs and Alpine meadows could drive many plant and animal species to extinction
- Allergies, asthma, and infectious disease outbreaks will become more common due to increased growth of pollen-producing ragweed, higher levels of air pollution, and the spread of conditions favorable to pathogens and mosquitoes

OR

VI. Explain the concept and role of biodiversity and the need to conserve that. (15)

BIODIVERSITY

- Variety and variability among living organisms and the habitats in which they live.
- It includes all life forms from micro organisms to complex multi cellular organisms such as plants, birds, fish and mammals.
- It includes the variety of living organisms, the genetic difference among them and the communities and ecosystems in which they occur.
- It is expressed as species richness.
- It is an index of vegetation, process, stability, composition and adaptation.



- **Ecosystem services**, such as
  - Protection of water resources
  - Soils formation and protection
  - Nutrient storage and recycling
  - Pollution breakdown and absorption
  - Contribution to climate stability
  - Maintenance of ecosystems
- **Biological resources**, such as
  - Food
  - Medicinal resources
  - pharmaceutical drugs
  - Wood products
  - Ornamental plants
  - Future resources
  - Diversity in genes, species and ecosystems
- **Social benefits**, such as
  - Research, education and monitoring
  - Recreation and tourism
  - Cultural values

Need of biodiversity conservation

1. It serves as a immediate benefits to the society such as recreation and tourism.
2. Drugs, herbs, food and other important raw materials can be derived from plants and animals.
3. It also preserves the genetic diversity of plants and animals.
4. Ensures the sustainable utilization life supporting systems on earth.
5. It leads to conservation of essential ecological diversity.

UNIT-III

VII. Briefly discuss various types of pollution and its impacts on environment. (15)

AIR POLLUTION

CAUSES OF AIR POLLUTION

Name of the gas	Characteristics	Source
Nitrogen dioxide(N2 in air is oxidized); Nox sum of NO, NO2, other oxides of N	Brownish gas irritates the respiratory system originates from combustion	Burning fuels including petrol, diesel, and coal
Carbon monoxide	Reduces bloods ability to carry O2	Produced by the incomplete burning of carbon-based fuels & natural and synthetic products such as cigarettes
Carbon dioxide	Principle greenhouse gas	Emitted as a result of human activities such as the burning of coal, oil, and natural gases
Sulphur dioxide	Precursor to acid rain along with Nox	Formed when fuel (coal, oil) containing S is burned and metal smelting
Chorofluoro carbon (CFC)	Ozone depletion	Released from air conditioning systems and refrigeration.
Lead	Cause learning disabilities in children , toxic to liver, kidney, blood forming organs	Present in petrol, diesel lead batteries, paints, hair dye products, etc

Causes of Water Pollution

- ✓Sewage
- ✓Industrial effluents
- ✓Synthetic detergents
- ✓Agrochemicals
- ✓Oil
- ✓Waste heat

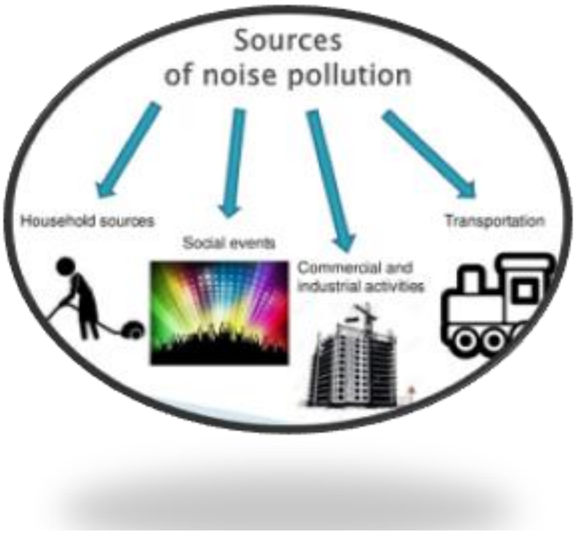
Effects of water pollution

- Depletion of dissolved oxygen
- Eutrophication
- Pathogen….spreading diseases
- Bio-magnification
- Genetic deformities
- Blue baby Syndrome
- Minamata disease, bone marrow disease
- Disturbs aquatic ecosystem
- Reduce crop yields
- Environmental damage
- Fluorine content cause fluorosis

NOISE POLLUTION

Sources of noise pollution

- ✓ *Transportation – road, railway, air traffic*
- ✓ *Industrial noise*
- ✓ *Heavy Machinery*
- ✓ *Construction activities*
- ✓ *Celebrations and household appliances*
- ✓ *Neighborhood noise*
- ✓ *Noise from other sources*



Effects

- Physiological and psychological changes
- Interferes communication
- Hearing damage
- Sleep disturbance
- Annoyance
- Task interference
- Acoustical privacy
- Pathological effects – rupture of ear drums, aggressiveness, increase in blood cholesterol, irreparable damage to unborn baby.

OR

VIII. **Discuss the types of solid wastes, its impacts and management.** (15)

- *Solid waste is the unwanted or useless solid materials generated from human activities in residential, industrial or commercial areas.*

- *It may be **categorized** in three ways.*

- *According to its:*

i. origin (domestic, industrial, commercial, construction or institutional)
ii. contents (organic material, glass, metal, plastic paper etc)
iii. hazard potential (toxic, non-toxin, flammable, radioactive, infectious etc).

CAUSES OF SOLID WASTES

i. Commercial establishments
ii. Residential houses
iii. Debris from construction and demolition
iv. Debris from roads (such as asphalt and scrap metal)
v. Scrap from vehicles
vi. Agriculture
vii. Increasing population
viii. Urbanization
ix. Change and advancing technology

➢ ***Environmental impacts***

1. *Leachates from refuge dumps percolates into the soil and contaminate underground water.*

2. *Vultures and stray animals invade the roadside garbage and litter the waste over large area causing much aesthetic damage to the atmosphere*

3. *Waste products when burnt like plastic and rubber pollute the atmosphere with harmful fumes.*

4. *Organic solid wastes emits obnoxious odor on their decomposition and make the environment polluted.*

➢ Health hazards

1. *Vectors like rats and insects invade refuse dumps and spread various diseases*

2. *During handling and transfer of hospital and clinic wastes, disease transmission may take place.*

3. *Water and food contamination through flies causes various diseases in humans as dysentery, diarrhea and amoebic dysentery.*

4. *Rats dwelling with infectious solid wastes may spread diseases like plague, salmonellosis, trichinosis, endemic typhus etc.*

5. *Water supply, if gets contaminated with pathogens present in solid wastes, may result in cholera, jaundice, hepatitis, gastro enteric diseases etc.*

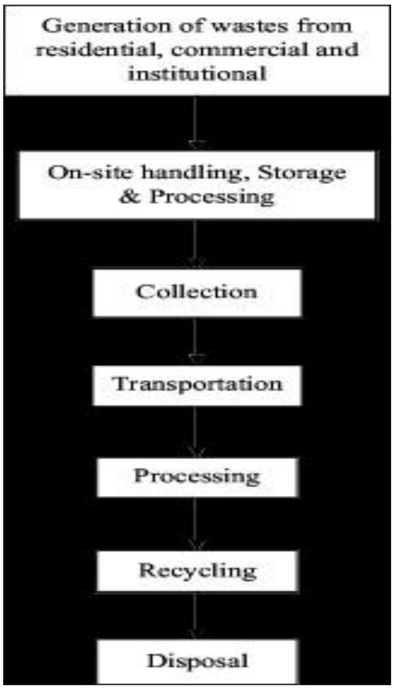
6. *Choking of drains and gully pits by the solid wastes results in water logging which facilitates breeding of mosquitoes and results in the spread of diseases like malaria and plague.*

SOLID WASTE MANAGEMENT

- *Solid Waste Management is a planned process of collection, storage, transportation, processing of disposable of solid wastes in safe and economic manner*

SOLID WASTE MANAGEMENT

- Storage
- Collection
- Processing
- Disposal
- Recycling
- Source recovery (pyrolysis)
- Source reduction



UNIT-IV

IX. **Explain the types of disasters, its impacts and causes.** (15)

EARTHQUAKE

MALABAR POLYTECHNIC CAMPUS
CHERPULASSERY,PALAKKAD

- *The earth crust is a rocky layer.*
- *The crust is not the single piece, but it consists of portions called ' PLATES'*
- *The plates will vary in size.*
- *When these plates meets each other, stress arises in the earth crust.*
- *The stress levels will be different for different types of plate movements.*

- *The following are the types of movement along the plate's boundaries.*

1. *Pulling from each other*
2. *Pushing against each other*
3. *Sliding sideways relative to each other.*

- ***An earthquake is a sudden vibration caused on the earth surface with the sudden release of tremendousenergystored in rocks under the earth'scrust.***

- *It is sudden shaking of the earth crust.*
- *The impact of an earthquake is sudden and there is hardly any time to prepare and it is almost impossible to predict*

- ***Causes of earthquake:***

1. *Disequilibrium in any part of earth crust*
2. *Underground nuclear testing*
3. *Decrease of underground water level*

Adverse Effect or Consequences of Earthquake

- *Human settlements*
- *Buildings*
- *Structures and infrastructures*
- *Bridges*
- *Elevated roads*
- *Railways*
- *Water towers*
- *Pipelines*
- *Electrical generation, transmission and distribution facilities*
- *Communication failure.*
- *Damage the settlements and transport system.*

- ***Secondary effects***

- *Fires*
- *Dam failures*
- *Land slide(which can cause water blocks and flood)*
- *Chemical spills*

✓ *Causes of Tsunami*

✓ *There are 3 major causes*

1. *Fault movement on sea floor, accompanied by an earthquake(most common cause).*
2. *The 2nd most common cause is the landslide occurring either under water or originating above the sea and then plunging into water.*
3. *The third major cause for the tsunami is volcanic activity.*

✓ *Adverse Effects of Tsunami*

1. *Loss of life and property.*
2. *May result in spread of water borne diseases*
3. *Damage to ports, airports, railway.*
4. *Affects the supply of drinking water, contaminates drinking water.*
5. *Damages communication networks*
6. *Environmental degradation*

- ***Causes of Flood***

1. *Heavy rainfall*
2. *Heavy siltation of riverbed reducing its water carrying capacity.*
3. *Blockage in drains.*
4. *Landslides blocking the flow of stream.*
5. *Construction of dams and reservoirs.*
6. *Cyclones can result in floods (storm surge associated with cyclone)*

Adverse Effects of Flood

- *Damage of structures like houses, bridges, roads etc…*
- *Loss of life and livestock*
- *Crop loss due to flooding of agricultural area.*
- *Contamination of drinking water.*
- *Damages communication and power networks.*
- *Spread diseases(epidemics)*
- *May affect soil characteristics might making the soil less fertile*

OR

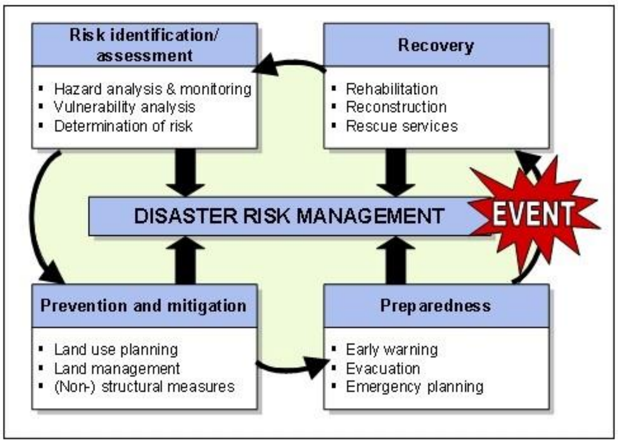
XI(a). **Discuss the various phases of disaster management cycle.** (8)

DISASTER RISK MANAGEMENT

- *Sum of all activities, programs and measures which can be taken up before, during and after a disaster with the purpose to avoid a disaster, reduce its impact or recover from its losses.*

➢ *Three main stages of disaster management*

1. *Pre-disaster stage*
2. *Emergency stage*
3. *Post disaster stage*

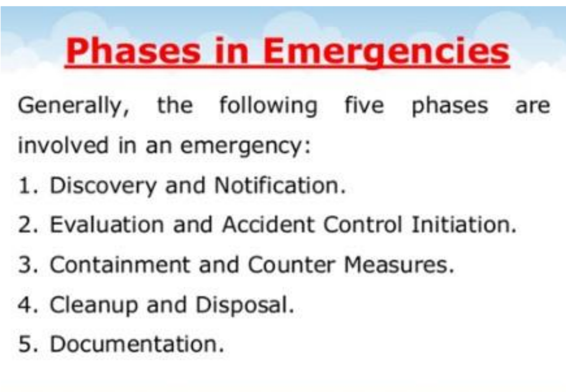


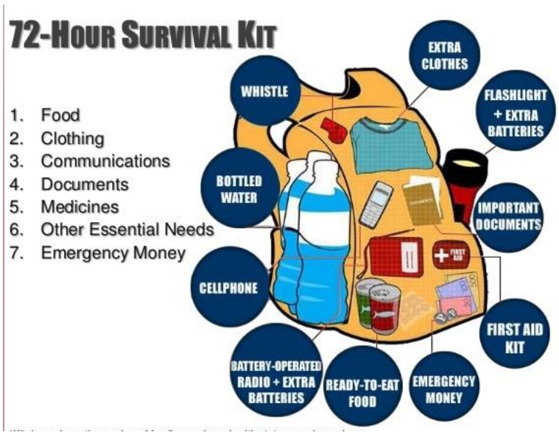
PRE-DISASTER STAGE

- Preparedness is a continuous cycle of planning managing, organizing, training, equipping, exercising, creating, evaluating, monitoring and improving activities.
- This stage includes preparedness and mitigation for the disaster
- Preparedness includes,

1. Preparing hazard zone maps, forecasting and warning.
2. Preparing disaster preparedness plan
3. Land use zoning
4. Preparedness through IEC(information, education and communication)

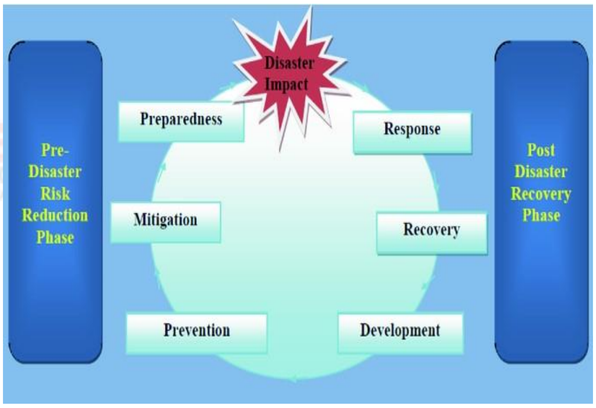
EMERGENCY STAGE





3. Post disaster stage or Recovery phase

- *The recovery phase starts after the immediate threat to human life has diminished*
- *The aim of the recovery phase is to restore the affected area to its previous state.*



- *This is done through ;*

1. *Rehabilitation and reconstruction*
2. *Political administrative aspect*
3. *Economic activity*
4. *Environmental impacts*

(b). **Explain the importance of hazard zonation map.** (7)

a) ***Hazard zoning maps***

- *Mapping is a tool for assessing, storing and conveying information on the geographical location of a disaster (or probable location) and effects (or probable effects) of disasters.*
- *Proper mapping helps not only for pre-disaster preparedness but also in rescue and relief operations with great accuracy and speed.*
- *With the data/information collection, storage, retrieval become highly technological and scientific, new specialized technics like Geographical Information system (GIS) is used for disaster mapping.*
- *Mapping plays an important role in India as natural disasters like floods, cyclone etc are quite frequent.*
- *Comparison of pre- and post-disaster maps helps in analyzing the impact of disaster.*